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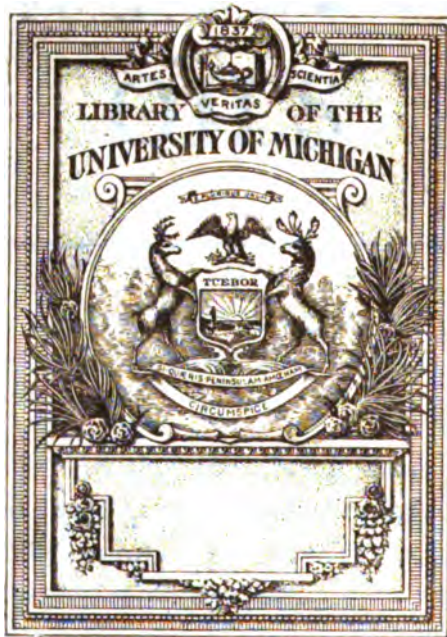
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A MANUAL OF

THE MINING INDUSTRY OF NORTH AMERICA

Founded by Horace J. Stevens, 1900

BY

WALTER HARVEY WEED, E. M.


Former Geologist in the U. S. Geological Survey, 1883-1905. Member
Institution of Mining and Metallurgy of America; Fellow
Geological Society of America; Member American
Institute of Mining Engineers, etc., etc.

VOL. XII

Supplementing Volumes I to XI

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1916



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PREFACE

For many years the Copper Handbook, founded by Horace J. Stevens, has been the accepted authority on the Copper Mining industry. Its pages have given a frank and absolutely unbiased account of all known copper mining companies and neither fear nor favor have ever influenced its descriptions or opinions. In this new volume, the work is enlarged to cover all metal mines save Iron, but the same policy is continued; neither money nor influence have affected or can affect the opinion, or alter the description given; it is however realized that errors may occur and honest criticism or correction is welcomed and invited.

The enlargement of the book is in response to repeated requests for information about the broader field of Gold—Silver—Lead—Zinc mines. Only the active companies are described, but it is intended to include all those whose stocks are listed and dealt in on any Exchange, and most of the properties actually under development. To cover all prospects and inactive companies would take several volumes, as our files contain records of fully 100,000 companies and properties.

The amount of time and labor expended in getting up the book has been considerable and exceedingly tiring, but it has resulted in bringing together in a small compass, all the essential facts concerning the mining companies of North America. Much of this material is entirely new; part of it has come from widely scattered sources. Doubtless there are many companies omitted and some listed as dead are alive; if there are errors I shall be glad to hear of them.

To make the book more useful to mining engineers, brief geological notes are given and references inserted to important publications in which the geology, mill equipment or processes used, are described.

Intending investors and others interested in mining ventures will do well to look up the reports made by the engineers, mentioned as having examined the property.

The present volume includes several new features: a chapter on the common minerals and a glossary of mining terms have been added for the convenience of non-technical readers; all copper-bearing minerals are described in a separate chapter, a feature not to be found in any other book published in any language; an alphabetical list of company and of mine officials has been added and statistical chapters enlarged to cover the common metals. The book also gives financial statements of many companies in a form used by the standard publications.

The opinions expressed are based on information obtained from many sources; this information is believed to be accurate and reliable, but is not guaranteed.

It has been found necessary, both for space and because of the Great War, to limit the Handbook to North America, save in the case of the important American owned companies, such as Chile Copper, etc.

It is hoped that many readers will offer suggestions for the improvement of future volumes.

The Geographical Index in the back of this book gives the mines or companies grouped by States and towns. Thus to find a list of companies operating in Arizona, look for Arizona, and the names of all active companies will be found arranged alphabetically. The description of each company is given in the body of the book, in alphabetical order.

Thanks are due to the U. S. Geological Survey and to Mr. W. R. Ingalls, Editor of the Engineering & Mining Journal, for part of the statistical material used in Chapters VII and VIII.

Thanks are also due to Mr. George H. Morgan, E. M., who has been my able and untiring helper in the preparation of the book.

WALTER HARVEY WEED.

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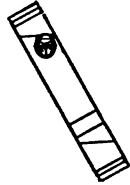
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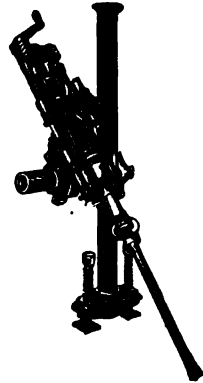
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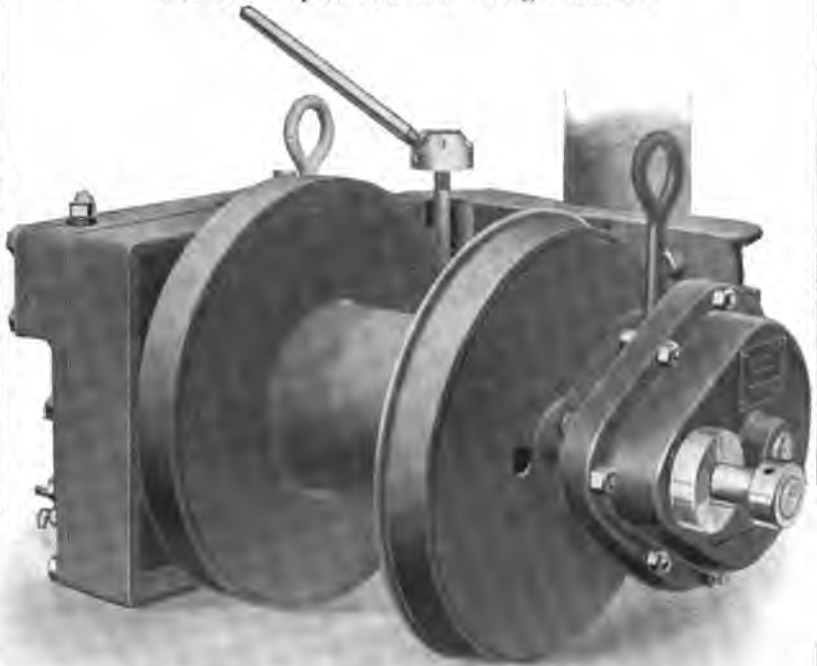
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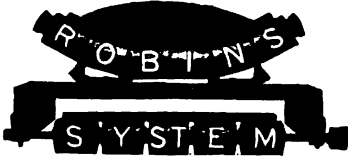
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CHAPTER I.

GLOSSARY OF MINING TERMS.

The following glossary of mining, milling and trade terms which first appeared in Vol. II of the Copper Handbook, has been amplified and is now fairly complete.

Acicular. Needle-shaped.

Acid. An acid or silicious rock is one in which bases are combined with silica. The antithesis of basic.

Adit. A level mine opening driven into a hill or mountain.

Adobe. Sun-dried brick used in all Latin-American countries.

Air-blast. A violent explosion caused by the escape of air compressed by the settling down of the rocks of the upper workings of a mine that is over 3,000' deep.

Air Compressor. A machine for condensing air to a pressure sufficient to actuate machinery. The compressed air is forced through pipes to various parts of the mine, or surface plant, and used in the same way as steam for driving drills, pumps, hoists, etc.

Air-doors. Doors built in mine passage ways to stop air currents.

Air-drill. A drill driven by the elastic pressure of compressed air.

Air-shaft. A shaft used to provide ventilation for deep workings. Two shafts, one opening on slightly higher ground than the other, will provide natural ventilation underground, when connected by a drift, the longer shaft becoming a chimney, and the shorter an inverted syphon, down which the air is sucked with great force.

Alkali. Potash and soda are the common alkalis. An alkali is a lye—the opposite of an acid.

Alloy. Two or more metals united mechanically, but not chemically by fusion.

Alluvium. Soil or broken rock deposited by the action of water.

Altered. An altered rock is one that has undergone changes in its chemical and mineralogical structure since its original deposition.

Aluminous. Containing aluminum.

Amalgam. An alloy of mercury with another metal such as gold, silver or copper. Mercury will not amalgamate with iron.

Amalgamation. The process of extracting gold and silver from crushed ores by amalgamation with mercury. The quicksilver is expelled later, by heat, and recovered for further use.

Amorphous. Without form.

Amygdaloid. A trap rock, containing vesicles or small rounded cavities filled by mineral matter such as calcite, agate, etc. Rock is spotted and in outcrop often pitted as amygdules weather out, leaving cavity. In the Lake Superior district copper-bearing amygdaloids frequently show native copper in the cavities left by the leaching out of the soft minerals originally therein.

- Analysis.** A determination of the constituents of a chemical substance.
- Anhydrous.** Devoid of water.
- Anode Copper.** Copper from a converter, cast in molds into plates with ears, and used in cells of electrolytic refineries.
- Anticline.** An arch or fold of rock-strata bulging upwards, in U shape. Is the reverse of syncline.
- Antigua.** In Mexico, is a mine worked by Spaniards or Mexicans at a time so remote—from 50 to 300 years—that particulars have been forgotten. Sometimes valuable.
- Antimonide.** An ore of any metal chemically united with antimony.
- Apartado.** Apartado de correos is Spanish for postoffice box. Usually abbreviated to Ap.
- Apex.** The top or uppermost part of a vein. In the United States the ownership of the outcrop or apex carries the right to follow the vein downward beneath another's ground, if within one's end lines extended.
- Arastra.** A circular rock lined pit in which broken ore is pulverized by stones attached to horizontal poles fastened in a central pillar and dragged around by mules.
- Arenaceous.** Sandy; carrying silica as sand.
- Argentiferous.** Silver-bearing.
- Argillaceous.** Clayey.
- Aroba.** A Spanish weight of 25.36 lbs. avoirdupois; Portuguese, 32.38 lbs.
- Arroya.** A gulch.
- Arsenide.** A mineral composed of arsenic combined with another metal.
- Arsenopyrite.** A mineral composed of arsenic sulphur and iron; often carries gold or silver also.
- Assay.** A test of ore or metal to determine the exact amount of any metal or metals contained in it. Usually fire assay; smelting on a small scale.
- Assessment Work.** The work required annually by the U. S. government, on an unpatented mining claim to keep title.
- Attle.** Cornish term for waste rock.
- Auriferous.** Containing gold.
- Back.** The rock above mine opening like the ceiling of a room. The part or section of a vein between two levels or between a level and the surface.
- Bad air.** Air vitiated by powder fumes, noxious gases or insufficient ventilation.
- Ball Head or Stamp.** A steam stamp, named after its inventor.
- Barilla (De Cobre).** Spanish term for particles of native copper, cleaned (concentrates). Equivalent to the "mineral" of Lake Superior mines. Used mainly in Bolivia.
- Barranca.** A deep gulch or canyon, with precipitous sides.
- Barrel Work.** Masses of crude native copper, picked out by hand before ore passes beneath stamp. Was formerly shipped in barrels to the smelter.
- Barrow.** A wheelbarrow.
- Basalt.** A dark colored heavy igneous rock, carrying much iron; a trap rock.
- Base.** Impure. An alkaline element.
- Base Bullion.** Copper or lead carrying much gold or silver.
- Base Metal.** Any of the non-precious metals.
- Basic.** Low in silica. Containing more than enough iron and lime to form a good slag.
- Basin.** A syncline; a trough in the earth's surface.
- Battery.** A set of stamps usually five in a stamp mill.
- Bearing.** The course of direction, as that of a mineral outcrop in degrees, east or west of, north (meridian).

Bed. A seam or layer of stratified rock. Used in some mineral districts for flat veins or lodes.

Bed Rock. The solid rock underlying stream gravel or rock.

Bedded Vein. One parallel with the bedding of the country rock.

Bells. Signals for lowering and hoisting the bucket, skip or cage in a shaft usually are given by bells, the number of strokes indicating the nature of the load, the place for stopping, etc.

Bit. The cutting end of a boring tool. A steel drill; a short hollow cylinder of soft steel, used in diamond drilling. The diamonds are set around the inner and outer edges of the bottom of the bit, and cut into the most refractory rocks when the bit is rotated.

Black Copper. Impure copper, smelted, but containing impurities requiring refining.

Black Jack. Sphalerite, zinc blende of dark color.

Blanched Copper. Copper containing a large amount of arsenic, practically forming an alloy.

Blast. (N.) Air forced through tuyeres into a blast furnace or Bessemer converter. (V.) to explode gunpowder or dynamite.

Blast Furnace. A cupola furnace in which ore is smelted, with the aid of air pumped in under pressure.

Blasted. A blasted miner is one who has been injured by the explosion of dynamite or gunpowder.

Blasting. The breaking of rock by means of high explosives, inserted in holes bored in the rock for the purpose.

Blende. Zinc-blende or sphalerite. Sulphide of zinc.

Blind Drift. A drift connected with other workings of the mine at one end only. A cul de sac.

Blind Lode. A lode not outcropping at surface.

Blister Copper. Copper of 96 to 99% purity. Applied to product of Bessemer converter.

Blocking Out. Exposing the ore in a mine so that it can be extracted by stoping. Properly speaking, ore is not blocked out for stoping until opened on three sides.

Blossom. The oxidized, softened outcrop of an orebody altered by weathering.

Blout. A mass of quartz, often mineralized, that is often isolated and not connected with a vein. An abbreviation of blow-out.

Blower. A fan used to force air into a mine; a blowing engine.

Blowing Engine. An engine for forcing air into blast furnaces under pressure often about one pound avoirdupois per square inch.

Blowing In. A smelting furnace is blown in, when charge is ignited, fusion begins and the process of reduction by fire is begun.

Blowing Out. A smelting furnace is blown out when the metal and slag are tapped out, and the fires are allowed to die out.

Blowout. An outcrop larger than the orebody beneath; see blout.

Bluestone. Copper sulphate.

Bonanza. Spanish for pay-ore. Usually applied in United States to a body of exceptionally rich ore, especially in silver mines.

Bonnet. The cover or roof of a cage; also a steel casting connecting the piston-rod with the upper end of a stamp-shaft.

Bostonite. A light colored igneous rock composed mainly of potash feldspar.

Bore Hole. A drill hole bored for test purposes.

Bort (Bortz). A form of crystallized carbon between the diamond and the black diamond.

Botryoidal. Resembling a bunch of grapes.

Bottom. A mass of impure copper formed below the matte, in matting copper ores.

Boulders. Loose, rounded masses of rock, larger than cobbles.

Box Canyon. A canyon closed at one end.

- Branch.** A vein branching off from the main orebody.
- Brattice.** A screen for the regulation of air currents in a mine.
- Breast.** The face or innermost end of a mine working.
- Breccia.** A rock formed of angular fragments cemented together.
- Brecciated.** Broken into angular fragments partially or wholly cemented together.
- Broken.** A vein is broken when dislocated by faults.
- Broken Ground.** Rock strata where the walls are poorly defined and the general formation shattered.
- Bucket.** An iron or steel bucket used for hoisting men or ore in a mine. In a vertical shaft a bucket swings free, but in an incline shaft the bucket runs on a skidway of plank timbers.
- Buddle.** A conical table on which ore is dressed. (Obsolete.)
- Bulkhead.** A wooden or masonry partition walling off part of a mine or protecting it against soft or creeping ground.
- Bullion.** Refined gold or silver.
- Bullion Bars.** Unrefined gold and silver melted and cast into bars.
- Bunch.** A small mass or pocket of exceptionally rich ore.
- Bunchy.** An orebody containing small scattered masses or bunches of ore.
- Cable.** The steel wire rope used in shafts for hoisting buckets, skips or cages.
- Cage.** The elevator used in vertical shafts for hoisting mineral and for lowering men, timber, etc.
- Calcareous.** Limey.
- Calcine.** To drive off sulphur, carbonic acid gas, or other volatile constituents of an ore by heating.
- Calcining Furnace.** A furnace for roasting ore to drive off sulphur, previous to smelting.
- Calcite.** Crystallized calcium carbonate.
- Cam.** A curved tooth, fixed on a shaft, for lifting the pistons of gravity stamps.
- Camp.** A mining town.
- Canyon.** A deep gorge with precipitous walls.
- Cap.** The top piece of a framed set of mine timbers; copper caps containing fulminate of mercury, used to explode dynamite in blasting rock.
- Capping (or Cap-Rock).** The rock or other ground above a mineral deposit.
- Captain.** In most mining fields where Cornishmen are employed, the foreman in charge of mining work is termed a captain.
- Carbonaceous.** Any mineral in which carbon and oxygen are chemically united.
- Carbonates.** A term commonly applied in the western part of the United States, to oxidized lead ores, usually argentiferous.
- Carboniferous.** Rocks of the coal age of geological eras.
- Carga.** A Mexican weight of 300 lbs. avoirdupois.
- Cartridge.** Dynamite put up in cylindrical cases of oiled paper to fit the holes bored by drills.
- Casing.** The wooden lining of a shaft; an iron pipe put down outside of a diamond drill hole when passing through soft or broken ground, to prevent the hole becoming clogged by matter intruding from outside.
- Casting Copper.** Impure copper better suited for casting into various forms than for drawing into wires or rolling into sheets.
- Cave.** A natural opening or "vug" in a rock formation; the partial or complete falling in of a mine.
- Caving System.** A plan of mining, by which the worked out upper levels and surface are allowed to subside gradually, as the mine workings are deepened.
- Cement Copper.** Regulus. The loose and usually impure copper deposited on iron by copper-bearing waters.

- Cerro.** Spanish for a mountain or hill showing rock outcrops.
- Chalybeate.** Iron-bearing waters.
- Chamber.** A large stope.
- Change House.** Building where miners change their clothing before entering a mine.
- Change Day.** The day when a gang of miners are transferred from day shift to night shift, or the reverse.
- Chapeau de Fer.** French term for an oxidized iron outcrop; gossan or iron hat.
- Charge.** The amount of ore, flux and fuel fed to a smelting furnace.
- Chert.** A coarse impure chalcedony or flint.
- Chile Bars.** Bars of Chilean blister copper, weighing about 200 lbs. each.
- Chilean Mill.** A grinding apparatus with three heavy wheels running around in a circular pan.
- Chimney.** An orebody of pipe shape in an approximately vertical position.
- Chloride.** A mineral (or ore) of any metal united chemically with chlorine. Usually applied to hornsilver ore.
- Chloride.** (V.) To work the oxidized part of an ore deposit on a lease or tribute. A term used in the western part of the United States.
- Churn Drill.** A drill having a churning motion, used for boring oil wells, test-holes, etc.
- Chute.** A hole, usually lined with planks, used for dropping ore or waste to a lower level of a mine.
- Claim.** The area of 600'x1,500' or 20 acres of U. S. public land staked off and claimed by a prospector or miner. Size of claims varies in different countries.
- Classifier.** A machine which separates particles, according to their weight.
- Chloride.** (V.) To work the oxidized part of an ore deposit on a lease or tribute. A term used in the western part of the United States.
- Clay Gouge.** A thin seam of clay separating ore, or ore and rock.
- Clay Slate.** An argillaceous slate.
- Clean-Up.** The collection or gathering together of accumulated ore or metal in a mill or smelter.
- Cleavage Planes.** The more or less regular lines along which slates and other metamorphic rocks break into slabs or leaves.
- Coarse Jigs.** The jigs used to handle the larger sizes and heavier grades of ore or metal.
- Coarse Metal.** Matte resulting from the first smelting in old-style smelting of oxidized copper ores.
- Cobbing.** Breaking masses of ore into lumps by hand hammers and sorting ore out.
- Collar.** The top of a shaft; surface timbering of a shaft.
- Colloids.** Non-crystalline materials.
- Compartment.** Mining shafts usually are divided into two or more compartments or sections, separated by framed timbers and planking.
- Concentrate.** The ore or metal, after partial or complete elimination of gangue rock.
- Concentration.** The process of separating the metallic part of an ore from the waste rock or mineral in which it has been enclosed. It involves crushing to free the metallic particles. The separation may be by gravity, either dry or in water; by oil or froth flotation, or magnetic separation.
- Concentration Table.** A table on which a stream of finely crushed ore and water flows downward and the heavier metallic minerals lag behind and flow off in a separate compartment.
- Concentrator.** A plant where ores are concentrated; a jig or machine for separating ore or metal from gangue-rock, the process usually employ-

ing a rocking or oscillating motion, aided by jets of water, whereby the worthless gangue is carried off and the heavier mineral remains.

Conchoidal. Breaking with a curved or shell-like face, or fracture.

Concretion. A rounded mass or nodule formed of mineral matter gathered about a center.

Conductivity. Electrical conductivity is measured by the resistance offered to the passage of an electrical current.

Conglomerate. A rock formed of pebbles and rounded boulders cemented together. Sedimentary conglomerates are ancient shore deposits whose pebbles and sands are hardened into rock. Volcanic conglomerates are formed of rounded masses ejected from volcanic vents cemented together by volcanic sand or ash (tuff) rock.

Construction Account. Many of the Lake Superior copper mines summarize their finances so that the cost of operation is divided into two classes, one being for general working expenses and the other for construction, sometimes classed as capital account. It includes new buildings and machinery on surface and frequently new mine openings.

Contact. The junction of two dissimilar bodies of rock, as limestone and porphyry.

Contact Deposit. A mineral deposit found between two unlike rocks, usually applied to an orebody at the contact between a sedimentary rock, limestone shale or sandstone and an igneous rock.

Contract. In mining applies to an agreement between operator and workman to pay latter so much per foot for excavating drift or stope. These men are known as contract miners and are usually skilled workmen.

Copper Ore. Rock carrying copper mineral or minerals. See detailed descriptions of copper-bearing minerals in Chapter III.

Core. A drill core.

Cornish Pump. A form of mine pump actuated by long rods reaching from surface down the shafts.

Costeining. Proving an ore deposit or vein by trenching across its outcrop at approximately right angles.

Counterbalance. Hoisting plants usually are worked in counterbalance for deep shafts. The weight of the descending cage or skip is used to partially offset the weight of the ascending cage or skip.

Counter Vein. A cross vein running at approximately right angles to the main orebody.

Country Rock. The predominant rock about an ore deposit.

Course. The direction or strike of a vein; a stretch of mineralized matter in a vein.

Crab. A hand winch.

Creeping. The slow movement of the rock in mine workings caused by the pressure of super-incumbent and adjacent rock masses.

Cretaceous. A geological age characterized by chalky beds in England. The limestones of Arizona and Mexico are largely of Cretaceous age and so are the coal-bearing beds of the Rocky Mountain region.

Cribbing. Close-set round timbers supporting an underground roof, or lining a shaft.

Croppings. Outcrops.

Cross Course. An intersecting vein.

Crosscut. A mine opening, similar to a tunnel, that is driven across the rocks at approximately right angles to the orebody; a drift follows the lode or vein.

Cross Vein. An intersecting vein.

Crucible. A vessel of refractory material in which ores and fluxes are melted.

Crystals. Geometrical forms, with plane faces, of infinite variety, assumed by the majority of minerals.

Cupola. An upright furnace used in smelting.

Cupriferous. Copper-bearing.

Cut. To intersect an orebody; the portion of a working face of mineral removed at one operation.

Cwt. A hundredweight, or 112 lbs. avoirdupois.

Cyanide (V.) To treat crushed rock with a weak solution of cyanide of potash or of soda, extracting the gold and silver, which is recovered by precipitating it with zinc.

Datum Level. The level (usually sea-level or mean level of nearest considerable body of water) from which altitudes are measured in surveys.

Dead Roasting. Sulphide ores are dead roasted when all the sulphur possible to drive off by roasting has been eliminated.

Dead Work. Underground work which is not in ore. The opening of new shafts, drifts and winzes preliminary to the stoping of the mineral bodies.

Debris. Broken down rock material. The fragmental material broken off by frost, etc., from rock exposures; talus.

Decomposed. Rock or ore altered and leached by air and water.

Decrepitate. To break into fragments with violence, under the blow-pipe or great heat.

Dendrite. A moss or fern-like mineral stain or film usually of manganese or iron oxides.

Denouncement. In Mexico, the formal filing of a claim to mineral land.

Denudation. The uncovering of rock or an ore deposit by the weathering of wind and water, or glaciation.

Dessication. Drying out. Loss of water from any given substance.

Detritus. Debris. Broken down rock, usually applied to gravel, etc., moved and deposited by streams or glaciers.

Development Work. Mining work performed to develop or expose an ore deposit and to open up new and further amounts of ore.

Diabase. A dark trap rock composed largely of a felt of lath shape crystals of plagioclase feldspar, plus ferro magnesian minerals, etc.

Diamond Drill. A machine used for boring holes in rocks, with a hollow cylinder for a bit, whose end is set with black diamonds or bort.

Die. The iron block in the mortar, onto which the ore is fed for crushing under the stamp.

Dike. A vein of igneous rock. Locally a reef or wall of rock projecting above the ground. Also applied to the hardened waste material filling fissures.

Diorite. A crystalline granitic rock with predominant plagioclase feldspar.

Dip. The inclination or angle at which a lode or vein pitches downward into the earth.

Dip Compass. A compass having the needle fixed to swing in a vertical plane, so it can be readily deflected by magnetic rocks.

Dirt. Frequently used to designate ore broken underground.

Disintegration. The breaking down of rock through weathering.

Disseminated Ore. Ore carrying fine particles of metallic minerals, usually sulphides, scattered through rock or gangue matter.

Disturbed. An orebody is disturbed when lacking defined walls and settled character.

Dolomite. Magnesian limestone; carbonate of calcium and magnesium.

Donkey. A small auxiliary hoisting engine, usually operated underground and actuated by compressed air, or used for preliminary work at new shafts or exploring pits.

Downcast. A shaft having a downward air current.

Draffage. An arbitrary allowance claimed by some British smelters to cover loss of weight in transport.

Dress. To separate ore from gangue rock by hand or machinery.

Dressing Floor. A floor of dirt surface where ore is sorted by cobbing and picking.

- Drift.** A horizontal passage in a mine following the lode or vein.
- Drift Copper.** Native copper found in gravel and clay, far from original orebody, from which it has been carried by glaciers.
- Drifting.** Opening drifts. Driving.
- Drill.** A steel bar with chisel shaped end used for boring in rock. Is struck on the other end by a hammer, or is forcibly driven against rock by air piston.
- Drill-Core.** Solid, cylindrical cores of rock cut out by a diamond drill. These form a record of the strata through which the drill has passed.
- Driving.** Extending a drift horizontally.
- Drum.** The cylinder of a hoisting engine, around which the rope is wound.
- Druse.** The crystallized crust lining a cavity in rock or ore.
- Dry Ore.** Argentiferous ores containing insufficient lead for fluxing in a smelter.
- Ductile.** That which is capable of being extended in length by tension, as into wire.
- Ductility.** The capacity of a metal to elongate, when under pull from the ends, without cracking or breaking.
- Dump.** A place for depositing rock taken from a mine. A pile of ore or rock; usually refers to the worthless rock hoisted from underground.
- Dyke.** See dike.
- Dynamite.** Nitro-glycerine held in wood pulp, infusorial earth, or some similar article, to render it safer in use. Strength varies according to percentage of nitro-glycerine contained.
- Eisener Hut.** German for iron hat, or gossan.
- Electrolyte.** The solution in which electrolytic separation of metals is carried on.
- Electrolysis.** The separation and redeposition of metals by electrolytic action.
- Electrolytic.** Applied to copper means copper made from impure metal by electrical decomposition and redeposition; the bar of impure copper is gradually dissolved and the pure metal redeposited at the opposite pole of the battery, while other metals fall as black slime to the bottom of the tank in which the solution (electrolyte) is held.
- Elvan.** Cornish name for dikes of greenstone, porphyrite and granite.
- Erosion.** The wearing away of surface masses of rock and soil by the elements, or by glacial action.
- Eruptive.** Igneous rocks, brought to the earth's surface or outer crust by volcanic activity.
- Escarpment.** A rock wall, nearly or quite vertical.
- Exfoliation.** The separation of thin leaf-like layers from a rock mass.
- Exploders.** A fulminating cap for setting off high explosives.
- Exploitation.** The productive working of a mine or ore deposit.
- Exploration.** Prospecting work; looking for ore.
- Face.** The inner or working end of any mine opening. A face of ore is the ore shown at the extreme end of a drift, stope or tunnel.
- Fahlband.** A zone or band of crystalline rock, carrying finely disseminated metallic sulphides.
- Fall of Ground.** Rock falling from the roof into a mine opening.
- False Set.** A temporary set of timber.
- Fan.** A machine for forcing air into a mine.
- Fathom.** Six feet. In stoping, a fathom is a cube of six feet.
- Fault.** Dislocation of a vein or of a rock stratum.
- Feeder.** A branch or small vein joining a larger one.
- Ferruginous.** Containing iron.
- Filling.** The waste material used to fill up old stopes or chambers; allowing a mine to fill with water.
- Filter.** A machine for removing the solution or moisture from crushed

ore, usually by forcing it under pressure through canvas or cloth, leaving the muddy ore mass behind.

Fines. The finer particles of ore or metals saved in concentrating processes.

Finisher Jigs. The jigs used to save the smaller particles of ore in a concentrator or stampmill.

Fire. The miner's warning cry when a blast is to be set off is "fire."

Fissile. Splitting easily into plates.

Fissure Vein. A fissure in the earth's crust filled with mineral matter.

Flake Copper. Very thin scales of native copper.

Float. Loose ore or rock, away from its parent mass.

Float Copper. Drift copper.

Float Ore. Loose ore, often water worn ore, found at a distance from its outcrop.

Flocculent. Resembling tufts; cloudy masses of slightly coherent material floating in a liquid.

Floor. The floor of a drift or other horizontal mine opening; the rock bed beneath an orebody.

Flour Copper. Very fine scaly native copper that floats on water and is very difficult to save in milling.

Flotation. A process of concentrating or separating out the valuable metallic sulphide minerals of an ore, by mixing the pulverized ore with acid and oil and agitating it by air or paddles to make a scum or froth that takes up the metallic minerals and floats them off, leaving the waste behind.

Flume. A launder or conduit for carrying water.

Flux. Salt or other substance used in furnaces to form a fusible compound with the waste matter and make slag.

Fluxing Ore. An ore containing appreciable metallic values, but smelted mainly because containing fluxing agents required in the reduction of richer ores.

Foliated. Having a laminated structure.

Foot. The foot-wall.

Foot-Wall. The rock wall under a vein or underlying inclined mineral deposit.

Fork. The branching of a vein.

Formation. A term used by miners for any particular body of rock, as a granite formation, a sandstone formation. Geologists limit term to groups or rock beds of similar age.

Founders Shares. The few shares issued to the individuals organizing a stock company. In companies owned outright by other companies, founders shares are issued to as many individuals as are required to incorporate and hold the offices required for corporate management, as the laws do not permit a corporation, which is an artificial person, to form another corporation, or to serve as a director of another corporation.

Free. A metal is free when virgin or native, and not combined chemically with any other element.

Free Milling. An ore that readily yields metallic contents by simple means, such as amalgamation or cyanidation.

Freeze. A furnace freezes when the molten charge solidifies.

Friable. That which may be pulverized or broken up easily.

Froth. Foam; a mass of bubbles.

Furnace. A structure or oven for the smelting of ore.

Fuse. A cotton cord with a gunpowder core, so made as to carry fire to an explosive.

Fusible. That which may be melted.

Fusion. Melting. Alloying metals while liquid, through heat.

Gabbro. A rock composed mainly of plagioclase feldspar and iron magnesia minerals.

Gad. A small steel wedge or chisel.

- Galena.** Lead sulphide; see Mineralogy.
- Gallery.** A drift or level.
- Gallows Frame.** The timber or steel framework over the mouth of a shaft, carrying a sheave-wheel, over which the hoisting rope passes to the engine.
- Gangue.** The waste rock or mineral in which ore or metallic particles are held.
- Gash Vein.** A gash shaped fissure vein, rapidly pinching downward.
- Geode.** A hollow crystal lined cavity, or the rounded mass containing such a cavity.
- Geological Horizon.** Rocks of one geological age.
- Geology.** The science of the formation of the earth and the rocks of which it is made.
- Giant Powder.** Dynamite.
- Girt (or Girth).** A horizontal brace in direction of a drift in mine timbering.
- Glaciation.** The erosive effect produced by glaciers.
- Glance.** A metallic sulphide showing a bright, shining surface. Copper glance is chalcocite. Silver glance is argentite.
- Glory Hole.** A large open pit from which ore is or has been extracted.
- G. M. B.** "Good Merchantable Brands"—an English grade of refined copper. Term replaced by Standard.
- Gneiss (pronounced nice).** A banded coarse-grained rock often formed of the same minerals as granite, often in patchy and irregular arrangement. May be a diorite gneiss, granite gneiss, etc.
- Gob.** Waste used to fill worked-out openings.
- Gophering.** Prospecting work confined to digging shallow pits or starting adits. Term used from similarity of this work to the crooked little holes dug in the soil by gophers.
- Gossan.** Iron hat. Is the leached capping, usually quartzite, showing yellow to reddish brown iron stains found overlying veins.
- Grade.** The percentage, or value, of ore and partly refined metals; the percentage of rise in roads or mine openings driven on an approximately horizontal plane.
- Gram.** A metric weight of 15.4 grains or 1-500 of a pound avoirdupois.
- Granite.** A dense, granular rock of igneous origin, composed of varying proportions of quartz, feldspar and mica.
- Granulated.** In the form of grains.
- Gravity Stamp.** A stamp, usually set in batteries of five, in which the piston is raised by a cam, the stamp crushing the charge in the mortar by its weight, when allowed to fall.
- Greenstone.** An altered basic porphyry; usually andesite or diorite.
- Grizzly.** A screen or grating of heavy iron rails or steel bars, through which the smaller pieces of rock or ore fall through.
- Groundsill.** The bed-piece of a set of mine timbers.
- Guides.** Perpendicular square wooden strips or stringers for guiding cages in vertical shafts. Cables are used instead in some mines.
- Gut.** To rob, or extract, only the rich ore of a mine.
- Hade (American).** Inclination or dip of a vein, measured from the vertical, while dip is measured from the horizontal. Becoming obsolete. Should not be confounded with rake of an ore-shot.
- Hanging.** The hanging wall; the rock on the upper side of a mineral vein or deposit.
- Hardinge Mill.** A cone-shaped tube mill, resting horizontally and half filled with pebbles, which fall and crush ore when mill is revolved.
- Haulage Plant.** A mechanical installation for the underground tramming of rock, operated by ropes, compressed air or electricity.
- Head or Heading.** An underground level or airway in a mine. Also water pressure.

Headframe or Gallowsframe. A building or framework, fitted with sheaves, over the mouth of a shaft.

Heap-Roasting. Burning the sulphur out of ores piled in heaps, with a small amount of wood or other fuel.

Heave. A horizontal dislocation of a vein or bed caused by a fault. Also applied to the rolling out of line of a lode in making depth.

Hectare. An area 100 meters on each side. Called *pertenencias* in Mexico. Equals 2.471 acres.

Hoist. An engine for raising ore from a mine and for lowering men and material.

Holing Through. A drift or other mine opening is holed through when a connection is made between two separate sections working toward each other.

Horizon. The sky-line, commonly used in the sense of absolutely flat, as shown by a spirit level. Geologically, all rock strata of the same geological period.

Horse. A mass of country rock enclosed in a mineral vein or deposit.

Horsepower. A measure of power of an engine. One horsepower is rated as equivalent to raising 33,000 lbs. *avoirdupois* to a height of one foot in one minute.

Horse-Whim. A windlass operated by horse power.

Hot Blast. Heated air supplied to a blast furnace.

Hungry. Nearly or quite barren.

Hunt & Douglas Process. A leaching process, using chloride of iron and salt, to dissolve oxide ores of copper.

Huntington Mill. An improved Chilean mill.

Hutch. See jig.

Hydrated, Hydrous. Containing water combined chemically.

Hydro-Metallurgy. The reduction of ores by wet processes.

Igneous. Rocks consolidated from a molten state; includes not only volcanic rocks but those deep-seated rocks, hardened under cover, which have been exposed to view by erosion, or artificial openings.

Impregnated. Containing metallic minerals, scattered or diffused through the mass. Properly used in referring to country rock carrying mineral similar to that in the vein.

Incrustation. A solidified coating, usually crystallized.

Infiltration. The deposition of mineral matter from percolating waters.

Ingot. A mass of metal cast in a peculiarly formed mold; applied only to gold, silver or copper. Iron and lead are cast in pigs.

In Place, In Situ. Rock or ore that is in the position where deposited by nature.

Intrusive. Igneous rock masses pushed up through other and older rock formations.

Iridescent. Showing the colors of the rainbow.

Iron Hat. Gossan. Outcrop of iron-stained material over an ore deposit or vein.

Jack. A miner's name for sphalerite. Is called black jack, ruby jack or rosin jack, according to color.

Jig. A machine for concentrating ore; i. e., separating the metallic mineral from the waste, by means of oscillatory or vibratory motion, aided by jets of water. The heavier ore minerals sink and the lighter rock or gangue is carried off by the current.

Jump. To locate and take possession of mineral lands held or claimed by another party.

Kaolin. China clay.

Keweenaw. Pertaining to or of the Keweenaw formation or rocks in which the Lake Superior copper veins occur.

Kibble. A bucket used for hoisting material in a shaft.

Kilo or Kilogram. A metric weight of 2.2046 lbs.

- Kilometer.** 0.621376 miles. For rough computations may be figured as 3-5 of a mile.
- Kin.** A Japanese weight of 1.31 lbs. avoirdupois.
- Kindly.** The appearance of rock carrying or promising to carry good mineral values.
- Ladderway.** The series of ladders giving ingress and egress to a mine; the compartment in which the ladders are located.
- Lagging.** Timber, usually of small diameter, placed over the cap-timbers of incline shafts and drifts, to prevent damage from falling rock.
- Lamina.** A thin plate. Plural is laminae.
- Lamellar.** In thin sheets of laminae.
- Lander.** The top man at the mouth of the shaft, who receives signals from below, and attends to the unloading of rock sent up in buckets, skips or cages.
- Launder.** A wooden flume or sluice, used to convey water, or tailings held in suspension in water.
- Lava.** Rock from volcanoes.
- Leach.** To dissolve metals out of ore by water, or acid or both.
- Leaching.** The process of extracting a metal from its ores or salts by treatment with a solvent, such as weak acid.
- Lead** (pronounced Leed). A mineral body.
- Leader.** A small vein running into a larger one.
- Ledge.** The solid vein or lode.
- Leg.** An upright timber supporting the cap of a set of timber.
- Lense.** An orebody of lenticular form.
- Lenticular.** Having the shape of a double convex lense.
- Level.** A horizontal opening in a mine, usually connected with a shaft. Levels are commonly opened at stated intervals as depth is gained—usually at 100 feet in modern mining practice. The word "level" frequently is used interchangeably with the word drift, but is more comprehensive. Both drifts and crosscuts may be opened on a level, though a crosscut is not a level.
- Limestone.** A rock composed of lime carbonate.
- Lixiviation.** The process of leaching out the metallic contents of ores.
- Locate.** To locate a mining claim is to file a notice claiming ownership, at the point where mineral is discovered and to put up stakes or monuments at the corners of the rectangular area claimed.
- Location Work.** Labor required by law to be done on mining claims within 60 days of location, in order to establish ownership.
- Lode.** A metalliferous vein. In Lake Superior region refers to the mineralized beds. Is used generally as synonymous with vein. Used by geologists as meaning an aggregation or congerie of mineralized veins.
- Long Ton.** An English ton of 2,240 lbs. avoirdupois.
- Low Grade.** Ore whose recoverable value yields but slight profit per ton. Carrying mineral values but sparingly.
- Magma.** An originally molten mass of rock coming to the earth's crust from depth.
- Magmatic Segregation.** The process by which the different constituents of molten rock masses crystallize at varying temperatures with a tendency to separate themselves, so far as circumstances allow, from the other compounds.
- Malacate.** Mex. A horse whim with vertical drum used for hoisting in Mexico. Sometimes is called a Zacatecas malacate.
- Mass.** Copper. A solid chunk of native metal.
- Massive.** Rock without defined lines, of cleavage; ore occurring without appreciable gangue, as contradistinguished from ore disseminated throughout a gangue.
- Matrix.** The rock between imbedded objects, such as a particle or mass of ore or native metal. More rarely a metallic mineral is the matrix cementing together rock particles.

Matte. A furnace product composed of copper and iron sulphides, produced by shaft or reverberatory fusion. Usually contains 30-40% copper, but varies from 20-60%. Is "blown" to blister copper 98-99% fine in bessemer converters.

Matting. The process of smelting sulphide ores into matte.

Mesa. Spanish for tableland or plateau.

Mesh. The size of openings in a screen.

Metalliferous. Carrying metal.

Metallurgy. The science and practice of reducing metals from ores and minerals.

Metamorphic. Rock that has been changed from its original condition by pressure, chemical action, heat or other causes.

Metamorphosis. The process by which changes in structure are effected in a rock form by heat or percolating waters.

Metasomatic. Replacement, particle by particle, so that original structure is often preserved.

Meter or Metre. 39.37 inches.

Metric Ton. A weight of 2,204.6 lbs. avoirdupois.

Mica. A scaly transparent mineral. Biotite is brown or black mica; muscovite or isinglass is the clear mica used in stoves, lanterns, etc.

Mill. Works for treating ores without smelting.

Milling. Dressing ore in a mill; also dumping ore in a winze to be drawn off into cars or wheelbarrows on a lower level.

Mill Run. The treatment of a definite quantity of ore in a mill. Also the result or yield thereof.

Mill Test. The determination of the metallic contents and recoverable values in any given ore by the milling of a sufficient quantity to afford average milling conditions.

Miner. In strict construction, the man that does the drilling and blasting in a mine. In a broader sense, all men working underground.

Mineral. Ore or rock containing metal. In the Lake Superior district the term mineral has a special use, being employed to designate the concentrate of native copper, with its small amount of admixed amygdaloid or conglomerate, as it comes from the mill, before going to the smelter.

Mineral Belt. The strip or zone of mineralized territory in a given formation or district.

Mineral Right. The ownership of mining rights under the surface of land owned by another holder. Mineral rights sometimes are reserved in selling land in some districts.

Mineralized. Carrying metalliferous values.

Miners Inch. The amount of water that will flow through an opening one inch square under a six-inch head, which is 2,274 cubic feet in 24 hours, or 94¾ cubic feet per hour, equal to 655 wine gallons or 593 imperial gallons hourly.

Mining Engineer. Graduates of technical mining schools are given the degree of engineer of mines and sign the letters E. M. after their names. The letters M. E. stand for mechanical engineer, when given by a school, but are often used by men engaged in mining, who lack scholastic degrees, as an abbreviation for mining engineer, or mining expert.

Misad Hole. A drill hole, charged with explosives which fails to be set off by the fulminating cap.

Moil. A steel bar, like a drill, except that it is sharpened to a point instead of having a cutting face.

Molybdenite. A graphite like, flaky, lead colored mineral found in some ores. Composed of molybdenum and sulphur.

Momme. A Japanese weight equal to 3.75 grams or 2.4113 pennyweights.

Monocline. Upturned beds of rock that have a practically uniform dip.

Monzonite. A granitic rock intermediate between diorite and granite.

Morgen. A South African land measure—2.1165 acres, or 1.44 claims.

Mortar. An assayer's mortar in which rock or ore is crushed with a

pestle. A mortar is the box, about the stamp of a mill, in which the ore is stamped and crushed.

Mother Lode. The main lode of the district. In America applies to the mineralized belt of the California gold region.

Mouth. The surface entrance or opening of an adit, tunnel or shaft.

Mucker. Ore shoveller, who loads the mine cars and in most mines is also a trammer, pushing the cars to the shaft or tunnel mouth.

Mullock. Australian for waste-rock broken underground.

Mundic. Pyrrhotite, magnetic pyrite; iron sulphide.

Mynpacht (South Africa). A part (10%) of a farm, which the owner has the first right to locate or peg out, when the farm is proclaimed a public goldfield.

Nickeliferous. Carrying nickel.

Nodule. A small concretionary, rounded mass of mineral matter.

Non-Conformable. Rock strata not associated originally in the position now occupied.

Nugget. A lump of native metal; usually applied to gold.

Open Cast, Open Cut. A mine worked as a quarry, or pit open to the sky.

Ore. Metallic minerals; mineralized material or rock, holding metallic minerals. Called pay ore when it can be profitably worked; low-grade ore when it yields but slight profit.

Ore Car. A mine car for carrying ore or waste rock.

Ore Chute. An opening in ore or rock through which ore is dropped downward. Also used for ore bins and pockets.

Ore Dump. A heap or pile of ore at the tunnel mouth or top of shaft.

Ore-Shoot. An orebody or portion of a vein carrying high-grade, or payable ore. Usually has a vertical or diagonal dip on the plane of the dip of the vein.

Orthoclase. A white, or pale colored feldspar composed of silicate of potassium and aluminum. Occurs as white crystals or spots in porphyry.

Outcrop. The apex, or part of a vein or mineral deposit that is exposed at the surface of the earth.

Outlier. An isolated mass of rock or group of rocks lying at a distance from the main body, and separated therefrom, on the surface by a different rock formation.

Output. Production.

Overburden. Waste material, usually drift or alluvium above the solid rock, or orebody.

Overhand Stopping. Removing ore in ascending steps.

Oxide. An ore of any metal or metals chemically united with oxygen.

Oxidize. To unite with oxygen. Many minerals and most metals oxidize with greater or less rapidity when exposed to air or water.

Panning. To wash gravel, etc., in a pan, so that the sand and gravel is loosened and thrown out and the gold or heavy metallic minerals left in the pan.

Patent. A deed given by the government, to mineral lands.

Patio. A walled yard with paved floor in houses and mine plants, in Mexico and other Spanish countries.

Paystreak. The rich band, part, or zone in a vein or ore deposit which carries the profitable, or pay ore.

Pegmatite. Very coarsely grained granite; a giant granite.

Penthouse or Pentice. A shed-roof erected in the bottom of a shaft, when sinking, to protect miners from accidental fall of rock, timber or tools from above.

Peroxide. The oxide of any metal containing the greatest proportion of oxygen.

Pertenencia. The unit of a mineral claim in Mexico; 100 meters square, or one hectare, 2.471 acres.

Peter Out. To pinch out, or feather out and end.

Petrology. The study of rocks.

Phosphate. An ore of any metal or metals with which phosphorous and oxygen are chemically united.

Picul. A Chinese weight of $133\frac{1}{2}$ lbs.

Pillar. A section, or block of ore left in place to support shafts or roofs.

Pinching. The narrowing of a vein.

Pinching Out. The narrowing of a vein to extinction.

Pipe Vein. An orebody of chimney form.

Pitch. The angle and direction of dip or take of an ore-shoot in a vein. If a vein dips east, an ore-shoot may pitch at a flatter angle than the vein, to the N. E. or S. E.

Plain. A flat or nearly level country.

Placer. A deposit of metal-bearing gravel or alluvium.

Plant. The machinery equipment of a mine or reduction works. In general use the term includes buildings housing machinery.

Plat. To draw to scale. In Lake Superior usage it is the station or enlargement of a level, to give extra space for loading and unloading the cage, skip or bucket.

Plumbiferous. Carrying lead.

Plutonic. Rocks of deep seated, igneous origin.

Pocket. An orebody of small extent. A natural underground reservoir of water. A cavity cut in the rock underground to hold ore. A bin at shaft house or mill, in which ore, flux or fuel is stored.

Pockety. Carrying only occasional bunches of good ore.

Poling. The process of deoxidizing molten copper in a reverberatory furnace by stirring with long poles of green timber.

Poll-Pick. A tool having a pick on one end, and a poll, or hammer head, on the other.

Pood. A Russian weight of 36.112 lbs. avoirdupois.

Poppet-Head. Framework or gallowsframe over a shaft, for sheave-wheel and hoist rope.

Porphyritic. Carrying isolated crystals in a groundmass, like plums in a pudding.

Porphyry. Properly, is any igneous rock showing phenocrysts, i. e., distinctly isolated crystals in a dense or crystalline matrix. Porphyry may be granite, quartz, or one of several other rocks.

Pound. The troy pound alone is used for gold, silver and platinum only. It is 0.82286 of an avoirdupois pound. A pound of gold weighs 12 troy ozs. or 5,760 grains and the avoirdupois lb. 7,000 grains.

Primary. The first; primary ores are those first or originally formed in an ore deposit, before alteration began. Also applies to the oldest rock formations.

Prop. A heavy timber placed with its foot against the floor of a mine opening, and its top against the roof, to support the rock above.

Prospect. To seek for mineral; a new mining property that has not yet been developed enough to be called a mine.

Prospector. A searcher for mineral deposits.

Protoxide. The oxide of any metal containing the least proportion of oxygen.

Puddingstone. A coarse conglomerate showing rounded pebbles.

Pulp. Pulverized ore or concentrate.

Pulverize. To crush to powder.

Pulverulent. That which may easily be reduced to powder.

Pyrrhotite. Iron sulphide, often called mundic or magnetic pyrite.

Pyrite. Iron disulphide. Fools gold.

Pyrites. A local term for pyrite and for sulphide ores; more properly iron disulphide.

Pyrolusite. A black, manganese ore containing 63% manganese.

Quarry. An open pit, of varying size, sometimes several acres, from which stone or ore is mined.

Quarter-Section. In the United States a quarter of a square mile; 160

acres, laid out in a parallelogram, each side of which is one-half mile in length.

Quartz. Crystalline silica. Any hard silicious ore, in miners' usage.

Quartz Claim. In the United States mining claims are of two classes, placer claims, carrying mineral, usually gold, in alluvium, and quartz lode claims, any prospect carrying metalliferous bodies in place.

Quartzite. An altered (metamorphosed) crystalline sandstone.

Quartzose. Rock having much quartz in its composition.

Quicksand. Fine sand, which flows easily when wet.

Ragging. Cornish for rough cobbing; broken lumps of ore of medium size.

Raise or Rise. A shaft or winze that is being opened from below. Sometimes called upraise or uprise.

Rake. The pitch of an ore-shoot on the plane of the vein. Also applied to cross veins, which are sometimes called rake, or counter veins.

Range. A mineral belt; also in many American states a surveyor's term for describing and locating lands. The state is surveyed in sections, towns and ranges. A township comprises 36 sections and is a square of six miles. Each township receives a double number, one for the town and one for the range. The towns are numbered consecutively from south to north, and the ranges are similarly numbered from east to west. Thus T. 2 N., R. 5 W. means Township 2 north or 12 miles north and Range 5, or 30 miles west of the State meridian.

Reamer. A tool like a bit, used to enlarge a hole previously drilled.

Reduction. The separation of metals from their ores.

Reef. A quartz vein or lode. A projecting ledge or inclined wall like an outcrop.

Refining. The elimination of impurities from crude metals, or separation of metallic alloys obtained in the reduction of ores.

Refractory. A refractory ore is one that cannot be smelted or otherwise treated by ordinary metallurgical processes. A refractory stamp-rock is one that is pulverized with unusual difficulty.

Regulus. The metallic material that separates and settles in the bottom of a pot of molten matte, or slag.

Reniform. Kidney-shaped.

Reserves. The amount of payable ore, developed and ready for extraction, or blocked out ahead of immediate requirements.

Reverberatory Furnace. A smelting furnace in which the flame from the grate below is reflected back by the roof, on the charge of ore.

Rise. A raise or opening driven upward.

Roasting. Driving off sulphur and other volatile elements from ore, by heat. When done in a furnace, under great heat, the process is called calcining.

Rob. To remove pillars and other supports from a mine for their mineral values, regardless of the future of the property.

Rock. Lake Superior; applied to ore mined and ready for the stamp mill. In English practice ore is called STONE. More properly applied to the stony matter surrounding ore, or constituting the earth's crust. Is a synonym for stone.

Rock Crusher. A machine for reducing rock or ore to smaller sizes. Crushers are of two types, the jaw-crusher and the centrifugal. The jaw crusher works as a man cracks nuts with his teeth, the centrifugal operates on the plan of a coffee-grinder.

Rock Drill. A power drill.

Rock Filling. Waste rock, used to fill up worked-out stones to support the roof.

Rock House. Lake Superior; the building (usually the one over the shaft) where copper-bearing rock from the mine is dumped from the ore skip (or bucket), is screened, crushed and stored in a bin, ready for shipment to the mill.

Rolls. Heavy steel rolls, worked in pairs, like a clothes wringer, for crushing rock and ore.

Roof. The rock overhead in a mine opening.

Room. Similar to a stope; term usually applied to mines working mineral bodies lying nearly horizontally.

Royalty. A percentage of the ore, or value thereof paid to the land owner by the lessee of the mine. Often a fixed sum for each ton of ore extracted.

Run. See mill run. A bar or course of ground better or worse than the average value of the mine.

Running Ground. Superincumbent material that breaks off readily and falls into the mine openings.

Saddle. Depression or U shaped fold. The reverse of an arch or anticline.

Safety Cage. A cage furnished with automatic appliances to stop its descent in case the cable breaks.

Salting. Placing rich, foreign ore, minerals or substances in a mine to deceive intending purchasers or other interested parties.

Sample. A specimen of ore from a mineral deposit. A selected sample is misleading because containing far above average values, and splendid samples frequently come from the poorest mines. An average sample is what its name purports—if it be an average sample.

Sampling. Cutting a representative part of an ore deposit, which should truly represent its average value. Most usually a trench-like cut 4 inches wide and 2 inches deep, cut into the clean face of ore and across its course. Honest sampling requires good judgment and practical experience.

Sand Pump. A pump, usually centrifugal, designed to lift water carrying large quantities of coarse tailings or sand in suspension.

Sands. Tailings from the stampmills of Lake Superior copper mines.

Sand (or Tailings) Wheel. A large wheel, having buckets on its inner perimeter, for elevating water carrying stamp-sand.

Scale Copper. Copper in very thin flakes.

Schist. A crystalline, usually micaceous rock of foliated structure, made up of superimposed flattened particles.

Scoria. Slags from copper smelters; volcanic ash.

Scoriaceous. Of the nature of scoria.

Scram. To search for ore in a mine that is apparently worked out and to extract it.

Screen. A grating of perforated metal or woven wire.

Seam. A thin layer of rock or ore.

Secondary Enrichment. An enrichment of a vein or an orebody by material of later origin, often derived from the oxidation of decomposed overlying ore masses. Nature's process of making high-grade out of low-grade ores. First discovered by Weed and announced by publication in Geol. Soc. of America program, Dec. 8, 1899. Confirmed by Emmons and by Van Hise, Feb., 1900.

Sectile. Easily cut.

Section. A field or district; also, in the U. S. a square mile of land.

Sedimentary. Rocks formed by deposition from water, as contradistinguished from rocks formed by igneous action.

Selvage. A clay seam along which parting occurs. Also called fluccan.

Set. A framed form of timber, used for supporting ground in a mine.

Shaft. A pit or deep mine opening.

Shaft-House. A building at the mouth of a shaft, where ore or rock is received from the mine.

Shale. A hardened clay with fissile structure.

Shear Zone. A belt in which the rocks are crushed by many parallel fissures.

Sheave. A grooved wheel, notched to carry rope; an open pulley.

Shift. A miner's work period of 8 to 10 hours' time; a force of men employed on one turn.

Shift Boss. A mine boss, or under-captain, in charge of a gang or shift of miners.

Shoot. See ore-shoot. To fire or explode dynamite in holes drilled for that purpose. An erroneous spelling for chute.

Short Ton. A weight of 2,000 lbs. avoirdupois.

Shot. A blast of some explosive.

Shot Copper. Small rounded particles of native copper, somewhat resembling small shot in size and shape.

Shrinkage Stopping. Taking out ore by blasting it down on a heap of broken ore. Working space for drilling is kept open by drawing out part of the ore from an opening beneath. Is a method of overhead stopping.

Silica. Quartz, a compound of oxygen and silicon. Ordinary sand is composed largely, if not wholly, of silica.

Silicate. A mineral composed of any metal or element chemically united with silica.

Silicious. Containing much silica or quartz.

Sill. The floor-piece of a set of mine timbers.

Sinking. The process of deepening a shaft or winze.

Sinking-Pump. A movable pump, usually vertical, hung in a shaft, and lowered, as the shaft is deepened.

Skip. An iron box, open at the top, running on guides, on four wheels, and hauled by a cable; used for hoisting ore and rock, and for lowering timber.

Skip-Road (or Way). A track of T-rails, spiked to wooden sleepers, on which a skip runs.

Slag. The melted rock or waste separated from the metal in a smelting furnace.

Slice. To remove ore in mine in pillars, or by successive slices.

Slickenside. A polished rock surface, showing striations produced by the opposing walls of a fracture rubbing and grinding against each other in the movement produced by earth stresses.

Slide. A bedding fault or slipping caused by the subsidence of the overlying rock formation. Also applied to masses of loose rock, or ore on a mountain slope.

Slime. Exceedingly small particles of rock and mineral held in suspension in water. This mud is called slum.

Slime Table. A circular revolving table, on which slimes flow and minute particles of mineral are saved.

Slip. A fault.

Sludge. The mixture of rock and water, or slime, formed by a diamond drill.

Sluice. A wooden trough, box, flume or launder.

Smelter. Works where ores or crude metals are reduced by fusion.

Soapstone. Steatite. A soft unctuous rock.

Soft Ground. Heavy ground. Rock about underground openings that does not stand well and requires heavy timbering.

Sollar. A platform or ladder landing in a shaft.

Spathic. Containing carbon dioxide; a carbonate.

Specimen. A sample of mineral selected because typical, unusual or exceptionally rich.

Speiss. Impure metallic arsenides produced in copper smelting; ore particles finely disseminated through a rock, usually occurring as impregnations.

Spelter. The common term for metallic zinc.

Sphalerite. Zinblende; zinc sulphide, the most common zinc ore mineral; is very often found associated with galena and chalcopyrite.

Spile. Lagging driven ahead of the regular timbering in treacherous ground.

Spitzkasten. Pyramidal boxes wherein ores are concentrated and sized by a jet of water fed from below.

Spoon. A long-handled spoon, used to scrape out drill holes.

- Sprag.** A prop or cross-timber set to secure the hanging wall in a stope. A short piece of wood used to block the wheels of a mine car.
- Spar.** A short, small branch from a vein.
- Square Sets.** A frame of mine timbers with mortised and tenoned sill, top piece and uprights of equal length, joined at right angles.
- Squib.** A fuse.
- Squeeze.** The slow settling down of the roof in mine workings without fracture.
- Stack.** The chimney of a furnace; usually employed to designate a number of furnaces, when used in the plural.
- Stamp-Mill.** A mill for crushing and concentrating minerals by stamps and jigs, etc.
- Stamp-Rock.** Rock containing fine copper that must be crushed and jiggged to recover the metal.
- Stamps.** Machines to crush rock or ore by heavy blows.
- Stamp-Shoe.** The heavy chilled iron casting attached to the lower end of a stamp piston, that does the actual crushing of rock in a stamp-mill. It hits against a round steel block called a die.
- Stanniferous.** Tin-bearing.
- Station.** A chamber in a shaft, cut out for pumps, landing place, etc.
- Station-Pump.** A mine pump permanently placed, as distinguished from a movable sinking-pump.
- Steatite.** Soapstone. A greasy mineral, having a talc base.
- Step Fault.** A series of faults, rising like steps.
- Stockwork.** A mass of rock penetrated by numerous small stringers of ore, the entire mass averaging sufficiently rich in metallic material to warrant its mining and treatment.
- Stone.** See Rock.
- Stope.** (V.) To mine or extract ore. (N.) The workings between levels or drifts, in which ore is broken down in a series of chambers and taken away for treatment.
- Stopping.** Breaking down the mass of pay-rock or ore above a drift. When stopping in an orebody of average width, miners can break rock much more quickly and cheaply than when driving the drifts.
- Stopping Ground.** Part of an orebody opened by drifts and raises and ready for breaking down.
- Strata.** The successive beds or layers of sedimentary rocks.
- Stratified.** Having regular layers of varying rock varieties.
- Stratum.** A layer or bed of rock.
- Streak.** The color given by a mineral when scratched or when rubbed on porcelain.
- Strike.** The horizontal direction of a vein, measured by the points of the compass; a discovery of ore.
- Stringer.** A thin seam of ore.
- Strip.** To remove the overburden of waste, drift or alluvial soil overlying an orebody.
- Stripping.** The waste or overburden above an orebody.
- Structure.** The form of a mineral, whether granular, crystalline or amorphous.
- Stull.** The top-piece of a set of mine timber. A timber prop supporting the roof of a mine opening.
- Sulphate.** A chemical compound (or a mineral) of a metal combined with sulphuric acid. An ore of any metal or metals with which sulphur and oxygen are united chemically.
- Sulphide.** A mineral or ore of any metal or metals with which sulphur is combined chemically.
- Sulphoantimonite.** A mineral in which sulphur and antimony are united chemically with a metal.
- Sulphoarsenite.** An ore mineral of any metal or metals with which sulphur and arsenic are united chemically.
- Sulphuret.** A sulphide. Term becoming obsolete.

- Sump.** The pit at the bottom of a shaft, where water collects.
- Surface Rights.** The ownership of the surface of land only, where mineral rights are reserved.
- Swabstick.** A stick used to clean out drill-holes.
- Syncline.** Canoe or U shaped fold of rock layers. The reverse of an anticline.
- Table.** A concentrating machine for separating finely crushed particles of ore from gangue.
- Table Land.** A plateau.
- Tailings.** The sandy and gravelly residue or refuse matter from a concentrating mill.
- Tamp.** To closely pack clay or other sticky earth into a drill-hole above the cartridges, to give greater force to the blast.
- Tap.** To draw off molten metal or slag from the vent of a furnace.
- Taper Off.** Cornish for stopping work temporarily.
- Tenor.** The percentage or average metallic content of an ore, matte or impure metal.
- Terrero.** Spanish for heaps of partly leached ore.
- Tertiary.** The third great geological period preceding the present Quaternary period.
- Test-Pit.** A shallow pit sunk to look for mineral.
- Texture.** A rock structure; is fine or coarse grained, porphyritic, etc.
- Throw.** The displacement of a vein caused by faulting.
- Timber.** The wooden logs and sticks used for underground supports.
- Timberman.** One who works at timbering a mine.
- Ton.** Long, 2,240 lbs.; metric, 2,206 lbs.; short, 2,000 lbs.
- Tonelada.** Spanish for long ton.
- Township.** Abbreviated T. or Twp. See Range.
- Trachyte.** A light colored volcanic rock made of alkaline feldspar with black mica and hornblende.
- Tram.** To load rock or ore in cars and push same to the shaft; a tramway.
- Trammers.** Men who load and tram the broken rock underground.
- Trap.** A dense gray, blue or greenish rock of volcanic origin; usually an old and altered basaltic rock.
- Trend.** The general direction of a mineral body.
- Trestle.** A frame-work of timbers, carrying tram-tracks.
- Tribute.** The money per ton or percentage of ore extracted which is paid by lessees to owners for the privilege of working a mine.
- Tripod.** The three-legged iron frame on which the working parts of a power-drill rest; a three-legged wooden frame over the mouth of a pit or shaft.
- Trommel.** A revolving cylindrical sieve for sizing ore.
- Troubled.** A vein is sometimes called troubled when disturbed or faulted.
- True Fissure Vein.** All mineralized fissures are true fissure veins. Term commonly used as meaning a fissure vein with promise of holding to great depth, in contradistinction to a gash vein.
- Tsubo.** A Japanese measure of 6 feet square, equalling 36 square feet.
- Tube Mill.** A steel cylinder half filled with flint pebbles, which crush ore when the "tube" is revolved.
- Tufa.** A limestone formed by spring waters. Name frequently used in place of tuff.
- Tuff.** Volcanic ash, cinder and lapilli, ejected from volcanic vents and deposited in layers from air in water and solidified by time and superincumbent pressure. Name also used for coarser volcanic debris, including breccia and conglomerate.
- Tunnel.** A practically horizontal opening entirely through a hill or mountain. Term is commonly used instead of adit, which is a horizontal gallery having only one opening to surface.

Turbine. The most efficient form of water-wheel; also a new form of steam-engine in which the entire movement of the power producing parts is rotary instead of reciprocating.

Tuyeres. The pipes in a furnace wall by which air is supplied under pressure, to either blast furnaces or bessemer converters.

Unconformable. With a break between. Rock beds lying at different angles or with erosion surface between.

Underhand Stoping. Cutting out ore from the floor of an opening. Removing ore in descending steps.

Underlay, Underlie. The downward extension of a vein or bed beneath the ground. Is technically the horizontal departure of a vein from the vertical measured in feet, per fathom (or 100'). Mineral bodies lying under a given tract, though not outcropping on surface.

Unpatented. Mining claims to which a deed from the U. S. Govt. has not been received. They are subject to annual assessment work, in order to maintain ownership.

Unstratified. Rock that is not bedded in layers.

Unwater. To free from water; to pump out or drain a mine.

Upcast. A shaft having an upward air current.

Upraise. A raise, an upward opening in a mine.

Van. To wash ore on a shovel, like panning.

Vanner. A concentrating table or machine for dressing ore by means of vibratory motion, aided by jets or water to carry away waste rock.

Vara. A Spanish-American measure of length, of 33 inches.

Vein. A rock fissure filled with mineral matter. A mineral body having defined walls. See contract vein and fissure vein.

Veinstuff. Vein filling. Also used for gangue.

Vertical Shaft. One sunk at an angle of 90° with the horizon, or directly downwards toward the center of the earth.

Virgin. Native metal occurring elementally, as distinguished from ore minerals, which are chemical compounds.

Vitreous. Of a glassy nature.

Volatile. That which can be driven off as vapor, by heat.

Vug. A cavity in the rock; usually lined with a crystalline encrustation.

W. The chemical symbol for tungsten.

Wall. The side of a mine opening or drift. The waste or country rock on each side of a vein.

Wall Plates. Are the two side pieces of a set or "frame" of shaft timbers, as distinguished from the end pieces.

Water-Jacket. An outer casing for a blast-furnace, in which water circulates, to keep the metallic furnace-walls from melting because of the intense heat of the charge.

Water Level. The level above which water does not rise, when a mine is allowed to fill. The water level is often the point below which altered and enriched ores are succeeded by base unaltered sulphides.

Weathered. Changed by long exposure to air and water.

Wet Process. Leaching or lixiviation.

Wheal. Cornish for mine.

Whim. A windlass with a vertical drum revolved by horse-power and used for hoisting.

Whip. A fixed pulley with hoisting rope passed through it and pulled by a horse or mule.

Wilfley. A Wilfley concentrating table.

Winch. A windlass.

Winding. Hoisting with rope and drum.

Windlass. A device for hoisting from a pit or shaft, by means of coiling a rope or cable around a drum, with crank handles.

Winze. A shaft, usually short, extending downward from the floor of a mine opening.

Wire Bars. Refined copper cast into bars for wire drawing.

Workings. The underground openings of a mine.

Wulfenite. See molybdenum in **Minerals**.

Zinblend. Sphalerite. Sulphide of zinc.

Zinckiferous. Carrying zinc.

Zinc Sulphide. A compound of zinc and sulphur. See **Minerals**.

Zn. The chemical symbol for zinc.

CHAPTER II.

MINERALOGY.

Ore Minerals:

Ores as mined are very seldom composed entirely of ore minerals, usually consisting of a mixture of quartz, or other non-metallic mineral, or of altered rock and metal bearing minerals. The mixture constitutes ore when it contains enough value, in one or more metals, to pay for the cost of mining, concentrating, transportation, smelting and marketing. As this cost varies with each mine and locality, and the price of every metal save gold, also fluctuates, there is a wide range of value to "ore." The Alaska gold quartz mines operating on a gigantic scale can mine, mill and reduce their product for less than \$1 per ton, whereas many smaller mines cannot make a profit on \$3 ore of similar character. Copper ores show a much greater margin, between the costs at the Utah Copper Co. and those of small vein mines.

In the following pages I have given a list of the more important ore minerals of each metal. It is intended only for general reference, the minerals being arranged under the name of the metal. The list of copper minerals is complete, giving every mineral containing copper. For sight tests and recognition of ore minerals, see Practical Field Mineralogy, Farrell-Moses, 1912.

Aluminum.

BAUXITE. 74% alumina. Hydrated alumina. Regarded as a hot spring deposit. Occurs in pockets in clay in Arkansas.

CORUNDUM. 53% aluminum. A bluish-gray, brown or white mineral which is harder than and will scratch any other mineral except diamond; will scratch steel. The clear red is the gem ruby and the blue, sapphire, found in many basic igneous dikes in Montana, especially in the sapphire mines at Yogo.

CRYOLITE. 12.8% aluminum, sodium alumina fluoride. A Greenland ore, essential to aluminum reduction.

GIBBSITE. 65.4% alumina. Hydrated alumina, derived in Arkansas deposits from decomposition of a granitic rock (Elaeolite syenite).

Antimony.

STIBNITE. Antimony glance 71.4% antimony. Is the common ore; a sulphide of the metal. Is in process of deposition at Steamboat Springs, Nevada. Antimony occurs in many silver ores. Is common in tetrahedrite or silver-bearing copper minerals. Antimony ores are mined at Pine Creek, near Wardner, Idaho.

Arsenic.

This metal is largely derived from arsenopyritic deposits, from nickel or cobalt arsenides, common at Cobalt, from enargite, copper arsenide at Butte or from the common mineral ARSENOPYRITE a sulpharsenide of iron, with 46% arsenic, which looks like iron pyrite, but emits a garlic odor when struck. Occurs in fissure veins, with gold ores. Ruby silver and other minerals rich in silver also contain arsenic.

Bismuth.

BISMUTHINITE. Bi_2S_3 81.2% bismuth, a sulphide of bismuth. The metal is a subordinate constituent of many gold, tin and silver ores, especially those of Leadville, Colo. It is obtained mainly as a by-product from gold-silver and lead ores and not from ores mined for this metal itself.

Cadmium.

GREENOCKITE. Is the only important ore mineral, the yellow sulphide, which occurs with zinc (sphalerite) ores in the Mississippi states.

Chromium.

CHROMITE, FeO , Cr_2O_3 or chrome iron ore, with 68% chromium is the sole ore of commerce. It resembles magnetite, the black iron oxide ore.

Cobalt.

COBALTITE, or cobalt sulpho-arsenide, with 35.4% cobalt.

ERYTHRITE. A cobalt bloom, 37.4% cobalt, a creamy raspberry red mineral, formed by oxidation; a hydrated arsenious oxide.

SMALTITE. Cobalt arsenide with 28.2% arsenious oxide.

Copper.

See special list of all copper minerals given in Chapter III.

Gold.

CALAVERITE. A pale bronze yellow telluride of gold with 40% gold, 1-2% silver and balance tellurium. Breaks with uneven fracture and scratches easily. If burned in a forge gives beads of gold. Common at Cripple Creek.

NATIVE. As clean metallic, gold; as rusty and mustard colored gold and as pale colored electrum, an alloy with silver.

PETZITE. Tellurides of gold and silver, a steel or iron gray metallic lustered mineral easily scratched with knife, slightly scaly, 20% to 25% gold; 18% to 25% silver.

PYRITE is the commonest gold bearing mineral.

SYLVANITE. A silvery telluride of gold and silver, with brilliant metallic lustre, very soft, and carries 26% gold, 12.5% silver. Common in Cripple Creek, Colorado, ores.

Iron.

Iron ores as such are not considered here, but magnetite, hematite, both earthy and specular and pyrite or sulphide of iron are common in all metallic ores, especially silver, gold, lead and zinc.

Lead.

GALENA. The common ore of lead; lead sulphide, 86.6% lead, a steely, silvery mineral that crystallizes in cubes, occurs massive, resembling pig iron, or with sheeted structure. Breaks with perfect cleavage. Is often silver-bearing.

CERUSSITE. White lead ore, lead carbonate, 77.5% lead, a white or gray brittle mineral with waxy lustre. Is the most common oxidized ore of lead and effervesces with acid.

ANGLESITE. Lead sulphate, 73.6% lead; a brittle, colorless, or white mineral, often coating a kernel of galena and mixed with cerussite; very common.

PYROMORPHITE. Lead phosphate, 76.30% lead, a green, gray or brown mineral fusing easily to crystalline globules. Occurs in six-sided crystals and mossy fibres.

JAMESONITE. Feather ore, lead sulpho-antimonide, 50.8% lead, 29.5% antimony, 19.7% sulphur, steel gray, metallic hairs and needles, also compact.

BOURNONITE. Lead copper sulphide. See Copper.

VANADINITE. A lead chloro-vanadinite, containing 18.7% lead oxide, 19.4% vanadium oxide, 2.5% chlorine, a bright yellow, orange or brown mineral, occurring in small, sharp hexagonal crystals; fuses easily.

WULFENITE. See molbydenum.

Manganese.

Ores to be valuable must contain at least 40% of the metal. Only the oxide ores are valuable.

BRAUNITE. 69.6% manganese. Occurs as brown and black bands in clay in Arkansas.

FRANKLINITE. See under zinc.

PSILOMELANE. 77% manganese; earthy manganese.

PYROLUSITE. 63.2% manganese, black manganese ore resembling limonite. Is the common form of the Virginia deposit.

WAD. A soft earthy brown or black ore of variable composition.

Mercury.

CINNABAR. 86.2% mercury. Sulphide of mercury, a red mineral, which is easily decomposed by heat.

Molybdenum.

MOLYBDENITE. The sulphide carries 60% molybdenum. Is a soft, lead colored, scaly metallic mineral resembling graphite, but malleable and giving a greenish streak on unglazed porcelain. Easily scratched by finger nail.

MOLYBDITE. Oxide with 66.7% molybdenum. Is an earthy yellow powder, formed by oxidation, but has never been found in commercial quantity.

WULFENITE. Lead molybdate, contains 39.3% molybdic oxide. It usually occurs in flat, resinous, lustered, yellow, orange or red crystals, in the oxidized parts of lead deposits.

Nickel.

NICCOLITE. Arsenical nickel, copper nickel, 43.6% nickel, 56.4% arsenic; somewhat resembles native copper. Has brownish, black scratch; metallic lustre and melts on heating.

MILLERITE. Sulphide of nickel, 64.4% nickel, a brass yellow, easily tarnished mineral, easily scratched by a knife.

PYRRHOTITE (magnetic iron pyrite). Contains 2-6% nickel at Sudbury, Ont.

Platinum.

METALLIC. In America is found in the black sand of gold placers, also at the Boss mine in Nevada and as minute crystals of sperryite in Sudbury, Canada, nickel ores.

Kadium.

CARNOTITE. See Uranium.

PITCHBLEND. See Uranite (uranium).

Silver.

ARGENTITE. Silver glance; 85% silver; a silver sulphide of leaden-gray, metallic appearance; scratches with thumb nail.

EMBOHITE. Silver bromide, 67% silver; resembles horn-silver.

FRIESLEBENITE. Gray silver; 22% silver, 30% lead, 28% antimony, 18% sulphur. Resembles gray copper ore (tetrahedrite), but contains silver.

GALENA. Lead sulphide. Is usually silver-bearing in our Western ore deposits.

HORNSILVER. Cerargyrite; 75.3% silver, 24.7% chlorine. When pure resembles wax and cuts like it. A fragment put on zinc and wetted, turns black and is reduced to silver.

POLYBASITE. 50.6% silver. A brittle, metallic mineral formed of silver and copper, combined with arsenic and antimony.

PROUSTITE. Light red or ruby silver, with 65% silver; also called arsenical silver; a brilliant red or ruby colored mineral that is subtranslucent, and is bright red, when powdered.

PYRRARGYRITE. Dark ruby; 60% silver; antimonial silver; a dark red to black metallic lustered mineral with brilliant red streak, or purplish powder.

STEPHANITE. Brittle silver, 68.5% silver; an antimonial sulphide of silver, with iron black color and streak.

TETRAHEDRITE. Gray copper ore, often rich in silver, with up to 17% silver. Usual composition, copper 30-40%; antimony 15-25%; sulphur 20-25%. Brittle iron gray to black metallic mineral; an important silver ore.

Tin.

CASSITERITE. Oxide of tin 78.67% tin. Is the common ore of tin; when weathered, looks like wood, but is very heavy.

STANNITE. Tin sulphide, rare.

Tungsten.

WOLFRAMITE. Iron manganese tungstate, 76.4% tungstic acid (WO_3). Has a hardness of 5; gravity 5, and a dark brown streak. The name covers all transitions and variations of iron-manganese tungstate from iron tungstate, ferberite to manganese tungstate, hübnerite.

Occurs in long, dark brown crystals, or short, stoutish columnar masses, varying to black, brilliant, lamellar masses in quartz and pegmatite. The brown varieties are softer and more brittle than the blacker form whose thin flakes are deep red in transmitted light. Is the most common ore of tungsten.

FERBERITE. Iron tungstate, 76.3% tungstic acid. A dull, coal black mineral, sometimes in an aggregate of cubic crystals, more often massive in black, sooty looking material in veins in pegmatite. Is thus far only found commercially in Nederland district, Boulder Co., Colo., and is a very desirable ore.

HÜBNERITE. Manganese tungstate, 76.6% tungstic acid. A light brown mineral often in needle-like crystals of hair brown color, in quartz.

SCHEELITE. Tungstate of lime, 80.6% tungstic acid. Hardness $4\frac{1}{2}$, gravity 6. Streak white, gray or pale brown, very heavy mineral with peculiar glitter to fractured surfaces. Occurs massive, and as crystals imbedded in quartz, and also in garnet (Hawthorne, Nev., and Bishop, Calif.) Also in gold ores.

The field test for tungsten is to crush the specimen and "pan" it, to get the heavy residue; powder a part of the residue and put it in a glass or porcelain dish; add a half ounce (tablespoonful) of muriatic acid and heat to near boiling for fifteen minutes. Then add a few drops of nitric acid and boil one minute. Set aside a moment to settle and pour off liquid into a large tumbler of cold water. Also add cold water to residue and stir. Set aside both dishes a few minutes to settle, then pour off liquid. Canary yellow sediment in dish shows tungstic acid.

The more common test is to wrap tin foil about the specimen and boil hard in hydrochloric (muriatic) acid for 15 minutes, remove foil; a blue color indicates tungsten, but the test does not always show the color.

Uranium.

CARNOTITE. 52%-57% oxide of uranium. A vanadate of uranium and potassium; a canary yellow powdery mineral occurring in large bedded deposits of impregnated sandstone in southern Utah and S. W. Colorado. Is the chief ore of uranium.

URANINITE. Pitchblende. 65%-80% uranium. A black to dark brown, olive green, very heavy mineral, found in Connecticut, Texas, Colorado and South Dakota. (See Bull. 70; U. S. Bureau of Mines, for description of mines.)

Vanadium.

CARNOTITE. (See above.) 18% vanadium.

ROSCOELITE. 21%-29% vanadium; a scaly green to brown micaceous mineral mined at Vanadium, Colo., by the Primos Co. and also found in California quartz mines.

VANADINITE. 19.4% vanadium oxide. See under lead minerals.

Zinc.

CALAMINE. Hydrated zinc carbonate, 67.5% zinc oxide.

Is also the trade name for oxidized zinc. Often occurs in clay. Is yellow to brown, rarely pale blue or green.

FRANKLINITE. An iron manganese zinc mineral with 5.54% zinc, 51.8% iron and 7.5% manganese; found at Franklin, N. J.

SMITHSONITE. Zinc carbonate, 64.8% zinc oxide. Dry bone, the white carbonate of zinc, differs from calamine by effervescing in acid.

SPHALERITE. Blende, black jack, zincblende, 67% zinc. Is the chief source of the metal; varies from brown to black, rarely clear resinous.

WILLEMITE. Zinc silicate, with 72.9% zinc oxide. Is a greenish yellow to apple green mineral with resinous lustre. Is only important as an ore mineral at Franklin, N. J.

ZINCITE. Red zinc ores, 80.3% zinc. Occurs at Franklin, N. J.

CHAPTER III.

A DESCRIPTION OF ALL COPPER BEARING MINERALS

This chapter has been carefully revised and amplified and is the only complete list of copper bearing minerals published.

ACICULITE. Aikinite.

ADAMITE. A hydrous basic zinc arsenate, in which copper sometimes replaces zinc to the extent of about 18%.

AGUILARITE. An unnamed alteration product of aguilareite has the formula $5(\text{Ag,Cu})_2\text{S}(\text{Sb,As})_2\text{S}_2$. The mineral, which is an arsenosulphoantimonite is isometric.

AIKINITE. $3(\text{Pb,Cu})_2\text{S.Bi}_2\text{S}_3$. A lead and copper sulphobismuthite, carrying 11% copper. Common names, needle ore, acicular bismuth. Crystallization, orthorhombic. Fracture, uneven. Hardness, 2 to 2.5. Gravity, 6.1 to 6.8. Lustre, metallic. Color, blackish lead-gray, tarnishing to pale copper-red. Fuses on charcoal and is soluble in nitric acid. Occurrence, in acicular crystals in quartz, Ural Mountains of Russia and Gold Hill, North Carolina.

ALASKITE. An argentiferous and cupriferous variety of galenobismuthite, which is a lead sulphobismuthite, carrying 3.5 to 5.1% copper.

ALGODONITE. Cu_2As . A copper arsenide carrying 85.5% copper. Structure, massive and granular. Fracture, subconchoidal. Hardness, 4. Gravity, 7.62. Lustre, metallic on fresh fractures, dulling on exposures. Color, steel-gray to silver-white on freshly polished surface, tarnishing to bronze. Is less fusible than domeykite. Occurs in Chile and Lake Superior, in the latter district being found in cross-courses traversing the cupriferous beds of the South Range mines, causing the copper product to be highly arsenical.

ALISONITE. $3\text{Cu}_2\text{S.PbS}$. A copper and lead sulphide, carrying 53.5% copper, and 28.5% lead. Is related to cuproplumbite. Structure, massive. Color, deep indigo-blue, quickly tarnishing. Occurs at Coquimbo, Chile.

AMMIOLITE. Formula undetermined. A mercury and copper antimonite, carrying about 12.5% copper. Occurs, as an earthy powder, in Chile.

ANDREWSITE. Formula undetermined. A hydrous iron and copper phosphate related to chalcosiderite, containing circa 8.6% copper.

ANNIVITE. A variety of tennantite with antimony and bismuth, from Switzerland.

ANTIMONIAL COPPER. Common name for chalcostibite.

ANTLERITE. Formula probably $10\text{CuO}.3\text{SO}_3.7\text{H}_2\text{O}$. A basic copper sulphate, containing about 54.7% copper. Structure, massive. Gravity, 3.93. Color, light green. From Yucca, Mohave county, Arizona.

APHANESITE. See Clinoclasite.

APHTONITE. An argentiferous and zinciferous variety of tetrahydrite.

ARNIMITE. $5\text{CuO}.2\text{SO}_3.6\text{H}_2\text{O}$. A hydrous basic copper sulphate, containing 47.6% copper. Color, bright green. Occurs in acicular crystals.

ARZUNITE. $(\text{Pb}_2\text{O})\text{SO}_3(\text{CuClH}_2\text{O})\text{CuOH}$. Crystallization orthorhombic, in small bluish green prisms.

ARSENICAL COPPER. Domeykite.

ASPEROLITE. $\text{CuSiO}_3 \cdot 3\text{H}_2\text{O}$. A hydrous copper silicate. Apparently a hydrated chrysocola, from Tagilsk, Perm, Russia.

ATACAMITE. $\text{CuCl}_3\text{Cu}(\text{OH})_2$. A hydrous copper oxychloride, containing 60.5% copper. Crystallization, orthorhombic. Fracture, conchoidal. Tenacity, brittle. Hardness, 3 to 3.5. Gravity, 3.75. Lustre, adamantine to vitreous. Color, emerald green to blackish green. Streak, apple-green. Is transparent to translucent. Occurs, as sandy granules, in numerous mines in the province of Atacama, Chile, and elsewhere. Usually occurs disseminated, and low in copper tenor, but is extensively mined in Chile.

ATELITE. $2\text{CuO} \cdot \text{CuCl}_2 \cdot 3\text{H}_2\text{O}$. A hydrated copper oxychloride. An altered tenorite. Color, green. An alteration product from Mt. Vesuvius, closely related to atacamite chemically and mineralogically, but occurring as a pseudomorph after tenorite.

ATLASITE. A copper carbonate containing chlorine, from Chañarcillo, Chile. Apparently is merely an intimate mixture of azurite and atacamite.

AURICHALCITE. $2(\text{Zn}, \text{Cu})\text{CO}_3 \cdot 3(\text{Zn}, \text{Cu})(\text{OH})_2$. A basic zinc and copper carbonate, containing 16.6% copper. Crystallization, probably monoclinic. Occurs in acicular crystals, forming drusy incrustations, also columnar, laminated and granular. Hardness, 2. Gravity, 3.5 to 3.6. Lustre, pearly. Color, pale turquoise green to sky-blue. Streak, light green to light blue. Is translucent. Is soluble in acids. Occurs in small quantities in many zinc and copper fields.

Azurite. $2\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$. A basic, copper carbonate, containing 55.3% copper. Common names, blue carbonate of copper, blue malachite, azure copper ore. Crystallization, monoclinic. Fracture, conchoidal. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.77 to 3.83. Lustre, vitreous. Color, azure blue. Streak, lighter blue. Is subtranslucent to transparent. Occurs frequently in the oxidized zone of copper ore bodies, almost invariably with malachite, but is much less common than malachite. Is a valuable commercial ore of copper.

BARNHARDTITE. Formula uncertain. A copper and iron sulphide, probably an alteration product from chalcopyrite that has lost part of its iron and copper, containing 46.7 to 50.4% copper. Apparently is nearer to bornite than to chalcopyrite. Structure, massive, compact. Fracture, conchoidal. Hardness, 3.5. Gravity, 4.5. Lustre, metallic. Color, bronze-yellow, tarnishing to pinchbeck-brown. Streak, grayish black, slightly shining. Occurrences, North Carolina and Arizona.

BARRACANITE. Cupropyrrite.

BAYLDONITE. $4(\text{Pb}, \text{Cu})\text{O} \cdot \text{As}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$. A hydrous basic lead and copper arsenate containing 26.1% copper. Occurs in minute mamillary concretions with drusy surface. Fracture, subconchoidal. Hardness, 4.5. Gravity, 5.35. Lustre, resinous. Color, grass-green to blackish green. Streak, apple-green. Is subtranslucent. Soluble, with difficulty, in nitric acid. Occurs in Cornwall, England.

BEAUMONTITE. A very doubtful hydrous copper silicate, from Chessy, France.

BELL-METAL ORE. Common name for stannite.

BERZELIANITE. Cu_2Se . A copper selenide containing 61.6% copper. Occurs disseminated in incrustations. Is very soft. Gravity, 6.71. Lustre, metallic. Color, silver-white, soon tarnishing. Streak, shining. Usually is argentiferous. Occurs in Småland, Sweden.

BEUDANTITE. Apparently this name is applied to two minerals, one an arsenate and the other a sulphate of iron, lead and copper, carrying from a trace to 9.8% copper.

BINNITE. Formula probably $3\text{Cu}_2\text{S} \cdot 2\text{As}_2\text{S}_3$. A copper sulphoarsenite, containing 37.7% copper. A variety of tennantite. Crystallization, isometric. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 4.47.

Lustre, metallic. Color, dark steel-gray to iron-black. Streak, reddish brown. Occurrence, Binnenthal, Switzerland.

BLACK COPPER. Common name for melaconite or disseminated chalcocite. In all likelihood much of what has been taken for melaconite in the past was disseminated chalcocite.

BLUE COPPER. Common name for azurite.

BLUE MALACHITE. Common name for azurite.

BLUESTONE. Common name for chalcantite; also for blue vitriol, the manufactured product corresponding in chemical formula with chalcantite.

BLUE VITRIOL. Common name for chalcantite or bluestone.

BOGOSLOVSKITE. Chrysocolla carrying carbon dioxide as an impurity, from the Bogoslovsk mine, Perm, Russia.

BOLÉITE. $\text{Pb}(\text{OH})\text{Cl}\cdot\text{Cu}(\text{OH})\text{Cl}+\frac{1}{2}\text{AgCl}$. A hydrated lead, copper and silver oxychloride, containing about 12% copper. Crystallization, isometric. Texture loose. Hardness, 3 to 3.25. Gravity, 5.08. Color, indigo-blue. Occurrence, at the Boleo mines, Baja California, Mexico.

BOOTHITE. $\text{CuO}\cdot\text{SO}_4\cdot 7\text{H}_2\text{O}$. A hydrous sulphate of copper. Crystallization monoclinic. Color, blue. A variety Morenoside.

Bornite. Cu_3FeS_4 . A copper and iron sulphide, containing 55.5% copper, 16.4% iron, 28.1% sulphur. Common name, peacock copper ore. Crystallization, rare isometric, with many hexagonal penetration twins. Structure, granular or compact. Fracture, small conchoidal to uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.9 to 5.4. Lustre, metallic. Color, copper red to bluish brown, quickly tarnishing to iridescence, often most brilliant. Streak, pale grayish-black. Is soluble in nitric acid, with separation of sulphur. Is a primary mineral, at Butte and in contact metamorphic ores, but also occurs as the first alteration product from chalcopyrite among the secondary copper sulphides, and often carries nodules and occasionally larger masses of chalcocite. Is one of the most important ores of copper.

BOTALLACKITE. Atacamite.

BOURNONITE. $3(\text{Pb},\text{Cu}_2)\text{S}\cdot\text{Sb}_2\text{S}_3$. A lead and copper sulphantimonite, containing 13% copper, and 42.5% lead. Crystallization, orthorhombic. Structure, massive, granular and compact. Cleavage, imperfect. Fracture, subconchoidal to uneven. Tenacity, rather brittle. Hardness, 2.5 to 3. Gravity, 5.7 to 5.9. Lustre, brilliant metallic. Color and streak, steel-gray, inclining to blackish gray or iron-black. Fuses easily on charcoal and is soluble in acids. Occurrence, in many copper fields.

BRASS ORE. Common name for aurichalcite.

BROCHANTITE. $4\text{CuO}\cdot\text{SO}_4\cdot 3\text{H}_2\text{O}$. A basic copper sulphate containing 56.2% copper. Crystallization, orthorhombic. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 3.9. Lustre, vitreous. Color, emerald-green to blackish green. Streak, paler green. Is translucent to transparent. Is found in many copper fields, and is an important commercial ore in the Clifton district, Graham county, Arizona, and Chuquicamata, Chile.

BURATITE. An aurichalcite containing calcium monoxide, probably as a mechanical admixture.

CACHEUTAITE. A lead, copper and silver selenide carrying 7 to 36% copper. Is closely related to zorgite.

CALCIOVOLBORTHITE. $4(\text{Cu},\text{Ca})\text{O}\cdot\text{V}_2\text{O}_5\cdot\text{H}_2\text{O}$. A hydrous basic copper and calcium vanadate, containing 31.7% copper. Hardness, 3.5. Gravity, 3.5 to 3.86. Color, gray to green. Streak, brownish yellow to greenish yellow. Occurrence, Thuringia, Germany.

CALEDONITE. $2(\text{Pb},\text{Cu})\text{O}\cdot\text{SO}_4\cdot\text{H}_2\text{O}$. A basic lead and copper sulphate, containing 9.4% copper. Crystallization, orthorhombic. Fracture, uneven. Tenacity, rather brittle. Hardness, 2.5 to 3. Gravity, 6.4. Lustre, resinous. Color, verdigris-green to bluish green. Streak, greenish white. Is translucent. Occurrence, Scotland, Hungary, California, etc.

CANTONITE. A dimorphous variety of covellite, apparently a pseudomorph after galena, crystallized in cubes with cubical cleavage.

CAPILLARY RED OXIDE OF COPPER. Common name for chalcotrichite, a form of cuprite.

CARMENTITE. A variety of digenite.

CARROLLITE. $\text{CuS} \cdot \text{Co}_2\text{S}_3$. A cobalt and copper sulphide containing 20.5% copper and 38% cobalt. Crystallization, isometric. Fracture, sub-conchoidal to uneven. Hardness, 5.5. Gravity, 4.85. Lustre, metallic. Color, light steel-gray, with faint reddish hue. Occurrence, Carroll county, Maryland.

CASTILLITE. $(\text{Cu}, \text{Ag})_2\text{S} \cdot 2(\text{Cu}, \text{Pb}, \text{Zn}, \text{Fe})\text{S}$. A copper, silver, lead, zinc and iron sulphide carrying about 41% copper. Apparently an impure bornite. Structure, massive. Hardness, 3. Gravity, 5.19 to 5.24. Resembles bornite in color, streak and tarnish. Occurrence, Guanaceví, Mexico.

CERALEITE. (Coeruleite) $\text{CuO} \cdot 2\text{Al}_2\text{O}_3 \cdot \text{As}_2\text{O}_5$. A massive clay-like, turquoise blue, arsenate of copper and aluminum.

Chalcanthite. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. A hydrous copper sulphate containing 25.4% copper. Common names, blue vitriol, bluestone, copper sulphate. Crystallization, triclinic. Structure, massive, stalactitic and reniform, sometimes fibrous. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5. Gravity, 2.12 to 2.30. Lustre, vitreous. Color, sky-blue. Streak, uncolored. Is translucent to subtransparent. Is soluble in water. Occurs as deposits from mine water in most sulphide copper mines, and is found in impure state, in beds, in Chile.

Chalcocite. Cu_2S . A copper sulphide carrying 79.8% copper. Common names, copper glance, cuprous sulphide. Crystallization, orthorhombic; also occurs massive, with structure granular to compact and impalpable. Cleavage, indistinct. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 5.5 to 5.8. Lustre, metallic. Color and streak, blackish lead-gray, tarnishing to dull green or blue. Is soluble in nitric acid. Occurs in all copper districts, frequently in large quantities. Is the richest commercial ore of copper and yields more than one-half of world's copper supply.

CHALCOLITE. Torbernite.

CHALCOMENITE. $\text{CuO} \cdot \text{SeO}_2 \cdot 2\text{H}_2\text{O}$. A hydrous copper selenite containing 28% copper. Crystallization, monoclinic. Gravity, 3.76. Lustre, vitreous. Color, bright blue. Is transparent. Is soluble in acids. Found at Cacheuta, Mendoza, Argentina.

CHALCOMICHLITE. Bornite.

CHALCOPHACITE. Liroconite.

CHALCOPYLLITE. $7\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 14\text{H}_2\text{O}$. A hydrous basic copper arsenate containing 42.3% copper. Crystallization, rhombohedral. Hardness, 2. Gravity, 2.43 to 2.66. Lustre, vitreous. Color, grass-green to verdigris-green. Streak, grass-green. Occurs in Hungary, Siberia and Utah.

Chalcopyrite. Cu_5FeS_4 . A copper and iron sulphide containing 34.5% copper and 30.5% iron. Is the primary ore of copper. Crystallization, tetragonal, sphenoidal, often twinning, also frequently massive and compact. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 4.1 to 4.3. Lustre, metallic. Color, brass-yellow, often tarnishing to iridescence. Streak, greenish black. Is soluble, except sulphur, in nitric acid, and, on being heated, yields a portion of its sulphur. On exposure to moisture and heat becomes hydrated, and copper and iron change readily to sulphates. Alters to azurite, malachite, melaconite, chalcocite, covellite, bornite, brochantite, chrysocolla, tetrahedrite and tennantite. Is found in practically every copper field in the world, and is second only to chalcocite in importance among the commercial ores of copper.

CHALCOPYRRHOTITE. $\text{CuS} \cdot \text{FeS}_2$. An iron and copper sulphide containing 13% copper and 48.2% iron. Structure, massive. Hardness, 3.5 to 4. Gravity, 4.28. Color, brassy, with brownish tinge. Occurrence, Nya Kopparberg, Sweden.

CHALCOSIDERITE. $\text{CuO} \cdot 3\text{Fe}_2\text{O}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 8\text{H}_2\text{O}$. A hydrous iron and copper phosphate containing 6.4% copper. Hardness, 4.5. Gravity, 3.1. Crystallization, triclinic in minute distinct crystals in sheaf-like group. Lustre, vitreous. Color, dark green. Streak, pale green. Occurs in Cornwall, England, and Westphalia, Germany.

CHALCOSINE. Chalcocite.

CHALCOSTIBITE. $\text{Cu}_2\text{S} \cdot \text{Sb}_2\text{S}_3$. A copper sulphantimonite containing 25.6% copper and 48.5% antimony. Crystallization, orthorhombic, in thin prisms. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3 to 4. Gravity, 4.75 to 5. Lustre, metallic. Color, between lead gray and iron-gray. Occurrences, in the Hartz Mountains of Germany and in Guadix, Spain.

CHALCOTRICHITE. A form of cuprite with capillary or acicular crystallization. Common name, plush copper ore.

CHALMERSITE. $\text{Cu}_3\text{S} \cdot \text{Fe}_2\text{S}_3$. Occurs in orthorhombic prisms. Color, bronze yellow.

CHELEUTITE. A ferruginous, nickeliferous and slightly cupriferous smaltite.

CHENEVIXITE. $2\text{CuO} \cdot \text{Fe}_2\text{O}_3 \cdot \text{As}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous copper and iron arsenate containing 21% copper. Structure, massive. Fracture, subconchoidal. Hardness, 3.5 to 4.5. Gravity, 3.93. Lustre, vitreous. Color, dark olive-green to greenish yellow. Streak, yellowish green. Is soluble in acids. Occurrence, Cornwall, England and Eureka, Juab county, Utah.

CHESSYLITE. Azurite.

CHILEITE. Formula uncertain. A hydrous lead and copper vanadate containing 11.7 to 13.6% copper. Is related to psittacinite. Structure, earthy. Occurrence, Chile.

CHILENITE. $(\text{Ag}, \text{Cu}) \cdot \text{Bi}$. A silver and copper bismuthide containing 8.5% copper and 75% silver. Structure, amorphous, granular. Is soft. Color, silver-white. Occurrence, Copiapó, Chile.

CHIVIATITE. A lead sulphobismuthite carrying about 2.5% copper.

CHLOANTHITE. Empirically nickel diarsenide, but analyses invariably show cobalt and iron, and commonly small quantities also of copper, lead, silver, bismuth and antimony.

CHLOROTHIONITE. $\text{CuCl}_2 \cdot \text{K}_2\text{SO}_4$. A copper and potassium chlorosulphate. Occurs in bright blue crystalline crusts on lava. Is an alteration product from Mt. Vesuvius.

CHLOROTILE. Formula probably $3\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$. A hydrous copper arsenate containing about 33% copper. Is related to trichalcite. Crystallization, orthorhombic; also occurs fibrous and massive. Is soft. Color, pale emerald-green. Is transparent.

Chrysocolla. $\text{CuSiO}_3 \cdot 2\text{H}_2\text{O}$. A hydrous copper silicate carrying 36% copper. Common names, mountain green and mountain blue. Structure, cryptocrystalline, enamel-like, sometimes botryoidal. Fracture, conchoidal. Is brittle and somewhat sectile. Hardness, 2 to 4. Gravity, 2 to 2.24. Lustre, vitreous to earthy. Color, mountain green, bluish green and sky blue to turquoise-blue, with impure varieties brown to dull black. Streak, white, from pure green and blue varieties. Is opaque to translucent. Is decomposed by acids, without gelatinization. Commonly occurs with carbonate ores in the oxidized zones of copper ore bodies, and is a commercial ore of value in many districts.

CLARITE. $3\text{Cu}_2\text{S} \cdot \text{As}_2\text{S}_5$. Crystallization monoclinic. Color, dark lead-gray. Belongs to enargite family. A dimorphous form of enargite, from Schapbach, Baden, Germany.

CLAYITE. A lead sulphantimonite, carrying copper as a replacement of lead to extent of circa 8%.

CLINOCLASITE. $6\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous basic copper arsenate carrying 48% copper. Crystallization, monoclinic. Is brittle. Hardness, 2.5 to 3. Gravity, 4.19 to 4.36. Lustre, vitreous to resinous. Color, blackish blue-green externally, dark verdigris-green internally. Streak, bluish

green. Is subtransparent to translucent. Is soluble in nitric acid. Occurrence, Cornwall and Utah.

CONDURRITE. Apparently a copper arsenide, related to domeykite. Is supposed to be an alteration product of tennantite. Is soft and blask. Occurs in the Condurrow mine, and at Carn Brea, Cornwall, England.

CONICALCITE. $4(\text{Cu,Ca})\text{O} \cdot \text{As}_2\text{O}_5 \cdot 1\frac{1}{2}\text{H}_2\text{O}$. A hydrous basic copper and calcium arsenate, carrying 24% copper. Structure, reniform and massive. Fracture, splintery. Tenacity, brittle. Hardness, 4.5. Gravity, 4.12. Color and streak, pistachio to emerald green. Is subtranslucent. Occurs in Andalusia, Spain and at Eureka, Juab county, Utah.

CONNELLITE. Formula probably $\text{Cu}_{15}(\text{Cl}_2\text{O}_2\text{H})_2\text{SO}_{16} \cdot 15\text{HO}$. A hydrous basic copper chlorosulphate, containing about 57.6% copper. Crystallization, hexagonal. Hardness, 3. Gravity, 3.36. Lustre, vitreous. Color, fine blue. Is translucent. Is soluble in nitric acid. Occurrence, Cornwall, England.

Copper. Cu. Native copper. The chemical symbol Cu is an abbreviation of cuprum, the Latin word for copper. The metal, native or refined, has the following names in modern languages: kupfer in German; koppar in Swedish; kobber in Norwegian; cobre in Spanish and Portuguese; cuivre in French; rame in Italian.

Atomic weight, 63.2. Belongs in the first group and is the leader of the fifth series of Mendeleef's Periodic System. The group is as follows: 1, hydrogen; 2, lithium; 3, sodium; 4, potassium; 5, copper; 6, rubidium; 7, silver; 8, caesium; 9, unknown (possibly terbium, atomic weight 160); 10, gold; 11, unknown. The fifth series, of which copper is the basic leader, is as follows: 1, copper; 2, zinc; 3, gallium; 4, germanium; 5, arsenic; 6, selenium; 7, bromine. The three metallic elements falling between series four and five in Mendeleef's table, are iron, cobalt and nickel. The frequency with which these three elements are found associated with copper, and the ease with which all four metals replace one another, are notable. The general resemblance between copper, silver and gold, which form ascending steps in the same group, is readily apparent.

System of crystallization, isometric. Tetrahexahedronal forms are the most common, with much twinning. Crystals often show cavernous faces and occasionally elevations, are often distorted and pass gradually through distortions into filiform and arborescent forms. Native copper also occurs massive, in granular form, and in laminae. In the Lake Superior mines the metal occurs in all observed forms and sizes, including lamellae from microscopic flakes up to sheets of immense size and weight, crystals of greatly varying form and size, grains from microscopic size to considerable nodules, and druses, often of considerable size, show various filiform and arborescent shapes. The finest particles are grains and exceedingly minute flakes, occurring in an upper sandstone of the Keweenawan series, while the largest masses, weighing upwards of 500 tons, have been found in contact and fissure veins.

Cleavage, none. Fracture, hackly. Tenacity, second only to that of iron. Is perfectly sectile and highly ductile and malleable, ranking in these particulars with the precious metals. Electrical conductivity, 931, as compared with 1,000 for silver, which possesses the most perfect electrical conductivity of any known metal or alloy. Conductivity for heat, 898, as compared with 1,000 for gold, the most perfect conductor of heat.

Hardness, 2.5 to 3. Specific gravity, in vacuo, at 0 degrees Centigrade (equal to 32°, or freezing point, Fahrenheit), when chemically pure and devoid of porosity, is 8.945. Specific gravity of the ordinary copper of commerce, none of which is free from impurities, varies from about 8.75 when cast, to about 8.95 when rolled, hammered or drawn, the exact gravity depending upon how handled, as well as upon the extent and nature of the impurities contained.

Lustre, metallic. Color, copper-red. Streak, copper-red, metallic, shining. Tarnishes upon exposure to air to brownish red, and is liable to form

a coating of verdigris or oxide upon long exposure to air. Atmosphere laden with moisture and carbonic acid is especially favorable to the formation of verdigris.

Fusibility: Copper is fusible at approximately 2,000° Fahrenheit, or a trifle less than 1,100° Centigrade. Color, when fused, sea-green. Copper becomes volatile under the high temperature of the electric arc.

Solubility: Copper is soluble in nitric acid, aqua regia, and strong boiling sulphuric acid, also, slowly, in dilute hydrochloric and sulphuric acids, with admission of air. When in solution in nitric or sulphuric acids will deposit metallic copper on iron immersed therein.

Affinities: Copper has a greater affinity for sulphur than for any other element, possessing also marked affinities for oxygen, carbon dioxide, arsenic, antimony and bismuth, and unites with many other elements.

Alterations: Native copper alters on exposure, especially in damp air, to the simpler oxide and carbonate ores, such as cuprite, malachite and azurite, and occasionally, in time, to the more complex ore forms.

Occurrence: Native copper occurs, usually in small quantities, in most of the principal copper districts of the world. The native metal is mined upon a considerable scale only in Lake Superior, U. S. A., and Bolivia. The Lake Superior native copper carries considerable silver, mechanically admixed, though not alloyed, but carries no gold. In districts outside of Lake Superior and Bolivia the metal occurs most frequently in connection with the oxide and carbonate ores, and occasionally with the secondary sulphide ores.

Impurities: Native copper frequently contains silver, arsenic, bismuth, antimony, zinc and occasionally mercury. Commercial copper, refined from ores, may contain any of the elements already named, and also gold, tin, lead, selenium and tellurium, the latter two elements in very minute quantities.

COPPER GLANCE. Common name for chalcocite.

COPPER MICA. A miner's name for chalcopyrite.

COPPER NICKEL. A term sometimes used for niccolite.

COPPER PHOSPHATE. Libethenite.

COPPER PYRITES. Common name for chalcopyrite.

COPPER VITRIOL. Trade name for copper sulphate which is called chalcantith in nature; bluestone when manufactured.

COPPER URANITE. Trade name for torbernite.

COPPITE. A ferruginous variety of tennantite.

CORNWALLITE. $5\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous basic copper arsenate containing 46.5% copper. Structure, massive. Fracture, conchoidal. Hardness, 4.5. Gravity, 4.16. Color, verdigris-green to emerald green. Occurrence, Cornwall, England.

COSALITE. Empirically lead sulphobismuthite, but usually cupriferous to the extent of from a trace to 8.75% copper.

Covellite. Covelline. CuS . A beautiful bright blue copper sulphide containing 66.4% copper. Chemical name, cupric sulphide. Crystallization, hexagonal; also occurs massive. Is flexible in thin layers, with basal cleavage. Hardness, 1.5 to 2. Gravity, 4.6. Lustre, submetallic on crystals, dull when massive. Color, indigo-blue. Streak, lead-gray to black, shining. Occurs in most sulphide copper districts, as a secondary ore and is a valuable commercial ore of copper, when found in sufficient quantities, as in Butte, Mont., Utah, Wyoming and elsewhere.

CREDNERITE. $3\text{CuO} \cdot 2\text{Mn}_2\text{O}_3$. A copper manganate containing 34.4% copper. Crystallization, monoclinic. Cleavage, basal, perfect, less distinct in other directions. Hardness, 4.5. Gravity, 4.9 to 5.1. Lustre, metallic. Color, iron-black to steel-gray. Streak, brownish black. Is soluble in hydrochloric acid.

CROOKESITE. $(\text{Cu}, \text{Tl}, \text{Ag})_2\text{Se}$. A copper, thallium and silver selenide, containing 44 to 46% copper, 17 to 18.5% thallium and 1.5 to 5% silver. Structure is massive, without crystallization. Is brittle. Hardness,

2.5 to 3. Gravity, 6.9. Lustre, metallic. Color, lead-gray, finely disseminated. Occurrence, Småland, Sweden.

CUBANITE. $\text{CuS.Fe}_2\text{S}_3$. An iron and copper sulphide containing 23.3% copper and 41.3% iron. Crystallization, isometric; also occurs massive. Cleavage, cubic. Hardness, 4. Gravity, 4.026 to 4.169. Color, bronze to brass-yellow. Streak, dark reddish bronze to black. Occurrence, Cuba, California and Sweden.

CUMENGITE. Pb(OH)Cl.Cu(OH)Cl . A hydrous lead and copper oxychloride, related to boléite. Crystallization, tetragonal. Color, indigo-blue. Loose texture.

CUPRIC OXIDE. Tenorite, when found in nature; copper monoxide in chemistry.

Cuprite. Cu_2O . A copper oxide, containing 8.88% copper, being the richest copper ore. Chemical names, cuprous oxide, copper protoxide. Common names, ruby copper, red glassy copper ore, octahedral copper ore. Crystallization, isometric, commonly in octohedrons; also occurs massive, granular and sometimes earthy. Fracture, conchoidal. Is brittle. Hardness, 3.5 to 4. Gravity, 5.85 to 6.15. Lustre, adamantine to earthy. Color, light to dark red; when fresh, usually ruby-red, but fades to duller red. Streak, brownish red, shining. Is subtransparent to subtranslucent. Occurs in most copper districts in the upper oxidized zone, frequently shading into crystals of native copper.

CUPROBISMUTITE. $3\text{Cu}_2\text{S.4Bi}_2\text{S}_3$. A copper sulphobismuthite containing 15% copper and 65.1% bismuth. Occurs in slender prismatic crystals. Gravity, 6.31 to 6.68. Lustre, metallic. Color, dark bluish black. Streak, black. The copper frequently is replaced partially by silver.

CUPROCALCITE. Formula perhaps $(\text{Cu}_2\text{O})_x \cdot \text{CO}_2 + 2\text{CaO} \cdot \text{CO}_2 + \text{H}_2\text{O}$. Apparently merely an intimate mixture of cuprite and calcium carbonate. Hardness, 3. Gravity, 3.9. Color, vermilion-red. Is soluble in hydrochloric acid.

CUPROCASSITERITE. Formula possibly $4\text{SnO}_2 + \text{Cu}_2\text{Sn(OH)}_2$. Occurrence, Black Hills of South Dakota.

CUPRODESCLOIZITE. A cupriferous variety of descloizite, which is a basic lead and zinc vanadate.

CUPROFERRITE. Pisanite.

CUPROGOSLARITE. A copper-bearing variety of goslarite, or zinc sulphate.

CUPROIODARGYRITE. CuI.AgI . A copper and silver iodide. Apparently a decomposition product of stromeyerite. Occurs, as incrustations, at Huantajaya, Chile.

CUPROMAGNESITE. $(\text{Cu,Mg}) \text{SO}_4 + 7\text{H}_2\text{O}$. A copper and magnesium sulphate; crystallization monoclinic. Occurs in crust on lava. Color, bluish green. Is alteration product, occurring as incrustations, from Mt. Vesuvius.

CUPROPLUMBITE. $\text{Cu}_2\text{S.2PbS}$. A copper and lead sulphide, carrying 61.3% copper and 19% lead. Structure, massive. Lustre, feeble or lacking. Color, lead-gray to indigo-blue. Occurrence, Catemou, Aconcagua, Chile, Butte, Montana, and Semipalatinsk, Siberia.

CUPROPYRITE. CuFe_2S_4 . An iron and copper sulphide, carrying 24% copper. Is closely related to cubanite.

CUPROSCHEELITE. $(\text{Ca,Cu})\text{WO}_4$. A calcium and copper tungstate carrying 3 to 5% copper. Is a variety of cuprotungstite in which copper is mainly replaced by calcium.

CUPROTUNGSTITE. CuWO_4 . A copper tungstate carrying 24% copper. Structure, granular and incrustive. Hardness, 4.5 to 5. Color, pistachio-green to leek-green. Streak, greenish gray to greenish yellow. Is soluble in hydrochloric acid. Occurrence, Llamuco, Santiago de Chile.

CUPROURANITE. Torbernite.

CUPROUS OXIDE. Cuprite in nature. Chemical term for two atoms of copper united with one atom of oxygen.

CUPROVANADITE. Chileite.

CYANOCHALCITE. A phosphoriferous variety of chrysocolla, from Nijnj Tagilsk, Perm, Russia.

CYANOCHROITE. $\text{CuSO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$. A hydrous copper and potassium sulphate, carrying 14.3% copper. Crystallization, monoclinic. Color, clear blue. Is an alteration product from Mt. Vesuvius.

CYANOTRICHITE. $4\text{CuO} \cdot \text{Al}_2\text{O}_3 \cdot \text{SO}_3 \cdot 8\text{H}_2\text{O}$. A hydrous basic copper and aluminum sulphate, carrying 39.4% copper. Crystallization, orthorhombic. Lustre, pearly. Color, smalt-blue to sky-blue. Occurrence, Hungary, France, Arizona and Utah.

DARWINITE. Whitneyite.

DELAFOSSITE. An iron, copper and aluminum oxide containing 37.9% copper, 47.99% iron sesquioxide and 3.52% aluminum sesquioxide. Occurrence, Ekaterinburg, Perm, Russia.

DEMIDOVITE. A phosphoriferous variety of chrysocolla from Tagilsk, Perm, Russia.

DIGENITE. Apparently a partly altered chalcocite containing a considerable percentage of covellite.

DIHYDRITE. $5\text{CuO} \cdot \text{P}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$. A hydrous basic copper phosphate containing 55.2% copper. Crystallization, monoclinic; also occurs massive and fibrous. Fracture, conchoidal to uneven. Tenacity, brittle. Hardness, 4.5 to 5. Gravity, 4 to 4.4. Lustre, adamantine. Color, dark emerald-green. Streak, pale emerald-green. Is translucent. Is soluble in nitric acid. Occurrence, Germany and the Ural Mountains of Russia.

DILLENBURGITE. An impure chrysocolla containing copper carbonate.

DIOPHASE. $\text{CuO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$. A hydrous copper silicate carrying 40.3% copper. Common names, emerald copper, emerald malachite. Crystallization, rhombohedral; also occurs massive. Fracture, conchoidal to uneven. Tenacity, brittle. Hardness, 5. Gravity, 3.28 to 3.35. Lustre, vitreous. Color, brilliant emerald-green. Streak, green. Is subtranslucent to transparent. Gelatinizes with hydrochloric acid. Is fusible with charcoal and soda. Occurrence, Chile, Hungary, Siberia, French Congo, at Superior, Arizona, etc.

DOGNACSKAITE. Formula perhaps $3\text{Cu}_2 \cdot 5\text{Bi}_2\text{S}_3$. A variety of cuprobismutite carrying slightly less copper and sulphur and slightly more bismuth than the normal mineral. Color, gray.

DOLEROPHANITE. $2\text{CuO} \cdot \text{SO}_3$. A basic copper sulphate carrying 53.1% copper. Crystallization, monoclinic. Color, brown. Is soluble in nitric acid. Is a sublimation product from Mt. Vesuvius.

DOMEYKITE. Cu_3As . A copper arsenide carrying 71.7% copper. Common name, arsenical copper. Structure, reniform and botryoidal, also massive and disseminated. Fracture, uneven. Hardness, 3 to 3.5. Gravity, 7.2 to 7.75. Lustre, metallic, dulling on exposure. Color, tin-white to steel gray, tarnishing to iridescent bronze, sometimes argentiferous and granular. Is fusible in open tube, yielding a white sublimate of arsenic trioxide. Is soluble in nitric acid. Occurrence, Chile, Bolivia, Saxony, Mexico and Lake Superior.

DUCKTOWNITE. Apparently merely a mechanical mixture of chalcocite and pyrite.

DÜRFELDTITE. $3(\text{Pb}, \text{Ag}, \text{Cu}, \text{Mn}, \text{Fe})\text{S} \cdot \text{Sb}_2\text{S}_3$. A lead, silver, copper, manganese and iron sulphobismuthite. Occurs in acicular crystals. Hardness, 2.5. Gravity, 5.4. Lustre, metallic. Color, light gray. Is related to stylopyrite. Found in Perú.

EHLITE. $5\text{CuO} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous basic copper phosphate containing 52 to 55% copper. Is closely related to dihydrite and pseudomalachite. Gravity, 4.2 to 4.4. Occurrence, Cornwall, England, and Nijnj Tagilsk, Perm, Russia.

EMERALD COPPER. Common name for diophtase.

EMERALD MALACHITE. Common name for diophtase.

EMPLECTITE. $\text{Cu}_2\text{S}\cdot\text{Bi}_2\text{S}_3$. A copper sulphobismuthite containing 18.9% copper and 62% bismuth. Crystallization, orthorhombic, in thin prisms. Tenacity, brittle. Hardness, 2. Gravity, 6.3 to 6.5. Lustre, metallic. Color, grayish to tin-white. Occurrence, Chile, Saxony and Norway.

Enargite. $3\text{Cu}_2\cdot\text{As}_2\text{S}_5$. Enargite grades into famatinite. A copper sulpharsenite containing 48.3% copper. Crystallization, orthorhombic; also occurs massive and granular. Fracture, uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.45. Lustre, metallic. Color and streak, grayish black to iron-black. Is soluble in aqua regia and fusible on charcoal. Occurs in many copper fields, notably at Butte, Montana, where it is a common and valuable ore.

EPIGENITE. Formula probably $4\text{Cu}_2\cdot\text{S}\cdot 3\text{FeS}\cdot\text{As}_2\text{S}_5$. A copper and iron sulpharsenite, carrying about 41% copper. Crystallization, orthorhombic, in short prisms. Fracture, uneven. Hardness, 3.5. Lustre, metallic. Color, steel-gray. Streak, black. Is soluble in nitric acid. Occurrence, Wittichen, Baden, Germany.

ERINITE. $5\text{CuO}\cdot\text{As}_2\text{O}_5\cdot 2\text{H}_2\text{O}$. A hydrous basic copper arsenate, containing 47.8% copper. Occurs in mamillated concentric crystalline groups, also fibrous and rough. Tenacity, brittle. Hardness, 4.5 to 5. Gravity, 4.04. Lustre, slightly resinous. Color, emerald green. Streak, grass-green. Is opaque to subtranslucent. Is soluble in nitric acid. Occurrence, Cornwall and Utah.

ERYTHROCALCITE. $\text{CuCl}_2\cdot n\text{H}_2\text{O}$. A hydrated copper chloride. Is an alteration product from Mt. Vesuvius.

EUCAIRITE. $\text{Cu}_2\text{Se}\cdot\text{Ag}_2\text{Se}$. A silver and copper selenide carrying 25.3% copper and 43.1% silver. Crystallization, isometric; also occurs massive and granular. Hardness, 2.5. Gravity, 7.5. Lustre, metallic. Color, silver-white, to lead-gray. Streak, shining. Occurrence, Småland, Sweden, and Copiapó, Chile.

EUCHLORINE. A compound of copper potash and soda sulphates and cuprous chloride, from Mt. Vesuvius.

EÜCHROITE. $4\text{CuO}\cdot\text{As}_2\text{O}_5\cdot 7\text{H}_2\text{O}$. A hydrous basic copper arsenate containing 39.7% copper. Crystallization, orthorhombic. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.39. Lustre, vitreous. Color, emerald-green to leek-green. Is translucent to transparent. Occurrence, Libethen, Hungary.

FAHLORE. Common name for tetrahedrite or tennantite.

FALKENHAYNITE. $3\text{Cu}_2\text{S}\cdot\text{Sb}_2\text{S}_3$. A copper sulphantimonite carrying 39.5% copper. Apparently is related to stylopyrite. Structure, massive. Gravity, 4.83. Color, gray-black. Occurrence, Joachimsthal, Bohemia, Austria.

FAMATINITE. $3\text{Cu}_2\text{S}\cdot\text{Sb}_2\text{S}_3$. A copper sulphantimonite carrying 43.3% copper. Crystallization, orthorhombic; is isomorphous with enargite; also occurs massive. Fracture, uneven. Tenacity, brittle. Hardness, 3.5. Gravity, 4.57. Color, gray with copper-red tinge. Streak, black. Is fusible on charcoal. Decrepitates in closed tube. Occurrence, Sierra de Famatina, Rioja, Argentina and Cerro de Pasco, Junín, Perú.

FIELDITE. A zinciferous variety of tetrahedrite.

FOOTEITE. $8\text{Cu}(\text{OH})_2\cdot\text{CuCl}_2\cdot 4\text{H}_2\text{O}$. A hydrous basic copper oxychloride containing 55.3% copper. Is closely related to tallingite. Crystallization, monoclinic. Color, deep blue. Occurrence, Bisbee, Arizona.

FOURNETITE. Apparently merely a mechanical mixture of tetrahedrite and galena.

FREDRICITE. An argentiferous, plumbiferous and stanniferous variety of tennantite, from Sweden.

FREIBERGITE. An argentiferous tetrahedrite carrying variable percentages of silver as a replacement of the copper found in the normal tetrahedrite.

FRIGIDITE. A ferruginous and nickleiferous variety of tennantite.

GERHARDITE. $4\text{CuO} \cdot \text{N}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A basic copper nitrate containing 52.9% copper. Crystallization, orthorhombic. Cleavage, yields flexible laminae. Tenacity, fragile and sectile. Hardness, 2. Gravity, 3.426. Lustre, vitreous, brilliant. Color, deep emerald-green. Streak, light green. Is transparent. Is soluble in dilute acids. Occurrence, Jerome, Arizona.

GERSDORFFITE. Empirically nickel sulphoarsenite, but occasionally slightly cupriferous.

Glance. Common name for sulphide ores with dark metallic lustre. Copper glance is chalcocite.

GLASBACHITE. Zorgite.

GLAUCOPYRITE. An iron and cobalt diarsenide, occasionally slightly cupriferous.

GRAY COPPER. Common name for tetrahedrite; name also is applied to tennantite, which shades into tetrahedrite.

GREEN COPPER. Common name for malachite.

GRUNAUITE. An impure nickel sulphide (polydimit) carrying copper, lead, cobalt, iron and bismuth, copper ranging 1.68 to 11.56% in tenor in published assays.

GUEJARITE. $\text{Cu}_2\text{S} \cdot 2\text{Sb}_2\text{S}_3$. A copper sulphoantimonite containing 15.2% copper. Crystallization, orthorhombic. Tenacity, brittle. Hardness, 3.5. Gravity, 5.03. Lustre, metallic. Color, steel-gray, with bluish tinge. Streak, black. Occurrence, Andalusia, Spain.

HARRISITE. A pseudomorph of chalcocite after galena.

HENWOODITE. Chemical formula uncertain. A hydrous aluminum and copper phosphate carrying about 5.6% copper. Occurs in botryoidal globular masses. Fracture, conchoidal. Hardness, 4.4 to 4.5. Gravity, 2.67. Color, turquoise-blue. Streak, bluish to greenish white. Occurs in Cornwall, England.

HERMESITE. An imperfectly established variety of schwartzite.

HERRENGRUNDITE. $\text{CaO} \cdot 4\text{CuO} \cdot 2\text{SO}_3 \cdot 6\text{H}_2\text{O}$. A hydrous basic copper and calcium sulphate carrying 39.5% copper. It is related to brochantite. Crystallization, monoclinic. Tenacity, rather brittle. Hardness, 2.5. Gravity, 3.13. Lustre, vitreous. Color, emerald-green to bluish-green. Streak, light green. Is transparent. Occurrence, Herrengrund, Hungary.

HISTRIXITE. $7\text{Bi}_2\text{S}_3 \cdot 2\text{Sb}_2\text{S}_3 \cdot 5\text{CuFeS}_2$ (a variety of Emeplectite). Orthorhombic prismatic steel gray.

HOMICHLINITE. Chemical formula uncertain. A copper and iron sulphide carrying about 43.8% copper. Apparently is chalcopyrite partly altered to bornite, and close to barnhardtite. Crystallization, tetragonal; also occurs massive. Hardness, 4 to 5. Gravity, 4.48. Color, brassy bronze. Streak, black. Occurrence, Chile, Germany, Japan, etc.

HORSEFLESH ORE. Common name for bornite.

HORSFORDITE. Cu_3Sb . A copper antimonide carrying 76% copper. Structure, massive. Is brittle. Hardness, 4 to 5. Gravity, 8.8. Lustre, metallic. Color, silver-white, tarnishing easily. Is said to occur in large deposits on the Island of Mitylene, Asia Minor.

HUTCHINSONITE. $(\text{Tl}, \text{Ag}, \text{Cu})_2\text{S} \cdot \text{A}_2\text{S}_3 + \text{PbS} \cdot \text{As}_2\text{S}_3(?)$ Crystallization orthorhombic in flattened prisms; lustre adamantine; red colored.

HYDROCIANITE. $\text{CuO} \cdot \text{SO}_3$. A copper sulphate carrying 39.6% copper. Crystallization, orthorhombic. Color, green. Is soluble in water. Is an alteration product, from Mt. Vesuvius.

HYDROCUPRITE. Apparently a hydrated cuprite. Is amorphous, occurring in very thin coatings on magnetite. Color, orange-red to orange-yellow. Found at Schapbach, Baden, Germany, and at Cornwall, Pennsylvania.

INDIGO COPPER. Common name for covellite.

ISOPYRE. Apparently an impure opal, carrying about 1.6% copper, found at St. Just, Cornwall, England.

JALPAITE. $3\text{Ag}_2\text{S} \cdot \text{Cu}_2\text{S}$. A silver and copper sulphide, carrying 13.1% copper and 71.5% silver. Apparently is a cupriferous argentite.

Crystallization, isometric. Tenacity, malleable. Gravity, 6.89. Color, blackish lead-gray. Occurrence, Jalpa, Mexico.

JAMESONITE. A lead sulphantimonite, sometimes cupriferous to the extent of about 3.5%.

JOHANNITE. Chemical formula uncertain. A hydrous uranium and copper sulphate, containing circa 4.8% copper. Crystallization, monoclinic. Hardness, 2 to 2.5. Gravity, 3.19. Lustre, vitreous. Color, emerald-green to apple-green. Streak, paler green. Is translucent to transparent. Taste, bitter. From Joachimsthal, Bohemia.

JULIANITE. A slightly argentiferous and ferruginous variety of tennantite, from Silesia, Germany.

KAMAREZITE. $(\text{CuOH})_2\text{SO}_4 \cdot \text{Cu}(\text{OH})_2 + 6\text{H}_2\text{O}$. A hydrated copper sulphate. Crystallization, probably orthorhombic. Color, grass green. Occurrence, Laurium, Greece.

KARAMSINITE. Chemical formula uncertain. As determined is a weird silicate of aluminum, iron, manganese, copper, calcium, magnesium and potassium, containing circa 1.85% copper. Occurrence, Finland.

KEWEENAWITE. $(\text{Cu,Ni,Co})_2\text{As}$. A copper and nickel arsenide, related to mohawkite, carrying 39 to 54% copper and 9.7% to 20% nickel, with cobalt replacing nickel to extent of about 0.9%. Structure, massive. Cleavage, subconchoidal. Fracture, uneven. Tenacity, slight. Hardness, 4. Gravity, 7.7. Lustre, metallic. Color, pale pinkish brown red, tarnishing to darker red. Is soluble in nitric acid. Occurrence, Mohawk mine, Keweenaw county, Michigan.

KLARPOTHOLITE. $3\text{Cu}_2\text{S} \cdot 2\text{Bi}_2\text{S}_3$. A copper sulphobismuthite containing 25.3% copper and 55.4% bismuth. Crystallization, orthorhombic, in furrowed prisms. Fracture, uneven. Tenacity, brittle. Hardness, 2.5. Gravity, 4.6. Lustre, metallic. Color, steel-gray, tarnishing to iridescent brass-yellow. Occurrence, Baden, Germany.

KOBELLITE. A lead sulphoantimonite, usually cupriferous to the extent of about 1%.

KROHNKITE. $\text{CuSO}_4 \cdot \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$. A hydrous copper and sodium sulphate carrying 18.8% copper. Crystallization, monoclinic. Fracture, conchoidal. Hardness, 2.5. Gravity, 1.98. Lustre, vitreous. Color, azure-blue to bluish green. Occurrence, Cobija, Atacama, Chile.

LAMPADITE. A cupriferous wad, an earthy form of manganese oxide with 3 to 15% copper.

LANGITE. $4\text{CuO} \cdot \text{SO}_3 \cdot 4\text{H}_2\text{O}$. A hydrous basic copper sulphate containing 53% copper. Is closely related to brochantite. Crystallization, orthorhombic. Hardness, 2.5 to 3. Gravity, 3.5. Lustre, vitreous on crystals, silky on crusts. Color, greenish blue. Is translucent. Occurrence, Cornwall, England.

LAUTITE. CuAsS . An imperfectly determined copper sulphoarsenite, of the enargite family, from Marienberg, Saxony.

LAVENDULAN. Chemical formula probably $3(\text{Cu,Co,Ni})\text{O} \cdot \text{As}_2\text{O}_5 + 3\text{H}_2\text{O}$. A hydrous copper, cobalt and nickel arsenate, containing about 32% copper, 2.5% cobalt monoxide and 1.35% nickel monoxide. Is related to trichalcite. Structure, amorphous. Fracture, conchoidal. Hardness, 2.5 to 3. Gravity, 3.01. Lustre, greasy to vitreous. Color, lavender blue. Streak, pale lavender blue. Diaphaneity, translucent. Is soluble in warm hydrochloric acid. Occurrence, Chile and Saxony.

LAXMANNITE. Vauquelinite.

LEDOUXITE. Cu_3As_2 . Massive, silver white.

LENGENBACHITE. $6\text{PbS}(\text{Ag,Cu})_2\text{S} \cdot \text{As}_2\text{S}_3$. Crystallization triclinic, bladed, steel gray.

LEPIDOPHAEITE. A varietal form of cupriferous wad or lampadite.

LETTOMITE. Cyanotrichite.

LEUCOCHALCITE. $4\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous basic copper arsenate, carrying about 39.8% copper. Structure, acicular. Lustre, silky. Color, light greenish white.

LIBETHENITE. $4\text{CuOP}_2\text{O}_8\cdot\text{H}_2\text{O}$. A hydrous copper phosphate carrying 51.1% copper. Common name, copper phosphate. Crystallization, orthorhombic. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 4. Gravity, 3.6 to 3.8. Lustre, resinous. Color and streak, olive-green. Diaphaneity, subtranslucent. Is soluble in nitric acid. Occurrence, Chile, Bolivia, England, Germany and Hungary.

LILIANITE. A lead sulphobismuthite, sometimes cupriferous to the extent of about 1.5%.

LIME-MALACHITE. Apparently merely a malachite carrying gypsum or calcite, or both, as impurities.

LINARITE. $\text{PbO}\cdot\text{CuO}\cdot\text{SO}_4\cdot\text{H}_2\text{O}$. A basic lead and copper sulphate carrying 15.8% copper and 55.7% lead oxide. Crystallization, monoclinic. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5. Gravity, 5.3 to 5.45. Lustre, vitreous to adamantine. Color, deep azure-blue. Streak, pale blue. Diaphaneity, translucent. Occurs in many lead and copper districts.

LINDACKERITE. Chemical formula probably $3\text{NiO}\cdot 6\text{CuO}\cdot \text{SO}_3\cdot 2\text{As}_2\text{O}_5\cdot 7\text{H}_2\text{O}$. A hydrous copper and nickel sulphoarsenate containing 27.8% copper. Crystallization, orthorhombic. Hardness, 2 to 2.5. Gravity, 2 to 2.5. Lustre, vitreous. Color, verdigris-green to apple-green. Streak, pale green to white.

LINNAEITE. A cobalt sulphide in which cobalt frequently is replaced partially by nickel, iron or copper, latter to the extent of 1 to 8%.

LIROCONITE. $18\text{CuO}\cdot 4\text{Al}_2\text{O}_3\cdot 5\text{As}_2\text{O}_5\cdot 55\text{H}_2\text{O}$. A hydrous basic copper and aluminum arsenate carrying 28.7% copper. Crystallization, monoclinic; also occurs rarely, granular. Cleavage, subconchoidal. Is imperfectly sectile. Hardness, 2 to 2.5. Gravity, 2.88 to 2.98. Lustre, vitreous. Color and streak, sky-blue to verdigris-green. Is soluble in nitric acid. Occurrence, Hungary and Cornwall, England.

LITHIDIONITE. A copper, iron, potassium and sodium silicate carrying circa 5.2% copper. Is an alteration product from Mt. Vesuvius.

LUNNITE. A name proposed for dihydrite, pseudomalachite and their varietal forms.

LUZONITE. A dimorphous form of enargite, found in the Mancayan-Suyoc district, Lepanto, Luzon, Philippines.

LYELLITE. Langite.

— **Malachite.** $2\text{CuO}\cdot \text{CO}_2\cdot \text{H}_2\text{O}$. A basic copper carbonate carrying 57.5% copper. Common names, green copper carbonate, basic cupric carbonate. Crystallization, monoclinic. Commonly massive, but frequently in crustive and sometimes granular or earthy, and disseminated as stains. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.9 to 4.03. Lustre, of crystals, adamantine, frequently with concretionary bands of varying shades from pistachio-green to bluish green. Streak, green. Is opaque to translucent. Is soluble in nitric acid. Occurs in most copper districts, in the upper portions of the oxidized zones of ore bodies, and frequently is an important commercial ore. When massive and beautifully marked is a semi-precious stone, used for table tops, etc.

MALINOWSKITE. A plumbiferous and usually argentiferous variety of tennantite.

MARCYLITE. An imperfectly determined alteration product from copper sulphides, consisting of hydrated copper oxides and sulphides. Occurrence, Peru and Arkansas, U. S. A.

MARSHITE. Cu_2I_2 . A copper iodide containing 33.4% copper. Crystallization, tetragonal. Fracture, subconchoidal. Tenacity, brittle. Lustre, adamantine. Color, oil-brown. Streak, orange-yellow. Is translucent. Occurrence, Broken Hill mines, New South Wales, Australia.

Melaconite. Massive, compact, shining or earthy dull, black copper oxide of same composition as tenorite. Tenorite.

MELANOCHALCITE. Chiefly CuO with some $\text{SiO}_2\cdot\text{CO}_2\cdot\text{H}_2\text{O}$. A massive black mineral. $\text{Cu}_2(\text{Si,C})\text{O}_4\cdot\text{Cu}(\text{OH})_2$. A copper silicate containing 61.4% copper. Structure, amorphous or cryptocrystalline, habit of crystals being

undetermined. Hardness, 4. Gravity, 4.14. Lustre, vitreous. Color, jet black, powder is coffee-brown.

MELANOTHALLITE. Chemical formula probably $\text{CuCl}_2 \cdot \text{CuO} \cdot 2\text{H}_2\text{O}$. A copper oxychloride. Is an alteration product at Mt. Vesuvius.

MIARGYRITE. A silver sulphoantimonite, frequently cupriferous to the extent of one-half to one per cent.

MIXITE. Chemical formula probably $20\text{CuO} \cdot \text{Bi}_2\text{O}_3 \cdot 5\text{As}_2\text{O}_5 \cdot 22\text{H}_2\text{O}$. A hydrated basic copper arsenobismuthite, carrying 35.2% copper. Occurs in tufts of minute acicular crystals. Hardness, 3 to 4. Gravity, 3.79. Color, whitish green to emerald-green or bluish-green. Streak, lighter green. Is translucent, and, in fine particles, transparent. Occurrence, Baden, Germany, and Utah.

MOHAWKITE. $(\text{Cu}, \text{Ni}, \text{Co})_2\text{As}$. A copper, nickel and cobalt arsenide, carrying 63 to 69% copper, 3 to 7% nickel and 0.5 to 2% cobalt, usually somewhat argentiferous. Crystallization, hexagonal, by synthesis, no crystals being found in nature. Cleavage, indistinct. Fracture, uneven. Tenacity, slight. Hardness, 4. Gravity, 8.05. Color, light gray on fresh fractures, tarnishing to purple or brassy yellow. Streak, gray. Is soluble in nitric acid. Occurrence, Mohawk mine, Keweenaw county, Michigan.

MOHAWK-WHITNEYITE. Cu_3As . A copper arsenide, carrying 83 to 87% copper. Is a mere name of convenience for an intimate blending of mohawkite and whitneyite, or keweenawite and whitneyite, indistinguishable to the eye, but determined chemically. Cleavage, none. Fracture, hackly. Tenacity, is malleable to only a slightly less extent than copper. Hardness, about 5. Gravity, 8.6. Color, gray, with a yellowish tinge, tarnishing to coffee-brown. Streak, gray. Is soluble in nitric acid, with a small residue of gray powder. Occurrence, at Mohawk mine, Keweenaw county, Michigan.

MOTTRAMITE. Chemical formula undetermined. A hydrous basic lead and copper vanadate containing about 16.3% copper. Form resinous, velvety black crystalline incrustation. Is very closely related to psittacinite.

MOUNTAIN BLUE. Common name for azurite.

MOUNTAIN GREEN. Common name for malachite. Name sometimes is applied to chrysocolla also.

MYSORIN. An impure malachite from Mysore, India.

NAMAQUALITE. Chemical formula probably $2\text{Cu}(\text{OH}) \cdot \text{Al}(\text{OH})_3 \cdot 2\text{H}_2\text{O}$. A hydrated copper and aluminum oxide, carrying 35.8% copper. Occurrence, Little Namaqualand, Cape Colony.

NANTOKITE. Cu_2Cl_2 . A copper chloride, carrying 84.1% copper. Crystallization, isometric; also occurs massive and granular. Cleavage, cubic. Fracture, conchoidal. Hardness, 2 to 2.5. Gravity, 3.9. Lustre, adamantine. Color, grayish white to colorless. Is translucent to transparent. Is soluble in nitric or hydrochloric acids, and in ammonia. Yields chlorine when sharply struck. Oxidizes readily on exposure to atmosphere. Occurrence, Carmen Bajo mine, Chile, and Broken Hill mines, New South Wales.

NATROCHALCITE. $\text{Na}_2\text{SO}_4 \cdot \text{Cu}_2(\text{OH})_2(\text{SO}_4) \cdot 2\text{H}_2\text{O}$. A sodium copper sulphate of the copperas group. Crystallization monoclinic. Lustre, brilliant. Translucent. Color, emerald-green.

NEOCIANOITE. Anhydrous copper silicate. Crystallization monoclinic, in microscopic tables as a blue sublimate on lava.

OCTAHEDRAL COPPER ORE. Common name for cuprite.

OLIVE GREEN COPPER ORE. Common name for olivenite.

OLIVENITE. $4\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot \text{H}_2\text{O}$. A hydrous basic copper arsenate, carrying 44.8% copper. Common name, olive green copper ore. Crystallization, orthorhombic, with prismatic and acicular crystals; also occurs globular and granular. Fracture, conchoidal to uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.1 to 4.4. Lustre, adamantine to vitreous. Color, olive-green to blackish green, also earthy, felt-like whitish mass. Is opaque to subtransparent. Is soluble in nitric acid. Occurrence, Nijni Tagilsk, Perm, Russia, Cornwall and Devon, England, Chile, Utah, etc.

ORILEYITE. $(\text{Cu}_2\text{Fe})_2(\text{As},\text{Sb})_2$. A copper and iron arsenoantimonite, carrying 12.13% copper. Is related to stibiodomeykite. Structure, massive. Hardness, 5.5. Gravity, 7.4. Lustre, metallic. Color, steel-gray, with purplish tinge on fresh fracture. Streak, dark gray. Occurrence, Burmah.

PARAMELACONITE. $\text{CuO} + \text{Fe}_2\text{O}_3$. A copper oxide carrying 79.3% copper. Is a dimorphous form of melaconite. Crystallization, tetragonal. Hardness, 5. Gravity, 5.83. Lustre, brilliant. Color, purplish black on faces, pitch-black on fractures. Occurrence, with footeite, at Bisbee, Arizona.

PARATACAMITE. $\text{CuCl}_2 \cdot 3\text{Cu}(\text{OH})_2$. Crystallization rhombohedral. Color, bright green.

PARTZITE. $\text{Cu}_2\text{Sb}_2\text{H}_2\text{O}$. Chemical formula uncertain. A hydrous copper antimonite, carrying about 28.7% copper. Fracture, conchoidal. Hardness, 3 to 4. Gravity, 3.8. Color, yellowish green to blackish green. Occurrence, Mono county, California.

PEACOCK ORE. Common name for bornite. Sometimes is applied also to chalcopyrite when showing an iridescent tarnish.

PEARCEITE. Chemical formula probably $9(\text{Ag},\text{Cu})_2\text{S}_2\text{As}_2\text{S}_2$. A silver and copper sulphoantimonite. Crystallization, rhombohedral; also occurs massive. Cleavage, none. Fracture, conchoidal. Tenacity, brittle. Hardness, 3. Gravity, 6.125. Lustre, metallic. Color and streak, black. Occurrence, Aspen, Colorado.

PELOCONITE. A varietal form of lampadite, a copper-bearing earthy form of manganese oxide.

PENTLANDITE. An iron and nickel sulphide carrying up to 1.75% copper.

PERCYLITE. Chemical formula probably $\text{PbCuO} \cdot \text{Cl}_2 \cdot \text{H}_2\text{O}$. A hydrous lead and copper oxychloride carrying about 17% copper. Crystallization, isometric. Hardness, 2.5. Color and streak, sky-blue. Occurrence, Chile, Bolivia, South Africa and Mexico.

PHILLIPITE. $\text{CuSO}_4 \cdot \text{Fe}_2(\text{SO}_4)_3 + n\text{H}_2\text{O}$. A hydrous copper and iron sulphate, carrying 11.5% copper. Structure, granular and fibrous. Lustre, vitreous. Color, azure-blue. Diaphaneity, translucent. Taste, astringent. Is soluble in water. A variety of Kröhnkite. Occurrence, Los Condes, Santiago de Chile.

PHOSPHOROCHALCITE. $6\text{CuO} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous basic copper phosphate, closely related to dihydrite and pseudomalachite.

PHOSPHOCHROMITE. Vauquelinite.

PILARITE. An aluminous variety of chrysocolla, from Chile.

PISANITE. $(\text{Fe},\text{Cu})\text{SO}_4 \cdot 7\text{H}_2\text{O}$. A hydrous iron and copper sulphate, carrying variable percentages of copper. Practically is a cupriferos melanterite, or copperas. Crystallization, monoclinic. Lustre, vitreous. Color, bright blue. Occurrence, Old Jordan mine, Bingham, Utah.

PLANCHEITE. $15\text{Cu}_2\text{O} \cdot 12\text{SiO}_2 \cdot 5\text{H}_2\text{O}$. A fibrous blue hydrated silicate of silver.

PLANERITE. A hydrous aluminum, copper and iron phosphate, carrying circa 2.8%. Occurrence, Gumishevsk, Perm, Russia.

PLUMBUCUPRITE. Cuproplumbite.

PLUSH COPPER ORE. Common name for capillary cuprite.

POLYBASITE. $9(\text{Ag},\text{Cu})\text{S}_2\text{Sb}_2\text{S}_2$. A silver and copper sulphoantimonite carrying 3 to 10% copper and 62 to 72% silver. Crystallization, orthorhombic. Fracture, uneven. Hardness, 2 to 3. Gravity, 6 to 6.2. Lustre, metallic. Color, iron-black, in thin splinters, cherry-red. Streak, black. Is nearly opaque. Occurrence, Neihart, Mont., Mollie Gibson mine, Aspen, Colo.

PRASINE. A varietal form of dihydrite, containing alumina, silica and arsenic in small amounts, apparently merely as impurities.

PSEUDOBOLÉITE. Cumengite.

PSEUDOLIBETHENITE. Libethenite.

PSEUDOMALACHITE. $6\text{CuO}\cdot\text{P}_2\text{O}_5\cdot 3\text{H}_2\text{O}$. A hydrous basic copper phosphate containing 53.5% copper. Is closely related to dihydrite, but has one extra unit each of cupric oxide and water. Structure, massive, reniform and botryoidal. Hardness 4.5 to 5. Gravity, 3.4 to 4.4. Lustre, vitreous. Color, emerald-green to blackish green. Streak, paler green.

PSITTACINTE. Chemical formula probably $4(\text{Pb}, \text{Cu})\cdot\text{V}_2\text{O}_5\cdot 2\text{H}_2\text{O}$. A hydrous basic lead and copper vanadate, containing about 15.4% copper. Cryptocrystalline coating. Structure, pulverulent. Color, olive-green. Occurrence, Argentina and Montana.

PURPLE COPPER ORE. Common name for bornite.

PYRITES OF COPPER. Common name for chalcopyrite.

RABDIONITE. Chemical formula uncertain. A hydrated iron, manganese and copper oxide, containing 11.2% copper. Is very soft. Gravity, 2.8. Lustre, dull. Color, black. Streak, dark brown. Occurrence, Nijni Tagilsk, Perm, Russia.

RAHTITE. An impure cupriferous sphalerite.

RAMIRITE. Cuprodescloizite.

RED COPPER ORE. Common name for cuprite.

RED GLASSY COPPER ORE. Common name for cuprite.

REDRUTHITE. Chalcocite; prismatic in pseudo-hexagonal twin crystals.

REGNOLITE. $5\text{CuS}\cdot\text{FeS}\cdot\text{ZnS}\cdot\text{As}_2\text{S}_3$. A copper, iron and zinc sulphoarsenite containing 32.6% copper. Is closely related to epigenite, sandbergerite. Crystallization, tetragonal. Occurrence, Cajamarca, Perú.

RESANITE. Chemical formula uncertain. A hydrous copper and iron silicate, containing about 18.5% copper. Structure, massive. Color, olive-green. Is soluble in hydrochloric acid. Occurrence, Liquillo, Porto Rico, associated with chrysocolla and malachite.

REZBANYITE. A lead sulphobismuthite, usually cupriferous to the extent of 1.75 to 3.75%.

RICHMONDITE. A cupriferous variety of beegerite, which is, normally, a lead sulphobismuthite.

RICKARDITE. Cu_2Te_2 . A copper telluride containing 40.5% copper. Structure, massive. Fracture, irregular. Hardness, 3.5. Gravity, 7.54. Color, brilliant, purple, rivaling bornite tarnish, even on a fresh fracture, and showing deep color when pulverized. Is fusible on charcoal and soluble in nitric acid. Occurrence, Good Hope mine, Vulcan, Colorado.

RIONITE. A bismuthiferous variety of tennantite. 13% bismuth.

RIVOTITE. Chemical formula uncertain. A copper and antimony carbonate and oxide carrying about 31.6% copper. Structure, amorphous, compact. Fracture, uneven. Tenacity, fragile. Hardness, 3.5 to 4. Gravity, 3.55 to 3.62. Color, yellowish green to grayish green. Streak, grayish green. Occurrence, Lerida, Spain.

ROSASITE. (Variety of Aurichalcite.) $2\text{CuO}\cdot 3\text{CuCO}_3\cdot 5\text{ZnCO}_3$. A fibrous greenish blue mineral.

RUBY COPPER. Common name for cuprite.

SAFFLORITE. A cobalt diarsenide, usually cupriferous to the extent of 0.25 to 4.25%.

SALVADORITE. $\text{FeSO}_4\cdot 7\text{H}_2\text{O}\cdot 2(\text{CuSO}_4)\cdot 7\text{H}_2\text{O}$. A hydrous copper and iron sulphate carrying about 14.5% copper. Is near pisanite. Crystallization, monoclinic. Lustre, vitreous. Color, bluish green. Occurrence, Calama, Antofagasta, Chile.

SANDBERGERITE. A zinciferous variety of tennantite, from Peru. Contains about 8% zinc.

SCHULZENITE. Chemical formula probably $\text{CuO}\cdot 2\text{CoO}\cdot \text{Co}_2\text{O}_3\cdot 4\text{H}_2\text{O}$. A hydrous copper and cobalt oxide. Structure, amorphous. Fracture, conchoidal. Hardness, 3.5. Gravity, 3.39. Color and streak, black. Occurrence, Chile.

SCHWATZITE. A mercurial tetrahedrite, in which mercury replaces copper variably, usually to the extent of about 15% of the total. Gravity, 5.10. Lustre, dull. Color, dark gray to iron-black.

SELIGMANNITE. $\text{Cu}_2\text{S} \cdot 2\text{PbS} \cdot \text{As}_2\text{S}_3$. Orthorhombic, in small crystals. Color, lead gray. Is a variety of bournonite.

SERPIERITE. $3(\text{Cu}, \text{Zn}, \text{Ca})\text{SO} + 3\text{H}_2\text{O}$. A hydrous basic copper, zinc and calcium sulphate, containing 28.8% copper. Crystallization, orthorhombic. Hardness 2.5. Color, bluish green. Is transparent. Occurrence, Laurium, Greece.

SIEGENITE. A nickeliferous variety of linnæite, frequently carrying small percentages of copper.

SMALTITE. Empirically cobalt disulphide, but frequently carrying copper in quantities from a mere trace to 3.25%.

SOMERVILLITE. $\text{CuSiO}_3 \cdot 4\text{H}_2\text{O}$. A hydrous copper silicate, corresponding in formula with chrysocolla and asperolite, except as to excess of water. From Somerville, Somerset County, New Jersey.

SPANGOLITE. Chemical formula probably $(\text{AlCl})\text{SO}_4 \cdot 6\text{Cu}(\text{OH})_2 + 3\text{H}_2\text{O}$. A basic copper and aluminum chlorosulphate, carrying about 47.7% copper. Crystallization, rhombohedral. Fracture, conchoidal. Hardness, 2 to 3. Gravity, 3.14. Lustre, vitreous. Color, dark green. Occurrence, Cochise County, Arizona.

SPANIOLITE. An imperfectly established variety of schwartzite.

STANNITE. Chemical formula probably $\text{Cu}_2\text{S} \cdot \text{FeS} \cdot \text{SnS}_2$. A copper, iron and tin sulphide, containing 29.5% copper, 13.1% iron and 27.5% tin. Structure, massive, granular and disseminated. Crystallization scalenohedral, tetragonal symmetry. Cleavage, cubic, indistinct. Fracture, uneven. Tenacity, brittle. Hardness, 4. Gravity, 4.3 to 4.5. Lustre, brilliant metallic. Color, olive steel-gray when pure, ranging to iron-black when impure, latter with bluish to yellowish tarnish. Streak, blackish. Occurrence, County Wicklow, Ireland, and Cornwall, England.

STELZNERITE. $\text{CuSO}_4 \cdot 2\text{Cu}(\text{OH})_2$. Chemical formula uncertain. A basic copper sulphate, closely related to brochantite. Crystallization, orthorhombic. Hardness, 3.5 to 4. Gravity, 3.9. Lustre, vitreous. Color, dark emerald-green to blackish green. Streak, lighter green. Is translucent to transparent. Occurrence, Chile, associated with brochantite and atacamite, and frequently mistaken for both.

STETEFELDTITE. Chiefly $\text{Sb}_2\text{O}_3 \cdot \text{AgCu}$ and H_2O . A hydrous copper antimonite, carrying about 12.8% copper. Structure, massive. Hardness, 3.5 to 4.5. Gravity, 4.12 to 4.24. Color, brown to blackish. Streak, shining. Occurrence, Nevada.

STIBIODOMEYKITE. $\text{Cu}_2(\text{As}, \text{Sb})$. A copper arsenoantimonite containing about 65% copper. Apparently is an antimonial domeykite. Crystallization, hexagonal in synthetic crystals, none being found in nature. Cleavage, none. Fracture, uneven. Tenacity, very slight. Hardness, 4. Gravity, 8.1. Lustre, metallic. Color, gray, with yellowish tinge, like domeykite. Streak gray. Is soluble in nitric acid, with small residue of gray powder. Occurrence, Mohawk mine, Keweenaw County, Michigan.

STROMEYERITE. $(\text{Cu}, \text{Ag})_2\text{S}$. A silver and copper sulphide, carrying 31.1% copper and 53.1% silver. Crystallization, orthorhombic. Fracture, subconchoidal. Generally compact, massive. Hardness, 2.5 to 3. Gravity, 6.15 to 6.3. Lustre, metallic. Color and streak, dark steel-gray. Occurrence, Chile, Perú, Siberia, Colorado, California and Silver King mine, Arizona.

STUBELITE. Chemical formula undetermined. A hydrous manganese, copper, iron and aluminum silicate, carrying about 12% copper. Structure, massive, reniform and botryoidal. Fracture, conchoidal. Tenacity, brittle. Hardness, 4 to 5. Gravity, 2.22 to 2.26. Lustre, vitreous, brilliant. Color, velvet-black to pitch-black. Streak, dark brown.

STUDERITE. A varietal form of tennantite containing, as partial replacement of normal copper content, silver, lead, zinc and iron.

STYLOTYPITE. $3(\text{Cu}_2\text{Ag}, \text{Fe})\text{S} \cdot \text{Sb}_2\text{S}_3$. A copper, silver and iron sulphobismuthite carrying 28.3% copper and 8.1% silver. Apparently is an argentiferous and ferruginous bournonite. Crystallization, orthorhombic, columnar prisms. Fracture, imperfectly conchoidal. Tenacity, brittle.

Hardness, 3. Gravity, 4.8. Lustre, metallic. Color, iron-black. Streak, black. Occurrence, Copiapó, Chile.

SUB-OXIDE OF COPPER. Cuprite in mineralogy; cuprous oxide in chemistry.

SULVANITE. $3\text{Cu}_2\text{S}_2\text{V}_2\text{S}_8$. Massive, bronze yellow, tarnishing on exposure. Is a variety of famatinite.

SYCHNODYMITE. $(\text{Co}, \text{Cu})_2\text{S}_8$. A cobalt and copper sulphide, containing about 14.5% copper. Crystallization, isometric. Gravity, 4.75. Lustre, metallic. Color, steel-gray. Is soluble in nitric acid. Occurrence, Eiserfeld, Siegen, Germany.

TAGILITE. $4\text{CuO} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. A hydrous basic copper phosphate containing 49.4% copper. Crystallization, monoclinic; also occurs in spheroidal concretions with structure fibrous to earthy. Fracture, uneven. Tenacity, brittle. Hardness, 3 to 4. Gravity, 4.08. Lustre, vitreous. Color, verdigris-green to emerald-green. Diaphaneity, subtranslucent. Is soluble in nitric acid. Occurrence, Coquimbo, Chile and Nijni Tagilsk, Perm, Russia.

TALLINGITE. Chemical formula probably $\text{Cu}_2(\text{OH})_2\text{Cl}_2 + 4\text{H}_2\text{O}$. A hydrated copper oxychloride containing about 64% copper. Structure, subcrystalline. Hardness, 3. Gravity, about 3.5. Color, greenish blue. Streak, white. Is subtranslucent. Thin crusts of minute greenish blue globules. Occurrence, Botallack, mine, Cornwall, England.

TARGIONITE. Apparently merely an impure galena carrying circa 1% each of copper, silver and zinc, from Tuscany, Italy.

TENNANTITE. $4\text{Cu}_2\text{S}_2\text{As}_2\text{S}_8$. A copper sulpharsenite containing 57.5% copper when pure, but shading into a great number of varietal forms. Common name, gray copper ore, in common with tetrahedrite, to which tennantite is closely related and joined by a chain of rather obscure minerals shading gradually from tennantite into tetrahedrite. The many varietal forms of this mineral are brought about by partial replacement of copper by silver, lead, zinc, iron, mercury, cobalt, nickel, tin and platinum, with a marked tendency toward mutual substitution of the antimony of tetrahedrite for the arsenic of tennantite, and vice versa, rendering the tetrahedrite-tennantite group unusually prolific. Crystallization, isometric; also occurs massive and granular, compact. Cleavage, none. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3.5 to 4.5. Gravity, 4.4 to 5.1. Lustre, metallic. Color and streak, flint-gray to iron-black. Diaphaneity, opaque to subtranslucent in small splinters. Is soluble in nitric acid and fusible on charcoal. Occurrence, at numerous points, being found in greater or less profusion in most copper districts. Is not regarded usually as a commercial ore, except where argentiferous, which is quite commonly the case.

Tenorite. Earthy form is known as melaconite. CuO . A copper oxide, containing 79.8% copper. Common names, BLACK COPPER, BLACK OXIDE OF COPPER. Chemical names, copper monoxide, copper peroxide, cupric oxide. Crystallization, monoclinic; also occurs massive, pulverulent and earthy. Fracture, conchoidal to uneven. Hardness, 3 to 4. Gravity, 5.8 to 6.25. Lustre, metallic. Color, dull grayish-black when massive, steel-gray in flakes. Is soluble in nitric and hydrochloric acids. Is found in most copper districts, and is a valuable ore of copper when occurring in quantities, but much of what has been considered tenorite in the past really was chalcocite, for which it is easily mistaken when disseminated. Found in very thin, long, flexible, minute scales of glistening gray color in Vesuvian lavas.

Tetrahedrite. $4\text{Cu}_2\text{S}_2\text{Sb}_2\text{S}_8$. A copper sulphoantimonite containing 52.1% copper. Shades into tennantite, which see, for reference to protean forms of these two closely related and frequently indistinguishable minerals. Common name, gray copper ore. Crystallization, isometric; also occurs massive and granular, coarse to fine, compact. Cleavage, none. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4.5. Gravity, 4.4 to 5.1. Lustre, metallic, brilliant. Color, flint-gray to iron-

black. Streak, grayish-brown to cherry red. Opaque in quantity, but occasionally subtranslucent in very thin splinters, giving cherry red transmitted light. Is soluble in nitric acid and fusible on charcoal. Occurrence, in most copper districts, but commonly is not regarded as a commercial ore, except when argentiferous, which frequently is the case.

THROMBOLITE. An imperfectly determined hydrous copper antimonate, carrying about 31.5% copper. Structure, amorphous. Color, emerald-green. Occurrence, Rezbánya, Hungary.

TIEMANNITE. An imperfectly determined silver, mercury and copper selenide, carrying about 8.8% copper. Occurrence, with eucairite and umangite, in the Sierra de Umango, Rioja, Argentina.

TORBERNITE. $\text{CuO} \cdot 2\text{UO}_2 \cdot \text{P}_2\text{O}_5 \cdot 8\text{H}_2\text{O}$. A hydrous uranium and copper phosphate, carrying 69% copper. Common name, uranium mica. Crystallization, tetragonal. Cleavage, micaceous, with brittle laminae. Hardness, 2 to 2.5. Gravity, 3.4 to 3.6. Lustre, pearly on cleavage planes and subadamantine on other faces. Color, emerald-green to grass-green. Streak, apple-green. Diaphaneity, translucent to transparent. Is soluble in nitric acid. Occurrence, Cornwall, Saxony, etc.

TRICHALCITE. $3\text{CuO} \cdot \text{As}_2\text{O}_5 + 5\text{H}_2\text{O}$. A hydrous copper arsenate containing 34% copper. Structure, in radiated groups, columnar, also dendritic. Hardness, 2.5. Lustre, silky. Color, verdigris-green. Is soluble in hydro-choloric acid. Occurrence, Russia.

TRIPPKEITE. ($n\text{CuO} \cdot \text{As}_2\text{O}_5$) A copper arsenite. Crystallization, tetragonal. Color, bluish-green. Is soluble in acids. Occurrence, Copiapó, Chile, in druses.

TRITOCHORITE. Cuprodescloizite.

TURQUOISE. $[\text{Al}(\text{OH})_2 \cdot \text{Fe}(\text{OH})_2 \cdot \text{Cu}(\text{OH}) \cdot \text{H}] \text{P}_2\text{O}_7$. A gemstone, essentially a hydrous aluminum phosphate, colored by 2 to 6% of copper, which probably is included as a hydrous basic copper phosphate.

TYROLITE. $5\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 9\text{H}_2\text{O}$. A hydrous basic copper arsenate carrying 40.1% copper. Crystallization, orthorhombic. Cleavage, micaceous. Tenacity, highly sectile and flexible in thin laminae. Hardness, 1 to 1.5. Gravity, 3.02 to 3.1. Lustre, pearly to vitreous. Color, verdigris-green to apple-green. Diaphaneity, subtranslucent to translucent. Occurrence, Libethen, Hungary, Utah, etc.

UMANGITE. Cu_2Se . A copper selenide containing 54.6% copper. Structure, massive. Cleavage, none. Fracture, subconchoidal to uneven. Hardness, 3. Gravity, 5.62. Lustre, metallic. Color, dark cherry-red, with violet tinge on fresh fracture, soon tarnishing to violet-blue. Streak, black. Occurrence, with tiemannite and eucairite, in the Sierra de Umango, Rioja, Argentina.

URANIUM MICA. Common name for torbernite.

URANOCHALCITE. Chemical formula undetermined. A hydrous basic uranium and copper sulphate carrying about 5% copper. Occurs in acicular crystals. Hardness, 2 to 2.5. Color, grass-green. Occurrence, Joachimstahl, Bohemia.

VALLERIITE. A sulphate of copper, iron, aluminum and magnesium. Apparently is a mixture of covellite, pyrrhotite and several aluminous and magnesium minerals. Occurrence, Nya Kopparberg, Sweden.

VARIEGATED COPPER ORE. Common name for bornite.

VAUQUELINITE. Chemical formula probably $2(\text{Pb} \cdot \text{Cu}) \text{CrO}_4 \cdot (\text{Pb} \cdot \text{Cu}) \text{P}_2\text{O}_7$. A lead and copper phosphochromate carrying 3.9 to 10% copper. Crystallization, monoclinic; also occurs amorphous. Fracture, uneven. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 5.8 to 6.1. Lustre, adamantine to resinous. Color, apple-green to liver-brown. Streak, greenish to brownish. Diaphaneity, opaque to faintly translucent. Occurrence, Berezov, Russia.

VELVET COPPER ORE. Common name for chalcotrichite.

VENERITE. A hydrous copper, aluminum, iron and magnesium silicate containing about 14% copper. Occurrence, Springfield, Berks county, Pennsylvania.

VERDIGRIS. Copper carbonate. Is formed from metallic copper by the action of carbon dioxide and moisture in the atmosphere. The verdigris of the pharmacist is a copper acetate and care should be taken not to confuse these widely varying compounds bearing the same name.

VESZELYITE. Chemical formula probably $(\text{CuZn})_2(\text{OH})_2(\text{AsP})_2\text{O}_8 + 5\text{H}_2\text{O}$. A hydrous copper arsenophosphate carrying about 30% copper. Crystallization, monoclinic. Hardness, 3.5 to 4. Gravity, 3.53. Color and streak, greenish blue. Occurrence, Moravitz, Hungary.

VOGLITE. Chemical formula uncertain. A hydrous uranium, lime and copper carbonate carrying about 6.9% copper. Occurs in aggregations of crystalline scales. Lustre, pearly. Color, emerald-green to bright grass-green.

VOLBORTHITE. Chemical formula probably $(\text{Cu,Ca,Ba})_2(\text{OH})_2\text{VO}_4 + 6\text{H}_2\text{O}$. A hydrous basic copper, calcium and barium vanadate carrying about 30.9% copper. Hardness, 3 to 3.5 Gravity, 3.55. Lustre, pearly to vitreous. Color, olive-green to citron-yellow. Streak, greenish yellow. Is translucent in thin splinters. Occurrence, Perm, Russia.

WARRINGTONITE. A varietal form of brochantite.

WHITNEYITE. Cu_3As . A copper arsenide containing 88.4% copper. Structure, massive, crystalline, very finely granular. Tenacity, malleable. Hardness, 3.5. Gravity, 8.4 to 8.6. Lustre, dull and submetallic on fresh fracture, strongly metallic when scratched, soon tarnishing. Color, pale reddish to grayish white, pale reddish white on a rubbed surface, tarnishing to yellowish bronze, brown and brownish black, sometimes with iridescence. Is soluble in nitric acid. Occurrence, Osceola Mine, Calumet, Michigan, Sonora, Mexico, and Chile.

WINKLERITE. Chemical formula uncertain. A hydrous cobalt, nickel and copper arsenate carrying about 11 to 12% copper. Structure, amorphous, massive. Fracture, conchoidal. Hardness, 3. Gravity, 3.43. Lustre, dull. Color, bluish black to violet black. Streak, dark brown. Occurrence, Almería, Spain.

WITTICHENITE. $3\text{Cu}_2\text{S.Bi}_2\text{S}_3$. A copper sulphobismuthite carrying 38.4% copper. Crystallization, orthorhombic. Fracture, conchoidal. Hardness, 3.5. Gravity, 4.3 to 5. Color, steel-gray to tin-white, tarnishing to pale lead-gray. Streak, black. Is soluble in nitric or hydrochloric acids. Decomposes easily on charcoal. Occurrence, Wittichen, Baden, Germany.

WOLCHITE. A varietal form of bournonite.

WOLFSBERGITE. Chalcostibite.

WOOD COPPER. Common name for olivenite.

WOODWARDITE. Chemical formula uncertain. An aluminum and copper sulphate containing about 38.4% copper. Is closely related to langite.

YELLOW COPPER ORE. Common name for chalcopyrite.

YPOLÉIME. Chemical formula perhaps $5\text{CuO}.2\text{P}_2\text{O}_5.5\text{H}_2\text{O}$. A doubtful hydrous basic copper phosphate of the dihydrite-pseudomalachite group.

ZEUNERITE. $\text{CuO}.2\text{UO}_2.\text{As}_2\text{O}_5.8\text{H}_2\text{O}$. A hydrous uranium and copper arsenate containing 6.1% copper. Crystallization, tetragonal. Fracture, uneven. Tenacity, brittle. Hardness, 2 to 2.5. Color, grass-green to emerald-green. Occurrence, Saxony and Cornwall, England.

ZINKAZURITE. Apparently merely a hydrous mixture of copper carbonate and zinc sulphate in small blue crystals, from the Sierra Almagrera, Spain.

ZINKENITE. A lead sulphoantimonite, usually slightly cupriferous.

ZIPPEITE. Chemical formula undetermined. A hydrous basic uranium, copper and calcium sulphate. Occurs in acicular crystals and crusts. Hardness, 3. Color, lemon-yellow to orange-yellow. Occurrence, Joachimsthal, Bohemia.

ZORGITE. Chemical formula uncertain. A lead and copper selenide, carrying 4 to 15.5% copper and 41 to 64% lead, with traces of silver, mercury and iron. Structure, massive and granular. Tenacity, brittle. Hardness, 2.5. Gravity, 7 to 7.5. Lustre, metallic. Color, lead-gray, tarnishing. Streak, darker lead-gray. Occurrence, Cacheuta, Mendoza, Argentina.

CHAPTER IV

THE MINING COMPANIES AND MINES OF NORTH AMERICA

Including United States, Canada and Mexico; also American owned mines of Central and South America, Philippine Islands, Cuba and elsewhere.

ABANGAREZ GOLD FIELDS OF COSTA RICA.

17 Battery Place, New York City. Mine office, Abangarez, Costa Rica. **Officers:** Minor C. Keith, pres.; A. W. Preston, v. p.; H. M. Keith, treas.; J. F. Tilden and E. W. Ong, sec.; E. S. Hyde, asst. treas.; directors, M. C. Keith, Maxwell Norman, E. W. Ong, B. W. Palmer, A. W. Preston, Jas. Virdin. Inc. Sept. 8, 1899, in Del. Cap. \$4,000,000 Com. and \$1,000,000 6% cumulative Pfd.; outstanding, \$3,880,000 Com. and \$1,000,000 Pfd.; par \$25. Transfer agt.: Old Colony Trust Co., Boston; registrar: American Trust Co., Boston. No dividends on Pfd. since May, 1911, when semi-annual dividend of 3% was paid. Annual meeting 3d Monday in Dec. Listed on Boston Stock Exchange.

Funded debt: \$374,000 1-year 6% gold notes; dated May 1, 1915; due May 1, 1916; int. payable May and Nov. 1st, at company's office. Coupon \$50, \$100, \$500, and \$1,000. Issued in exchange for \$353,300 1-year 6% notes due May 1, 1915, callable at par and interest on any interest date on 4 weeks' notice: \$476,000 2-year convertible 6% notes; dated May 1, 1914, due May 1, 1916, int. payable May and Nov. 1st, at company's office. Coupon \$100, \$500, and \$1,000. Convertible at maturity at option of holder into Com. stock. Issued to retire \$461,200 3-year 6% notes which matured May 1, 1915.

Balance sheet for year ending Dec. 31, 1915, shows assets \$6,529,377 which includes cost of property \$3,553,362; mine equipment, \$1,585,383; supplies \$156,782; cash, \$55,337; bullion, \$33,240; accts. and notes receivable, \$138,752; profit and loss, \$1,006,369. Liabilities include notes payable \$1,327,751, current liabilities \$240,570, compared with \$25,903 in 1914. Income account for 1915 shows: deficit from operations of \$9,243, compared with \$99,090 in 1914; interest charges \$78,545; deficit for the year \$87,789, as compared with \$174,589 the previous year. Total deficit Dec. 31, 1915, \$1,006,369 as compared with \$809,063 the previous year.

Property: Company acquired the properties of the Guanacaste Syn. and the Guacimal Expl. Co. After obtaining possession of $\frac{3}{5}$ of the capital stock of the Costa Rica Esperanza Mng. Co. in exchange for land, the Abangarez Co., Dec. 31, 1909, acquired the balance of the stock by giving one share of Abangarez and \$1.87 in cash for each share of Costa Rica

Esperanza. Owns mining properties in full operation covering 118 sq. miles in the province of Guanacaste, Costa Rica, C. A. The ore developed at Majica Creek on the Tres Hermanos Lode is transported by aerial tramway to the Abangarez mill. Also owns a power plant in the Guacimal River, 12 miles from the mill.

Recent production has been as follows:

Year	Tons	Cost Per Ton			Total (a)	Prod. (b)	Earn (b)	Int.
	Milled	Mng.	Mlg.	C'yg.				Chgs. (b)
1915	25,262	\$4.33	\$0.84	\$1.60	\$8.18	\$7.82	d\$0.36	\$3.11
1914	37,742	4.47	0.58	1.39	7.89	5.27	d2.62	2.00
1913	69,346	4.92	0.64	1.70	8.68	8.36	d0.32	1.00
1912	50,011	9.11	1.07	2.28	14.71	12.14	d2.57	0.94
1911	42,514	10.06	1.61	2.38	16.98	21.84	4.86	0.42

(a) includes cost of production, administration and marketing.

(b) per ton. (d) deficit.

In view of the company's financial conditions and conditions in general, an arrangement has been made with J. N. Popham, who has been successful in the management of a neighboring mining property, to undertake the operation of the company's property. He is to furnish all necessary capital for carrying on operations. As compensation he will receive 10% of the net profits over and above operating and development expenses. Company reserves the right to withdraw from agreement upon due notice. Since Mr. Popham assumed charge there has been a gradual but fairly constant improvement in the output of the mine. Net earnings for last quarter of 1915 averaged \$8,800 per month.

ABBEY MINING CO.

NEW MEXICO

Idle. Apparently dead. Described in Volume XI, Copper Handbook.

A. B. C. METALS CO.

BRITISH COLUMBIA

See Alaska British Columbia Metals Co.

ABUNDANCIA; MINA LA

PORTO RICO

Idle. Mine near Rio Blanca, Porto Rico, opened in 1869. Produced a small quantity of rich oxidized ore from a paystreak of 8 to 15', carrying bornite and chalcopyrite averaging 10 to 12% copper, in a vein of cupriforous pyrrhotite of 6 to 10' width.

ABUNDANCIA MINING CO., S. A.

MEXICO

Address: Puerticitos, via Cananea, Sonora. Inc. May, 1912, in Mexico, by O. L. Neer of Douglas, Ariz., Apollo Fuller of Boston and W. C. Webster, Los Angeles. Property, lease and bond on the Abundancia claim, 30 hectares, 5 miles west of Cananea on west slope of mountain. Formerly held by West Cananea Mining Co. and later bonded by Copper Queen Consolidated Mining Co., relinquished 1909. Was shipping from 150 to 200 tons monthly of 9% ore from open cuts and tunnels at last accounts.

ACACIA GOLD MINING CO.

COLORADO

Mining Exchange Bldg., Colorado Springs, Colo. Mine office: Cripple Creek, Colo. K. Mackenzie, pres.; C. S. Gambrill, v. p., K. Macdermid, sec.-treas. **Cap.** \$1,500,000, shares \$1.00 par, outstanding Jan. 1, 1916, 61,011 shares. Gross production to Jan., 1916, \$1,287,513. Net production last 12 months 1915, \$20,139. No liabilities. Annual meeting in Jan.

Dividends to Jan., 1916, \$136,703. Payment of last dividend, Dec. 15, 1912, \$14,389.

Property: The Burns and Morning Star claims, patented, 20 acres, on Bull Hill, Cripple Creek. Developed by a 425' shaft with over 2,000' of underground work, on the Morning Star, and 3 shafts on the Burns claim, one being double compartment with depth of 1,250' and a mile of

underground workings. A second shaft, 350' deep, has 3,390' of drifting and a third 825' deep, has 3,600' of drifting. Cost of development work is about \$694,000. The Burns' claim is being worked at present, shipments being made from the 1,200' level. Ten men employed.

ACCORD MINING & MILLING CO. COLORADO

Address: Georgetown, Colo. Capital stock, \$250,000. **Property:** 40 claims on Saxon Mt., 3 miles from Georgetown. Development by means of the 900' Cully Tunnel which company intends to advance an additional 2,100' with expectation of cutting the American Sisters and Jo Reynolds system of veins on the east and the Capital Prize system on the west.

Property not unpromising, but company was not in good financial condition in March, 1915. Closely related to the Alco Mining & Milling Co.

ACME CONS. GOLD & COPPER MINING CO. WYOMING

Inactive. See Copper Handbook, Vol. XI.

ACME GOLD MINES, LTD. ONTARIO

See Hollinger Cons. Mines, Ltd.

ACME MINING & REDUCTION CO. ARIZONA

Idle. Mail returned from former address in Tucson, Ariz. See Vol. XI, Copper Handbook.

ADANAC SILVER MINES, LTD. ONTARIO

Standard Bank Bldg., Toronto and Cobalt, Ont., Can. **Officers:** B. E. Cartwright, pres.; J. B. Bickell, treas.; D. McArthur, sec. with P. M. Bushnell, J. J. Calvin, directors. Chas. Spearman, supt.

Inc. March, 1915, in Ont. **Cap.** \$2,500,000, shares \$1 par.

Property: In Coleman Twp., Cobalt district, Ont., adjoins the Temiskaming. Developed by shaft which is being sunk to 400' and a winze being sunk to 200' level on a vein showing smaltite, niccolite and a little silver. Property is in the prospect class.

ADELAIDE STAR MINES, LTD. NEVADA

Office: Joseph Ralph, Attorney, 416 Walker Bank Bldg., Salt Lake City, Utah. Dec., 1915, company was being liquidated. Fully described in Vol. XI, Copper Handbook.

ADMIRAL GOLD AND COPPER MINING CO. NEW MEXICO

Idle. **Office:** Tusas, Rio Arriba Co., N. Mex. G. F. Hall, mgr. Inc. 1900 in New Mexico. **Cap.** \$500,000; shares \$1 par. **Lands,** 8 claims, 160 acres, in the Bromide district, show 3 fissure veins carrying silver, copper and gold ores, opened by 3 shafts, deepest 150'. Inactive owing to lack of funds.

ADMIRAL MINING CO. WASHINGTON

Mine in Colville district, near Valley, Stevens Co., Wash. Inc. 1913. **Officers:** T. H. Greenway, pres.; T. R. Tate, v. p.; Mrs. T. R. Tate, treas., Chas. Warsth, sec. **Cap.** \$1,500,000; shares \$1 par.

Property: Developed by 3 tunnels. Reported to have opened up a silver-copper vein in 1915, 18"-8' wide, assaying from \$30-\$100 per ton. In April, 1916, the property was optioned to J. R. Brown and W. Everett of Spokane for \$30,000 and development work scheduled to start.

ADVANCE MINING CO. ARIZONA

Letters "unclaimed" at Fort Grant, Graham Co., Ariz. See Copper Handbook, Vol. XI.

ADVANCE MINING CO. IDAHO

Office: 824 Vine St., Missoula, Mont. Mine office: Mullan, Shoshone Co., Ida. **Officers:** F. D. Fox, pres.; Herbert Crego, v. p.; Henry Hubert, sec.-treas.; preceding officers and F. H. Murphy, directors. Joe. Peila, mgr.

Inc. 1903. **Cap.** \$1,000,000, shares \$1 par, assessable. **Lands:** 5 unpatented claims, 4 miles from Mullan, on Snowstorm Hill, lying between

the Snowstorm on the east and the Butte & Coeur d'Alene on the west and 107 acres of timber land.

Development: by 1,550' tunnel with 2 crosscuts showing streaks of chalcopryrite ore. Management plans active development work, installation of a Pelton water wheel and other necessary machinery in 1916.

ADVENTURE CONSOLIDATED COPPER CO. MICHIGAN

Idle. Office: 32 Broadway, New York. Mine office: Greenland, Ontonagon Co., Mich. Jas. L. Bishop, pres.; Charles G. Lund, v. p.; W. R. Todd, sec.-treas.; preceding officers, Chas. J. Devereaux, James S. Dunstan, Chas. G. Lund and Chas. D. Hanchette, directors; W. A. O. Paul, asst. sec.-treas.; Chas. L. Lawton, gen. supt.

Inc. Oct. 17, 1898, in Michigan. **Cap.** \$2,500,000, shares \$25 par; paid in, \$23. American Loan & Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agt. Annual meeting, first Thursday after first Wednesday in June. Stock listed in Boston; price varied from \$1 to \$4 $\frac{7}{8}$ in 1915.

Operations, 1912, were conducted at a loss of \$38,741, and company ended year with cash assets, \$42,307, and liabilities, \$33,634. An assessment of \$1 per share was levied July 20, 1911. On January 1, 1915, balance on hand was \$2,054 as compared with \$9,263 on Jan. 1, 1914. Receipts for 1915 totaled \$15,805 and expenditures \$13,750, of which \$7,614 represented State taxes for 1913 and 1914. Receipts were derived from rents, sale of previously stored mass copper, mining supplies and land near Ontonagon.

Property: Consists of 3 old mines, the Adventure, Knowlton and Hilton, opened in 1850, 1853 and 1863 respectively, 1,696 acres on the mineral belt, also a mill site on Lake Superior. The mineral lands are located in Secs. 35 and 36, T. 51 N., R. 38 W., and in Secs. 1 and 2, T. 50 N., R. 39 W. The Toltec and part of the Belt lie on the north, South Lake east, Toltec and Mass on the South, and the Mass on the west of the main tract. The Knowlton tract has the Mass to the north and east, Flint Steel to the south and Michigan to the west, the Ridge mine of the Mass lying between the two Adventure tracts. The village of Greenland lies on the northwestern corner of the Adventure's principal tract, and the village of Maple Grove, controlled by the company, is near the mine.

The old Adventure mine was opened 1850, along a line of ancient pits showing prehistoric mining. The largest annual production was \$233,941 lbs. fine copper, 1857. After being closed by owners, the old openings were worked for years by tributors, proving notably rich in silver.

The Hilton, or Ohio mine, opened 1863, on the Mass lode, never was worked vigorously. The Knowlton was opened in 1853. These three old mines made 1,949,173 lbs. fine copper, previous to their merging as the Adventure Consolidated which started work Nov. 1, 1898.

Diamond drill work and crosscutting has disclosed four copper bearing lodes.

The Adventure property has a series of 7 parallel copper-bearing beds in a cross-section of about 1,200' and these, coupled with the existence of Adventure bluff, a 300' hill, caused the opening of the mine by adits, as well as by shafts. The Evergreen belt, of Ontonagon county, comprises a belt of bedded traps, amygdaloids and conglomerates, 7 of these amygdaloidal beds carrying copper on the Adventure tract. These beds were fully described, Vols. I to VII, inclusive.

The cupriferosus beds of the Evergreen belt are notoriously bunched, being rich in spots and worthless at other points. The strike of the parallel lodes of the Adventure is N. 73° E. on the main tract, where operations were conducted, shafts being sunk at an angle of 45°. The old mine has

4 tunnels and 4 shafts, latter, except No. 1, which is in the Merchant lode, being sunk on the Knowlton bed, at 45°, and numbered from west to east.

Production from the old mines ceased, Jan., 1908, since which time only exploratory and development work has been done.

There are 5 shafts, of which No. 5 is the deepest.

No. 5 shaft, started May 6, 1909, is 6x16' inside measurement, with two 6x6' hoisting compartments and a 4x6' compartment for ladders and pipes. Shaft is vertical and was 1,520' deep, June, 1913. It is located about 1,500' south of No. 3 shaft, is lined with concrete for a depth of 50' from the collar, and is solidly timbered from surface. The shaft cuts No. 1 Adventure lode at depth of 894', and is expected to cut No. 2 lode at about 2,200' depth, and No. 3 at about 2,600' depth. The No. 1 lode, opened by an 80' crosscut on the 1,021' level has been drifted upon for a distance of about 200' and discloses very little copper. A 1,150' exploratory crosscut south and west on the 1,500' level intercepts 3 beds, designated as Nos. 2, 3 and 4, cutting the first at a distance of 634', the second at 880' and the third at 1,015' from the shaft. These lodes, opened by drifts out from the crosscut, are altogether without promise so far as opened, the No. 2 lode, 29' wide, and opened for a distance of 145', carrying much copper in the first 7' with the remainder practically barren; No. 3, 32' wide, and opened 547', showing varying amounts and generally poor, and No. 4, 65' wide, carrying practically no copper in the 34' drift run along the footwall of the lode. A fifth lode, No. 1½, first encountered in shaft sinking, is opened for a distance of about 130' at a depth of 1,190' in the shaft, and makes a fair showing. All work was suspended June, 1913. Current rumors report probable calling of assessment and resumption of exploratory development work in 1916.

The new Mass lode, so-called, lying about 120' S. E. of the Evergreen bed, was opened by test pitting, May, 1909, and some crosscutting was done from the Evergreen bed, down to the 6th level of No. 2 shaft, but only a few feet of drifting was done. This bed shows a width of 8 to 12', but carrier flaky copper, with considerable epidote. No work is in progress on this bed.

The mine equipment includes a 38x59' steel boiler house with three 500-h. p. Burt boilers; a 59x59' steel engine house having an Allis-Chalmers duplex double-cone drum direct-acting hoist with 42x60" cylinders, capable of raising a 12-ton load from a depth of 5,000' on an incline of 45° at a speed of 2,000' per minute, and a 38x65' steel compressor house having a 60-drill Rand-Corliss air compressor. There is a complete electric light and power plant and protection from fire is furnished by water mains. The principal mine buildings are sheathed with steel and painted, and the property is served by a spur of the Copper Range railroad.

The stamp mill at Edgemere, on Lake Superior, went into commission Sept. 22, 1902. Equipment includes 3 Allis-Chalmers heads, fitted with Parnall-Krause mortars having 11 to 16" openings in discharge screens, with 2 horizontal revolving screens having 5 to 16" openings for each head. The stamp pistons are automatically rotated, equalizing wear on the shoes. From the revolving screens of the heads, crushed rock goes to the separator jigs, 24 for each head, or 72 for the mill, thence to 36 finisher jigs. There are round slime tables, 3 Overstrom and 3 Wilfley concentrators, and Huntington mills for raggings. Rock bins have a storage capacity of 4,500 tons. Coal is delivered from trestles to boiler rooms by gravity, through chutes. The pump is a 16,000,000-gal. Reidler, drawing its supply from Lake Superior through a tunnel extending 1,200' under the lake. Miscellaneous improvements at the mill site include an office, smithy, machine shop, dwellings, etc.

Production has been as follows: 23,572 lbs. in 1900; 29,361 lbs. in 1901; 606,211 lbs. in 1902; 2,182,608 lbs. in 1903; 1,380,480 lbs. in 1904; 1,606,208 lbs. in 1905; 1,552,628 lbs. in 1906; 1,244,874 lbs. in 1907, with no later production.

AEOLIAN COPPER CONSOLIDATED MINING CO., LTD., IDAHO

Idle. Described in Copper Handbook, Vol. XI.

AETNA MINING CO.

WYOMING

Idle. Office: Merrill, Wis. Mine near Riverside, Carbon Co., Wyo. See Copper Handbook, Vol. XI.

AFTERTHOUGHT COPPER CO.

CALIFORNIA

Office: 400 Meridian Life Bldg., Indianapolis, Ind. Mine and works office: Ingot, Shasta Co., Cal. James E. Watson, v. p.; O. E. Adams, sec.; W. H. Watson, treas.; preceding officers and Geo. L. Porter, directors; S. E. Bretherton, gen. mgr.; John Bull, smelter supt.

Inc. Jan., 1909, in Arizona. Cap. \$8,000,000, shares \$1 par, nonassessable, in \$200,000 of 7% cumulative preferred stock and \$7,800,000 common stock; issued about \$4,200,000. Was organized as successor of Great Western Gold Co. A 20-year first mortgage 6% gold coupon bond issue—authorized to raise funds for payment of debts and further development work; \$229,000 issued to end of 1915.

Property: 19 claims, 18 patented, area 380 acres, with mill and smelter sites and timber lands giving total holdings of 1,704 acres. Lands include the Afterthought, Liberty, Last Chance, Section 15 and Bull groups, mines more or less developed being Afterthought, Copper Hill and Copper Grand. Lands are on the east side belt which extends from Ingot to DeLamar, and is entirely distinct from the copper belt on the west side of the Sacramento river. Lands show porphyry, slates and shales, carrying contact deposits with sulphide ores, there being 5 known orebodies, of which 2 are under development, 1 being reported by company to be 160x500x35' in size.

The Afterthought mine, in the Furnaceville district, 20 miles east of Redding, had about 2,000' of workings, when taken over by predecessor of present company, and now has shafts at 216 and 327', with 7 tunnels, main tunnel being about 2,500' long, with a total of 8,500' of workings, reported by management to show 400,000 tons of ore, estimated to carry 2.7 to 3.4% copper, 10 to 25% zinc, a trace of lead, 6.4 oz. silver and 52 cts. gold per ton. Ore is almost exclusively chalcopyrite and sphalerite, a little oxidized ore having been shipped under former ownership. In 1905 ore smelted assayed 2.81% copper, 14.3% zinc, 11.6% iron, 18.7% sulphur, 5.3% alumina, 7.4% barium sulphate, 5.4% calcium carbonate and 18% silica. The main working tunnel cuts a 25' ore body in the Copper Hill mine.

Equipment includes blast furnaces, electric power, a 115-h. p. steam plant at the mine, with 20-h. p. and 30-h. p. hoists and a 5-drill air compressor. Company owns a total of 55 buildings, including mine and smelter buildings, shops, dwellings, etc.

Survey was made, 1907, and work begun May, 1913, on a 14-mile standard-gauge railway, known as the California, Shasta & Eastern railway, connecting the mine and works at Ingot with the Southern Pacific railway at Bella Vista.

The smelter, 1 mile north of Cow creek, and 1½ miles north of the mine, connected therewith by a 30' tramline, includes a small sampling mill. The smelter, blown in March 24, 1905, has water-jacket blast furnaces of 42x96", rated at 75 tons, and 42x150", rated at 250 tons daily capacity. Fuel is coal, costing \$4.50 per ton. Smelter has 2 brick dust chambers. Much trouble was had at first with the smelter, but under the management of Mr. Bretherton, who took charge later, the furnaces were run with a low

charge and an exceptionally hot top, on account of the excess of barium sulphate, this plan giving good results.

Production by the Great Western Gold Co., 1905-1907, is reported to have upwards of \$900,000 worth of copper, silver and gold, and the last ore smelted, amounting to 18,951 tons, to have averaged 3.1% copper, 15.3% zinc, 8.6 oz. silver and 60 cts. gold per ton.

Company in Dec., 1915, under the leadership of Geo. L. Porter, is planning a reorganization of the board, refinancing, and the building of a 100-ton reduction plant for the recovery of zinc, copper, silver and gold, leaching the zinc and recovering the copper from the residue; operations to be resumed in 1916.

AGUILA AMALGAMATED MINING CO.

MEXICO

Last address: 185 Summer St., Boston, Mass. Probably dead. See Vol. XI, Copper Handbook.

AHMEEK MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Kearsarge, Keweenaw Co., Mich. Officers: Rudolph L. Agassiz, pres.; Geo. A. Flagg, sec.-treas.; Clarence H. Bissell, asst. sec.-treas.; Rodolphe L. Agassiz, Wm. A. Hodgson, Benj. Joy, Thomas L. Chadbourne, Jr., James McNaughton, Thomas M. Perkins and Francis L. Higginson, directors; Jas. MacNaughton, gen. mgr.; S. Russell Smith, supt.; Thos. Rapson, mg. cap.; J. T. Reeder, purch. agt.; John G. Bennetts, chief clerk. Inc. March 22, 1880, in Michigan and charter extended, 1910, for 30 years. Cap. \$1,250,000, shares \$25 par, fully issued; \$17 paid in; increased, June 8, 1915, to 200,000 shares, par \$25, 4 new shares being given for each one of the original shares. Last assessment was \$5, Feb. 5, 1904. Paid dividends of \$5 in 1911, \$22 in 1912, \$17 in 1913, \$4 in 1914, \$13 on old capitalization and \$2.50 on new in 1915, \$5.50 for first two quarters of 1916. Annual meeting, second Tuesday in April. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Balance of assets was \$968,772 at end of 1914, and \$1,583,654 at end of 1915. Is controlled by the Calumet & Hecla Mining Co., through ownership of 98,048 shares, of a total issue of 200,000 shares.

Net income for 1915 was \$2,180,000 compared with \$463,000 in 1914, \$207,420 in 1913, and \$1,465,397 in 1912.

Property: 931 acres, lying between the Mohawk and Allouez mines, set off, 1880, by the Seneca Mining Co., to work the Kearsarge or Houghton conglomerate. Under the management of Capt. John Daniell, 2 shafts were sunk on this bed, which averages about 70' width, with 3 paystreaks of 2 to 3', aggregating 7' width, each carrying copper in good quantities, but bed not payable as a whole, owing to great width of partially or wholly barren rock. Boundary lines were rectified, by exchange of 11.18 acres with Allouez, July, 1903, and by a similar exchange of 20 acres, with Mohawk, 1909, giving straight boundary lines on the dip of the bed, permitting easier development by all mines concerned. Work on the present mine was started Dec. 2, 1902, as work at the Mohawk mine had disclosed the position and trend of the Kearsarge lode.

The Kearsarge bed, on which the present mine is opened, ranged 14 to 18' in width, with but little poor ground encountered in the entire mine. Openings are considerably ahead of stoping requirements, and blocking out is almost entirely by drift stopes, which are carried about 9' wide and 14' high, to the boundary limits, where extraction is begun and brought backward to the shafts, thus reducing timber requirements to a minimum. The mine keeps 3,000,000 to 3,500,000 tons of stamp rock blocked out for stoping. All levels below the first are 125' apart. A Richmond electric bell

signal system connects all underground workings with the engine rooms, and underground stations are connected with surface by telephone. Concrete is substituted for timber in the construction of the shafts, and in other places where practicable, rendering the shafts as nearly fireproof as possible. Mules are used in trampling rock underground.

A cross fissure vein of domeykite, copper arsenide, 71.7% copper, and mohawhite, a copper-nickel-cobalt arsenide, mainly the former, that is 4 to 12" wide, was opened 300' south of No. 1 shaft, on the 5th level, and a second vein of 2 to 12" width is found about a quarter-mile south, both crossing the bedded formation at practically right angles.

The mine has 4 shafts, numbered from south to north, planned to develop the entire tract. Nos. 1 and 2 shafts, 1,445' apart, sunk at 42°, are each 8x17' 4" in size, with 2 hoisting compartments and a ladderway. These shafts were 2,533' and 2,775' deep respectively at end of 1915. Each shaft has, between the 9th and 10th levels, a 400-ton rock bin, equipped with a measuring hopper holding exactly one 7-ton skip load, loaded in 20 seconds by one man, this system saving much time, and confining hoisting of all rock mined down to the 10th level to 1 point in the shaft. No. 1 shaft can be sunk to about 3,000' depth before cut off by the Allouez line, and No. 2 can be sunk much deeper.

The northern end of the mine is developed by shafts 3 and 4, begun August, 1908. These will command the 12 forties lying in the western half of Sec. 28 and eastern half of Sec. 29. Shafts 3 and 4, three-fourths mile N. E. of No. 2, have a common collar, being only 6' apart at surface, but diverging north and south, from the surface, at an angle of 42°. These shafts are sunk through 70' of overburden, and are concreted into the solid rock ledge for depth of 95' from surface. Owing to the outcrop of the Kearsarge lode being owned by the Mohawk, Ahmeek having only the underlay at its northern end, shafts 3 and 4 are sunk in the hanging, at an angle of 80° on a plane corresponding longitudinally to the strike of the bedded formation, and bend at depth of 980', in a curve with a radius of about 400', bringing the shafts to 34°, to correspond with the rather flat dip at the Kearsarge bed, both shafts entering the bed, early 1911, at depth of about 1,275'. Concrete sets and stringers have been used in these shafts wherever ground would permit. Each shaft has 3 compartments, with two 8x8' skipways and a 4x8' ladderway. It is proposed to work out the upper portion of the bed by crosscuts, beginning at depth of 1,020' in No. 4 shaft, which will be the 1st level in these shafts, which have 3 stations above the point where the bed intersects, from which crosscuts will be run to the Kearsarge bed, to the Mohawk line. No. 3 shaft was 2,210' and No. 4 was 2,158' deep at end of 1915. In 1915 new workings totaled 8,769' compared with 4,587' in 1914.

Shaft house No. 1 is 26x26' on the ground, and 80' high, with a 28x100' ironclad wing over the collar of the shaft. A new shaft rockhouse is being built at No. 2 and when completed the rock from this mine will be crushed here instead of sending it to the central crushing plant.

The main power house, between shafts 1 and 2, is in 2 parts, of brick and steel, with composition roof. Equipment of No. 1 power house includes 60-drill and 50-drill Nordberg cross-compound 2-stage air compressors, and a 32x72" cylinder Nordberg hoist. The electrical plant consists of a 13x26" Nordberg tandem-compound engine, direct-connected to a 200-kw. 250-volt Northern Electric generator. Condenser pumps and reheaters are located in the basement. No. 2 engine house is a duplicate of No. 1, containing a similar hoist with double conical drums with maximum diameter of 18'-6", capable of hoisting 10-ton skips in counterbalance from 1 mile

depth. Nos. 1 and 2 engine houses are connected by a steel-frame boiler house, having six 200-h. p. boilers, with room for 8 equipped with feed pumps, ash sluices, coal trestles, etc. The boiler house has a self-supporting steel smokestack, 150' high and 7' 6" in diameter, on a sandstone-faced concrete base.

Shafts 3 and 4 are equipped with two 32x72" cylinder Nordberg hoists, a triple-expansion Nordberg compressor and electric-light engine, housed in a brick structure 65' wide by 146' long, with corrugated-iron roof; a steel boiler house 57' wide and 84' long with corrugated-iron roof, housing eight 200-h. p. boilers, and a steel self-supporting brick-lined smokestack, 7' diameter and 140' high. There is also a change house of brick construction, 39x139". One shaft rock house serves both shafts.

The central crushing plant, of brick, is 800' north of No. 1 shaft, and 624' south of No. 2, with which the plant is connected by a temporary frame trestle 37' high and 14' wide, carrying a double track for 7-ton tram cars, which are dumped by means of cradles, and rock directed by grizzlies and chutes to the crusher, below which is a hopper, feeding directly into a shaker driven by a 7½-h. p. electric motor, crushed rock, thence being fed automatically into a link-belt conveyor driven by a 35-h. p. motor, going to the rock bin. The crusher building, of steel, contains 3 Farrell crushers, driven by a 12x24" Nordberg engine, and tram cars are actuated by two 35-h. p. motors, located in the 2nd story of the building. Crushed rock goes to a 1,600-ton cylindrical steel rock bin, 32' in diameter and 48' high, set on concrete piers, with tunnel and railway track beneath, permitting the filling of cars by gravity, 1 man loading a 40-ton car in 10 seconds.

Mine buildings include office building, machine shop, warehouse, connecting with railway tracks; an office for mining captains and timekeepers, smithy, cold-storage shed, and about 70 dwellings. The location is protected by a water system having 6,000' of 6" mains with 16 Ludlow hydrants. Water is taken from an 8' dam across the outlet of Seneca lake. This water supply probably will be adequate for several years, but is located on another company's land. A large water supply could be developed from Ahmeek lands near the Allouez boundary, and an inexhaustible supply is available from Lake Superior, 4 miles distant, but about 600' lower.

The mine has rail connections with both the Mineral Range and Keeweenaw Central lines, and is connected with the mill by the Mineral Range, which enters the structure over a steel trestle 100' high.

The stamp mill, at Hubbell, on Torch lake, went into commission June, 1910. There were 4 heads, each stamp breaking about 560 tons of rock daily. The mill site has a frontage, on Torch lake, of about 2,000' with a maximum water depth of 90', providing for wasting sands for many years. Ground was broken May, 1913, for an addition to the mill, with room for 4 heads, 2 of which have been installed, together with extensive regrinding machinery, and the other two will be operating by the middle of July, 1916, making 8 heads in all, with an estimated daily capacity of 5,600 tons.

Several new ideas are embodied in the erection and equipment of this mill. The material of construction is steel and concrete throughout. Stamps rest on concrete piers, each standing on a concrete slab 4' 6" thick that rests directly upon a hard pan of closely-cemented gravel. Each slab holds about a mile of wire cable, interlaced upward on its surface and reaching into the pier above, which is 40x40' at the base, pyramidal in form and 38' high, giving the stamps an elevation of about 50' above lake level. There are four 1,000-ton rock bins. A new feature in local mill

construction is double-deck floors, the jigs being located on the upper or roughing floor, and sands overflowing to Evans round tables and Wilfley concentrators on the ground floor. Wash equipment includes 88 jigs, 12 Evans round tables, 45 Wilfley tables and 4 sets of Woodbury jigs. Tests made to end of 1910, indicate a saving of about one-half pound fine copper per ton from the Woodbury system of milling, over the old system. The jigs and tables are actuated exclusively by electricity.

The mill power house has six 200-h.p. boilers, and a low pressure steam turbine. The plant has a 300-k.w. generator, and a pump of 40,000,000-gal. daily capacity, capable of supplying water for 8 heads, connected with Torch lake by a 600' pipe intake.

Production

Year	Tons R'k Treated	Lbs.		Lbs. Cu.		Lbs.		Tot. Cost per Lb.	Rec'd per Lb.
		Mineral Produced	R'k	per Ton Stpd.	Cost per Ton	Copper Produced	per Lb.		
1915	948,874	32,292,325	23.0	\$1.26	21,800,492	7.96c	18.28c		
1914	590,519	20,333,000	23.1	1.55	13,634,605	9.71	13.08		
1913	383,749	13,742,140	24.0	1.77	9,220,874	13.30	15.42		
1912	652,260	23,945,315	25.2	1.39	16,455,769	7.85	16.61		
1911	598,549	21,917,925	25.4	1.42	15,196,127	7.17	12.85		
1910	530,365	16,758,521	22.3	1.42	11,844,954	11.05	12.94		
1909	406,045	.....	22.7	(a)	9,198,110	15.48(b)	13.39		
1908	298,178	.....	21.1	....	6,280,241	12.66	13.36		

(a) Includes mining, transportation, stamping and taxes. (b) Due to unusually heavy construction costs.

Copper production is marketed through the United Metals Selling Co. Reserves not officially given are maintained at about 5,000,000 tons, and the life of the mine is estimated at 18 years, with present output.

The strike called by the Western Federation of Miners on July 23, 1913, and declared off on April 12, 1914, curtailed production during that time. Later in 1914 when the European war broke out, the copper market was demoralized and the mines were operated on a three-quarter time basis from Sept. 1, 1914, to Feb. 1, 1915.

With 6 stamps operating, Ahmeek is now producing at the rate of over 25,000,000 lbs. copper per year and with the two additional stamps its output will be at the rate of 32,000,000 lbs. of copper per year, figured on the basis of 24 lbs. rock, with a cost per lb. copper of between 7 and 8c. With copper at 14c earnings per share would approximate \$4.40; at 18c \$8.80 and at 20c, \$11.00.

AJAX GOLD MINING CO.

COLORADO

Address: 416 E. 10th Ave., Denver, Colo. Mine address: Victor, Colo.
Officers: E. A. Colburn, pres.; Wm. Lennox, v.-p.; B. L. Gorich, sec.-treas.; E. A. Colburn, E. A. Colburn, Jr., Wm. Lennox and C. H. Dudley, directors. E. A. Colburn, Jr., supt. Reorganized in 1914. **Cap.**, \$1,250,000, shares \$1.00 par. Outstanding \$1,000,000.

Property: 11 claims, patented, 33 acres, on southeast slope of Battle Mt., Cripple Creek mining district, show quartz fissure veins in granite, phonolite and basalt. Veins dip 72° S. W. with strike of N. 32° W. Pay ore occurs as telluride. Company reported 1914 to have leased the property of the Aloha Gold Mining Co. adjoining on the south. Lessees found good grade gold ore on the different levels of the Ajax from the 400' to 1200' levels, in veins from 2' to 4' wide, probably the extension of ore shoots previously worked. Average grade of ore shipped in 1915 was \$16 per ton.

Development: is by means of the Ajax shaft of 1,350' depth, with over 12 miles underground workings. There is a 300-ton cyanide-concentration mill on the property treating custom ores in addition to company ore. Equipment includes a steam hoist and 40 drill air compressor. Output to date said to total \$4,500,000. In Nov., 1915, the output, 2,081 tons, had a gross value of \$22,403. Management intends sinking shaft an additional 500'.

AJO CONSOLIDATED COPPER CO.

ARIZONA

Office: 77 Franklin St., Boston, Mass. **Officers:** Jas. Phillips, Jr., pres.; Walter M. Briggs, v. p.-treas.; H. I. Gaskill, sec., with Jeremiah Horvin, H. C. Slack, Guy Murchie and A. D. Parker, directors. James P. Gaskill, mine supt., Ajo, Pima Co., Ariz.

Inc. Dec. 5, 1912, in Me. Cap., \$6,000,000, shares \$10 par; non-assessable; 4,980,000 shares outstanding. Annual meeting June 14th.

Property: 54 claims, 7 patented, about 1,000 acres in Pima Co., Ariz. Ore occurs as a disseminated deposit of copper sulphides, capped by a heavy burden of oxidized material. Extensive diamond drill prospecting underway 1915-16. Developed by 200' shaft and equipped with gasoline power. Employs 25 men.

AJUICHITLAN MINING & MILLING CO.

MEXICO

Address: Monterey, Mexico. Mines located in district of Toliman, State of Queretero, Mexico, about 25 miles northeast of Bernal station on the National railway, are reached by coach over good roads from Tequisquiapan. Ore is gold-silver, occurring in veins in shale. Vein has well defined walls, an average width of 9 metres, and dips east 50°. Average assay of ore from upper level is \$8 per ton, with \$4 to \$6 ore on the level 50 metres below. Ore is blocked out for 50 metres above upper level, company claiming to have 250,000 tons of \$7 to \$12 ore blocked out in the workings. There is a 65-ton mill on the property, water being obtained from a shaft in the arroyo. Output not reported.

ALADDIN COBALT, LTD.

ONTARIO

Address: F. F. Fuller, sec., 638 Salisbury House, London, E. C., Eng. Mine address. Cobalt, Ont. C. R. E. Jorgensen, pres.; directors, D. H. Herbert, chairman, A. Ferland, C. R. E. Jorgensen, S. B. Peech, J. A. McVichie, mgr. Registered in England, April 23, 1913. Acquired a controlling interest in Aladdin Cobalt Co., Ltd., registered in Canada and having a capitalization of \$500,000, shares \$5 par. Canadian shareholders were offered 5 fully-paid shares for every two \$5 shares held. In addition the Canadian company was allotted 58,000 fully-paid shares in order to enable it to acquire 1,160,000 shares, \$1 each, in the Chambers-Ferland Mng. Co., Ltd. Shares are held in reserve for the acquisition of remaining outstanding shares of the Chambers-Ferland Co. at the rate of one fully-paid £1 share for every 20 Chambers-Ferland shares. For services rendered in organization of the company, 134,351 shares were allotted to H. B. Sedgwick and C. R. E. Jorgensen. The Aladdin Cobalt Co., Ltd., owns the old Silver Queen mine at Cobalt, which was originally worked by the Cobalt Silver Queen, Ltd. It has an authorized capital of £500,000, shares £1 par, issued 439,519 shares. The mine was closed down in Aug., 1914.

Company leases the works of the Nipissing Reduction Co. Employs about 16 men. Recent production is as follows:

	Ore Milled Tons	C'ncts Tons	C'ncts Shipped Tons	Silver Oz.
1914.....	1161	....	....	60,000
1913.....	1898	57.2	31.5	19,511

ALADDIN MINING CO.**ARIZONA**

W. A. Kent, mgr., Prescott, Ariz., writes as follows: "I do not feel at liberty to fill out blank you send. All those entitled to receive the information asked for receive it direct." Company has 5-year lease on Paymaster mine and 8 other claims, the property of the Oriental Mining Co., in Big Bug district, near Poland. Lottie mine of same group has 4,400' tunnel and 20-stamp mill.

ALADDIN MINING CO.**WASHINGTON**

Mine near Northport, Stevens Co., Wash. Frank Earnest, pres.; P. P. Swanson and C. A. Magney, directors. Mine is developed by 2 tunnels, lower 400' below upper, and management plans a third crosscut tunnel. Workings show mainly silver-lead ore, decidedly zinciferous in the upper levels. Has about 1,500' of openings in ore. Equipment includes a 50-ton concentrator and sawmill. Presumably idle.

ALAMEDA MINING CO.**IDAHO**

Wallace, Ida. **Officers:** F. J. Finucane, pres., 323 8th St., Spokane, Wash.; Frederick Burbridge, v. p.; Chas. McKinnis, mgr.; J. A. Wayne, sec.-treas.; above with Chas. Hussey, directors. Originally inc. 1900 as the Alameda M. & M. Co., Ltd. Reorganized 1910 as Alameda Mng. Co. **Cap.**, \$1,500,000, shares \$1 par; assessable; 14 assessments levied since 1900. Control of 800,000 shares purchased April, 1916, at 15 cents a share, by syndicate consisting of above named officers. Stock listed on Spokane and Butte Exchanges.

Property: 6 claims adjoining Success Mng. Co. ground; on the E., in Nine-mile section, Coeur d'Alene district, Shoshone Co., Ida. Little work has been done on the property during the last 4 years, but operations of the Success Co. have shown that ore bodies opened on the 400, 450 and 700' levels of the Success mine extend into Alameda ground and judgment has been rendered the Alameda Co. for illegal extraction of ore estimated at 11,000 tons and valued at over \$200,000. The faces on the 400' and 450' levels are said to average 31.7 oz. silver per ton, 31.5% lead, 21.1% zinc and on the 700' level, 7.5% lead, 7 oz. silver and 25.7% zinc.

Operations through the Success No. 2 tunnel or by a new crosscut to tap the 700' level are proposed for 1916.

Development: up to 1916 consists of about 1,400' of tunnel work on the 300' level, disclosing no ore. Property considered promising and new management able. Further litigation with the Success Company pending.

ALASKA BRITISH COLUMBIA METALS CO., BRITISH COLUMBIA

50 Broad St., New York City. **Officers:** J. C. Eden, pres.; Geo. C. Treat, v. p.; Geo. Allen, treas.; S. I. Silverman, sec., with J. D. Trenholme, Henry J. Mayer and Frank W. Coler, directors.

Inc. Dec., 1915, in Wash. **Cap.**, 1,000,000 shares, \$1 par; outstanding 200,000 shares; 500,000 shares held for issue. Transfer agent, 50 Broad St. Registrar, Metropolitan Trust Co., New York City. Listed on New York Curb.

Company's report for 1915 shows assets of \$1,700,000 which include 400,000 shares Stikine Mining Co., \$400,000; option on 200,000 shares Stikine Mng. Co., \$175,000; 200,000 shares Glenora Mining Co., \$200,000; option on 50,000 shares Glenora Mining Co., \$37,500; Stikine claims \$750,000; machinery, supplies, etc., to make up the balance.

Property: 3 groups of claims in B. C.; the Stikine group, 3 claims of the Stikine Mining Co., located 115 miles from Wrangel, Alaska, up the Stikine River, thence 2 miles by trail to claims; elevation, 1,500' to 2,500'. Claims said to have a mineral zone 3,000' wide, running through entire length of claims, with "irregular deposits occurring here and there

throughout the entire zone, which lies in a granitic formation." Little work has been done on the claims. Average sample taken from the first 150 tons ore mined said to yield \$35 gold and silver; 12% lead; 16½% zinc per ton.

The Glenora group: 3 claims, located 5 miles from Glenora, 150 miles up the Stikine River from Wrangel, Alaska, said to cover 4,500' along strike of vein. Ore: chalcopryrite, containing gold and silver. No work has been done except a little open-cutting.

The Jumbo group, 4 claims, located on Copper Creek, at the end of Tofino Inlet, Clayoquot mining division, Vancouver Island, B. C., said to show 1' to 4' of chalcopryrite in a limestone formation, with diabase hanging-wall. Development: 65' shaft with 80' drift and several short tunnels.

Properties are prospects.

ALASKA CONSOLIDATED MINING & SMELTING CO. ALASKA

Mines at Copper Mount, Sulzer P. O., Prince of Wales Island, Alaska. Officers: Geo. H. Crosby, pres.-gen. mgr., Lonsdale Bldg., Duluth, Minn.; A. M. Sellwood, v. p., with A. L. Warner and Henry W. Armstrong, directors. R. L. Kirkpatrick, supt. Inc. Oct., 1912, in Ariz. Cap., \$2,500,000, shares \$5 par; \$1,500,045 outstanding.

Company purchased property of the Alaska Copper Co. at sheriff's sale and offered 100,000 shares to stockholders of the old company at \$1.25 per share. Property consists of 23 claims, 18 patented and 5 being patented, with 40 acres mill site, known as the Copper Mountain group, situated on Copper Harbor, Prince of Wales Island, Alaska.

Property covers a contact metamorphic zone between granite and limestone with a porphyry intrusion along the contact. Orebodies are from 3 to 50' wide with mineralized zone 900' wide and quite attractive surface showings. Development by 4,600' of tunnels and several shallow shafts. Engineer on ground for past year has kept a few men at work waiting for company to be financed.

Equipment includes smelter, sawmill, tramway and many buildings, put up before sufficient ore had been found to keep smelter in operation. Reports made by W. H. Weed and other engineers on file in company office. No ore shipped since 1907.

ALASKA COPPER & COAL CO.

ALASKA

Dissolved in 1915. The Kennecott group, formerly owned by this company, has been sold to the Kennecott Mines Co., and property is described under that title. See volume XI, Copper Handbook.

ALASKA COPPER CORPORATION

ALASKA

Offices: 60 Wall St., New York City, and 437 Chestnut St., Philadelphia, Pa. Mine office: Strelna, Alaska. Officers: Samuel D. Wariner, pres.; D. Geo. Dery, v. p.; John W. D. Bausman, sec.-treas., with I. M. Thomas, W. F. B. Stewart, G. R. Bedford, M. J. Martin, F. P. Lauer, H. W. Davis, directors. Howard W. DuBois, cons. engr.; C. N. Anderson, Strelna, mgr. Angus McLeod, supt.

Inc. Dec., 1914, in Delaware. Cap., \$10,000,000, shares \$5 par, fully paid and nonassessable; 1,700,000 issued. Guaranty Trust Co., New York, transfer agent. Columbia Trust Co., New York, registrar. Annual meeting 3rd Tuesday in February. Stock listed on New York Curb. Company is a successor to the Alaska Consolidated Copper Co.

Property: 35 claims, 700 acres; nine claims patented and balance in process of patent. Holdings comprise Nugget group, situated about 18 miles from railroad station of Strelna, on the Copper River and North Western R. R., at an elevation of about 3,500'.

The property is crossed by a series of parallel fault fissure veins, in amygdaloidal greenstone, containing mostly bornite and some chalcopyrite, in a siliceous limestone gangue. The several parallel veins dip 83° N. W. and strike N. 40° E. One vein system has been followed on the surface along its strike for 3,500', by means of test pits sunk at frequent intervals. The main vein system is prominently exposed at the surface, the orebody said to have a width of 16' across its strike, and to average better than 5% copper. From the high-grade orebody train carload shipments have been made from which smelter returns are reported to have averaged 49% copper and 13 oz. silver per ton. The property is being developed for mining the disseminated ore, which will average 5% copper and which will be milled by a special flotation process.

Development: Underground workings of 2,320' were driven by hand drilling previous to the new management installing power equipment for carrying on all future development work. The power equipment includes two 30-h.p. of the N-S-O type of fuel oil engines, manufactured by the Chicago Pneumatic Tool Co. The air compressors are direct connected, furnishing 366 cu. ft. air per minute, at 100 lbs. pressure. The general equipment includes a No. 5 Leyner drill sharpener, one oil furnace for heating drill steel, two tigger hoists and one air-driven pump. Both Ingersoll-Rand and Sullivan hammer and stoper drills are used. The above equipment was installed during the spring of 1916 and plans have been made for carrying out a development campaign during 1916-17. Property considered meritorious, but needs large amount of money for development and equipment.

ALASKA-EBNER GOLD MINES CO. ALASKA

Dead Property, sold under bondholders' foreclosure for \$225,000, to A. W. Middleton, former treasurer, acting for a bondholders' protective and reorganization committee. Company's best asset was 100,000 shares Ebner Gold Mines Co. stock.

Shareholders were invited to pay 50c a share and receive stock in the newly organized Cons. California-Nevada Co., which see.

A Federal Court decision rendered Jan. 27, 1916, held that the 100,000 shares of the Ebner Gold Mines Co., and 1,000 shares of the Humboldt Mining Co., are the property of the bondholders' committee, but subject to a lien of \$170,072, of the U. S. Smelting, Refining & Mining Exploration Co. The Court held that the deposit agreements with the latter company are void, and restrained the Exploration Co. from disposing or pledging the stock, until further order of the court.

ALASKA FREE GOLD MINING CO. ALASKA

Originally organized as a stock company, now operated under an 8-year lease that began in 1912. Wm. Martin is lessee. **Property:** 13 claims, surveyed for patent, in Fishhook Creek Valley, Willow Creek district, south-central Alaska. It was on this property the first gold quartz of the district was discovered in 1906. Two orebodies have been opened on two different veins, that are sharp, clean fissures in quartz diorite, traceable for several hundred feet on surface. Ore treated in the mill has averaged about \$20 per ton. Development is by means of several tunnels, maximum length 100', with some stoping.

Equipment: includes an aerial tramway, mill and cyanide plant. Sixty men were employed in 1915 and production is said to have been \$90,000. Operating costs are high, due to short season of 100 to 150 days each year, and the isolated position in which property is located. District will be made easily accessible by the Gov't railroad from Seward to Fairbanks, construction of which is under way. See U. S. G. S. Bull. 607, page 60.

ALASKA GASTINEAU MINING CO.**ALASKA**

Office: 25 Broad St., New York. Mine near Juneau, Alaska. **Officers:** Chas. Hayden, pres.; D. C. Jackling, v. p.; C. W. Peters, treas.; K. R. Babbitt, sec.; preceding officers, J. T. Gilbert, N. B. MacKelvie, D. B. King, directors. Operating officials in Alaska: B. L. Thane, mgr.; G. T. Jackson, supt. of mines; F. G. Janney, cons. met. engr.; Geo. O. Bradley, cons. mech. engr.; H. L. Wollenberg, chief engr.; C. E. Bruff, cons. mill engr.; E. S. Daveler, supt. met. dept.

Inc. Jan. 14, 1911, in New York. **Cap.**, authorized and outstanding, \$12,000,000; shares \$5 par. Is controlled by the Alaska Gold Mines Co., which owns \$11,438,670 of the outstanding stock.

Bonded debt: consists of \$3,500,000 (Entire Issue) First Gold 6%; dated Feb. 1, 1911, due Feb. 1, 1931. The Alaska Gold Mines Co. owns \$3,268,000 of the issue. Balance sheet of Dec. 31, 1915, shows total assets of \$23,228,510, which includes mining grounds, titles and rights, \$14,328,321; mine development, construction and equipment, \$7,630,153; materials and supplies, \$373,945; merchandise at stores, \$31,123; product on hand and in transit, \$131,718; accounts receivable, \$133,520; cash, \$25,035; deferred charges to operations, \$574,690. Liabilities: capital stock, \$12,000,000; bonded debt, \$3,500,000; notes payable, Alaska G. M. Co., \$6,858,264; accounts payable, \$94,798; payroll, \$75,701; bond interest accrued, \$612,500; reserve for replacement of equipment, \$6,360; profit from operations, \$80,886. Mining profit for 1915 was \$251,848; miscellaneous income, \$26,923; total operating profit, \$278,771.

Properties: of the Alaska Gastineau Mining Co., situated in the vicinity of Juneau, Alaska, in what is known as the Juneau Gold Belt, comprise (Dec. 31, 1915) a net area of 2,166 acres, consisting of 1,672 acres of lodes, 219 acres of placers and 275 acres of millsites and homesteads. The mining claims of the company consist principally of 4 groups, formerly owned and operated independently of each other, locally known as the "Alaska Perseverance," "Ground Hog," "Silver Bow Basin" and "Sheep Creek" groups. They cover the so-called Gold Creek lode system of ore deposits, across a low spur of mountains from Gold Creek to Sheep Creek and extending into the basin of each stream, total length of lode system so covered being in excess of 2 miles. The company owns a 310-acre mill site near the mouth of Sheep Creek, on the Gastineau Channel. In addition to the above the company owns and controls lands, reservoir sites, power plant sites and rights-of-way on Salmon Creek, emptying into Gastineau Channel, in connection with its principal water power development; and also on Annex Creek and Carlson Creek, streams emptying in to the Taku Inlet about 10 miles east of the mill, and on Granite Creek, Gold Creek and Lurvey Creek. The property of the Alaska Juneau Gold Mng. Co. adjoins the Alaska Gastineau on the west. The mineralized zone dips about 70° E. and in the main has a slate or a schist hanging wall and greenstone foot-wall. It is cut in a number of places by metagabbro dikes, intrusive into the vein. Gold-bearing quartz is irregularly distributed through the zone in the form of veinlets, stringers and masses. The height of vein measured on the dip above Sheep Creek tunnel and for the length of zone developed on No. 10 level is almost 2,000' with a length of 5,000'. Thickness of the main vein, as used for estimates of tonnage, is 70'. A solid block of ore this size would contain more than 50,000,000 tons. This vein is known as the Perseverance Block. It served as a basis for the purchase of the property. Another orebody, known as vein No. 2, has been opened up for several hundred feet, with an average width of over 100'. It is about midway of the length of the Alexander crosscut. On Jan. 1, 1915,

the estimated tonnage of this block was 21,000,000 tons of fully-developed ore, with average assay value slightly less than \$2 per ton. A third orebody, the Ground Hog or Footwall orebody, has been developed in a few places, principally on the Sheep Creek tunnel level, where it was opened up for 1,500' in driving the tunnel. At this point its width and value are as large as those of the Perseverance vein, lying immediately north. The ore zone, known as No. 1, and lying between the Footwall vein and No. 2 vein, contains two, and possibly three, distinct veins, ranging in width up to 200' or more.

At beginning of 1915 the minimum estimate of fully developed, partially developed, and probable ore, was from 75,000,000 to 100,000,000 tons having a recoverable value of \$1.50 per ton. Undoubtedly the ultimate tonnage will be very much greater than these figures, as no consideration has been made of orebodies extending below sea level. Underground work done in 1915 did not materially change the estimate of ore reserves.

The several orebodies opened thus far in the Perseverance Block, are composed of schist, slate, and metagabbro and slate, with the highest grade ore found to date, occurring in the schist; it has averaged in excess of \$2 per ton; No. 2 East stope on the 5th level averages \$2.70 per ton. This orebody has a strong rake to the east appearing further away from the central shaft and workings on successively deeper levels, until on No. 10 level it is first found east of No. 2 shaft. The slate orebody is the lowest grade so far developed; west of No. 1 shaft the vein widens out to twice and three times the width of the original development of 70'; this widening of the ore zone has resulted in a decrease in assay values. East of No. 1 shaft and below No. 5 level the slate orebody is narrower and higher grade, \$1.50 to \$2.50 per ton. West of No. 1 shaft and below No. 9 level the orebody is made up of meta-gabbro and slate, the meta-gabbro dike replacing the foot-wall and making up a large percentage of the orebody. This section so far as sampled and opened, is higher grade than the slate orebody west of the shaft, but lower grade than the schist orebody; it will furnish ore of an average grade.

It had originally been determined that if a mixture of ore could be made, approximating 25% from the schist orebody and 25% from the slate orebody, both east of the shaft, and 50% from the slate orebody west of the shaft, ore of an average grade would be sent to the mill so long as these percentages were maintained; actual results have proven this to be true, but due to unforeseen conditions underground this schedule could not be adhered to and the percentage of high grade ore as originally depended upon dropped in proportion to tonnage increase from 25%, as calculated, to 5% in Nov., and the profit per ton dropped accordingly. Without doubt new development work with the opening of new stopes, will overcome the difficulty and it will be possible to follow the original plan.

Principal development is by means of the Perseverance, or No. 1 shaft, 1,544' deep; No. 2 shaft extending from the 5th to the 10th level, with an oreway from the 10th to 13th level at this point; the Sheep Creek tunnel, or No. 13 level; and the Alexander or No. 10 level. The 8' by 10' Sheep Creek tunnel with length of 9,178' from the bottom of the Perseverance shaft to the portal near Sheep Creek was started Nov., 1912, and finished April 1, 1914. For the last 6 months of 1913 the average distance driven monthly was 583', during 3 of these months advancement was over 600', and in Nov. 661' were driven. The tunnel was driven both for the purpose of developing the property longitudinally and at depth, and to provide a transportation outlet for delivery of ores to the new mill. It

is driven parallel to and in the foot-wall of the principal or Perseverance vein. At certain points, irregularities of the orebody threw portions of the vein into the direct course of the tunnel; at such places the ore was found to be of good value. The Alexander Crosscut, 10th level, 700' above the Sheep Creek tunnel and 1,300' from the surface on the dip of the vein, runs from the Perseverance mine camp to No. 1 shaft, which is vertical and connects No. 13 level with the top or No. 5 level. It is used only for men and supplies, has a reinforced concrete shafthouse and is equipped on the 13th level, with an air driven hoist, which operates two cages. Between the 10th and 5th levels the mine is opened by levels spaced 200' apart. The ore is dropped from the different levels through oreways to the 13th, or main haulage level, Sheep Creek tunnel. No. 1 oreway extends from No. 5 level to No. 13 level, parallels the vein and is almost wholly in the foot-wall. On No. 9 level there is a timber bulkhead which is used to break the fall of ore. It is hinged and can be pulled out of the way when not required. Oreway No. 2 extends from the 9th to the 13th level. It is expected to put these oreways in at 2,000' intervals.

Two methods of mining are used, shrinkage stoping in the gabbro where the back is so hard it must be drilled and blasted, and a caving system in the slate. Full sized stopes are 400' long with 40' pillars between. A 2-compartment raise is carried through the middle of each pillar, half of it being used as a manway, the other half as a skipway through which supplies are delivered from the level below by means of an air hoist. Stopes are started from the tops of chutes run along the foot-wall, a slice being taken across the lode at right angles to the dip. In order to start movement in the lode a cut is driven along the length of the stope and in the foot-wall. No attempt is made at sorting, the mining being done on a large scale and everything extracted put through the mill. During 1915 development work amounted to 17,346', exclusive of 5,943' of diamond drilling, compared with 28,523' of underground workings and 6,203' of diamond drilling in 1914. Total amount of work done since beginning of company's operations in July, 1912, to Jan. 1, 1916, was 71,049', exclusive of 13,499' of diamond drilling; this added to previous work brings total development work to over 17 miles.

Haulage on the different levels is done in 4-ton cars of the Granby type, by means of 6-ton Baldwin storage-battery locomotives, thus eliminating the trolley-wire. The locomotives are operated for 16 hours, then charged for 8 hours. On the main haulage level four 10-ton cars can be loaded at the same time. Haulage to the mill is done over a narrow gauge railroad by electric locomotives of the trolley type. The railroad to the mill runs through Sheep Creek tunnel for 10,000', then along the north side of Sheep Creek for 6,000' to the coarse crushing plant. When the mine and mill are running at full capacity this railroad will handle from 10,000 to 12,000 tons of ore daily.

The milling plant was designed to handle a daily tonnage of 1,500 tons of ore in each of its 4 sections. Since starting operations Feb. 15, 1915, it has been demonstrated that the mill will handle from 10,000 to 12,000 tons of ore per day, necessitating a larger mine output. The mill is essentially a concentrator, accompanied by a separate small plant for retreatment of concentrates produced. It differs greatly from the conventional type of amalgamating gold mill, in that the main milling plant produces nothing but concentrates, at a ratio of about 60 into 1. A decided novelty has been introduced by crushing with rolls instead of stamps. In the retreatment plant the coarser gold containing some silver is separated from the concentrates and reduced to gold and silver bullion; this separation

produces a small tonnage of lead concentrates containing gold and silver that is shipped to Pacific coast smelters. The residual portions of original concentrates, consisting chiefly of iron and zinc sulphides, are finely ground and amalgamated for gold and silver, resultant iron-zinc tailing being discarded.

The mill is built upon a very steep slope, the bottom floor is 192' above Gastineau Channel, the crushing plant 685' above the water. Supplies to the mill are handled over an inclined tramway, while supplies for the crushing plant or the mine are handled over a longer tramway to a loading station on the ore railroad. The course of the ore through the coarse crushing plant is as follows: From the mine cars to the rotary dump, capable of handling four 10-ton cars at once, to grizzly; oversize to two 36" by 42" rolls set to 5"; over caterpillar feeders to stationary inclined screens with 1½" square openings; oversize to two No. 8 gyratories set to 2"; to ore pocket beneath the crushing plant. This pocket is cut in solid rock, is 30' by 50' in cross-section and 225' in height, 110' of which is the ore-pocket proper. Remaining 115' is a raise connecting the ore-pocket with the crushing plant. The bin has a capacity of 10,000 tons of ore. At the bottom of the bin 8 feeders supply ore to a 42" belt-conveyor, 608' long, that runs through a tunnel to the coarse ore-bins in the mill. From the bins the ore goes to stationary inclined screens, 1½" square openings; oversize to 72" x 24" rolls set to ⅞"; undersize to 54" x 24" rolls set to ⅜". Rolls are run on choke-feed and crush dry, and are of heavy design, having the large pulley in the form of an 8,000-lb. flywheel. Bearings are water-cooled. Roll shells are 6" thick and are shrunk onto the roll-cores. Five-ton skips, working in balance, raise the roll product 115' to a series of 10-mesh impact screens; undersize goes to concentrator; oversize is returned to the 54" rolls. Each of the 4 sections contains 15 impact screens, and there are two 54" rolls for every 12 screens. The two 72" rolls serve the entire 4 sections of the mill. Seven sets of skips are used; one set for each 72" roll, and one set for each of the 5 pairs of 54" rolls. Exhaust fans carry away the excessive dust caused by dry crushing.

The concentrating department has a primary set of 10 double-deck Garfield tables and 10 Wilfley tables per section. Products are tailings and a concentrate that assays nearly 50% lead, which is shipped. Tailing goes to a 4-spigot Janney classifier; product of first 3 spigots to tube-mills. Tube-mill product goes to a secondary set of 10 double-deck Garfield tables, followed by 10 Wilfley tables using as wash water the 4th spigot product of the classifier. Each primary Garfield table can handle 300 tons per day. A 15-h.p. motor drives 10 tables. Concentrate from the secondary Wilfley tables will receive a more thorough treatment when the new concentrate retreatment plant is running.

Hydro-electric power is used. The chief sources of supply at present are the Salmon Creek plants, 2 miles northwest of Juneau, and the Annex-Carlson Creek plant furnishing 4,000-h.p.; these furnish a minimum of 6,000-h.p. Ultimate capacity of the Annex Creek project will be 12,000-h.p. The Salmon Creek project necessitated the building of a concrete dam 165' high and 700' long on its crest. Base of dam is 1,000' above sea level. In order to get maximum benefit from the water available 2 power plants were built. No. 2 is a mile below the dam and operates under a head of 600'. Power Plant No. 1 is on the shore of Gastineau Channel, near the mouth of Salmon Creek. Water discharged from upper plant is conveyed by a 10,000' flume to No. 1 plant and there used under a head of 500'. Power plants No. 1 and No. 2 are each equipped with two 1,500-k.w. generating units with total capacity of 6,000-k.w. or 8,000-h.p. Office build-

ings, machine shops, sawmill, six 50-men bunk houses, messhouse and dock have been built on the beach below the reduction plant.

The first ore was run through the mill Feb. 15, 1915. Towards the end of the year a daily capacity of 6,000 tons was reached, but the grade of ore falling for a time, this tonnage was reduced to 4,000 tons daily. When the mine output is increased to a point commensurate with mill capacity there will be a daily tonnage handled of 10,000 to 12,000 tons. The original figure was a daily tonnage of ore handled of 6,000 tons, with a recoverable value of \$1.50 per ton and net profit of 75c per ton. Operating costs have been proven to have been estimated 10% to 20% too high as 60c costs were obtained in Nov., 1915.

Production: by quarters for 1915:

	1st Qr.	2nd Qr.	3rd Qr.	4th Qr.	Total for Year
Tons treated	42,142	221,706	402,024	449,422	1,115,294
Gross value per ton....	\$1.6216	\$1.3783	\$1.0992	\$1.0537	\$1.1569
Value recovered	1.304	1.118	.906	.843	.938
Operating expenses	1.083	.789	.666	.681	.712
Operating profit .....	.221	.329	.240	.162	.226
Miscellaneous income....	.015	.023	.024	.026	.024
Total profit per ton....	.236	.352	.264	.188	.250

Extraction and costs in 1915:

Tons Milled	Value	Tails	Ext.	Mng.	Tram.	Trans.	Gen.	Total	Mill	Total
Tons % ————— Cost Per Ton, Cents										
1,115,294	\$1.157	21.91c	81.06	22.47(a)	4.98	3.64	0.33	31.44	30.50	69.04

(a) Includes 5.25c per ton charged against mining to create a reserve to cover cost of preparing new stopes as old ones are exhausted; this cost, 22.47c applies to 2,089,620 tons of ore broken.

ALASKA GOLD BELT MINING CO.

ALASKA

Address: 170 Broadway, New York. Mine office: Juneau, Alaska.

Officers: Sanford Makeever, pres.; A. B. Dodd, v. p.; M. M. Makeever, sec.; J. Makeever, treas.; preceding officers and D. C. Bard, directors; A. B. Dodd, supt. Inc. 1915, in Alaska. Cap., \$1,000,000, shares \$1 par, none outstanding Feb. 3, 1916.

Lands consisting of 93 lode claims, 13 tunnel claims, and 18 wharfage claims, total area 2,500 acres, are located 4 miles south of Juneau and adjoining property of the Alaska Gastineau on the southeast. They cover the extension of the Juneau gold belt and the ore is supposed to be of the same general character as that of the Alaska Gastineau.

Development work was started in the summer of 1915 on the Lott-Nelson group of 30 claims, located in the upper Sheep Creek basin. Roads were built, buildings constructed, and an air compressor put in, preparatory to driving a 3,000' exploratory and development tunnel in Sheep Creek mountain to cut upper part of orebody. In Jan., 1916, this tunnel had been driven 2,880' and \$100,000 is said to have been spent thus far on the development work. Is diamond drilling in an attempt to cut the Gould & Curry vein, supposed to be the main orebody of the property. At last accounts, April, 1916, this drill hole had reached a depth of 1,575' in a horizontal hole without results. Company plans to drive a 9,000' tunnel at sea-level that will cut the orebody at depth, and to build a mill on the beach south of that of the Alaska-Gastineau Co. Trying to make good with the aid of the reflected glory of its neighbors.

ALASKA GOLD & COPPER MINING CO.

ALASKA

Apparently dead. See Copper Handbook, Vol. XI.

ALASKA GOLD EXPLORATION & DEV. CO.

ALASKA

Officers: Chas. J. Hutchinson, pres.; Nelson W. Parker, sec.; both of

Seattle, Wash., and S. I. Silverman, v. p. and mgr., Seward, Alaska. **Property:** Barnes group, including Stella & Ruth claims, in Crow Creek Canyon, in Knik Mng. district, Alaska. **Ore:** gold, in three veins, said to average about \$40 per ton. **Development:** by opencuts and 1,000' of underground workings.

ALASKA GOLD MINES CO.

ALASKA

Office: 25 Broad St., New York. Mine near Juneau, Alaska. **Officers:** Chas. Hayden, pres.; D. C. Jackling, v. p. and managing director; C. W. Peters, treas.; K. R. Babbitt, sec.; directors, Chas. Hayden, D. C. Jackling, K. R. Babbitt, C. M. MacNeil, Sherwood Aldrich, F. H. Goff, E. A. Clark, Wm. H. Coolidge, Jos. T. Gilbert.

Inc. Aug., 1912, in Maine. It is the holding company, owning \$11,438,670 of the \$12,000,000 capital stock, and \$3,268,000 of the \$3,500,000 bonds of the Alaska Gastineau Mining Co. Property is described under title of Alaska Gastineau Mining Co.

Cap., \$7,500,000, increased Jan., 1915, to \$10,000,000, shares \$10 par, outstanding \$7,500,000. Of the unissued stock, \$500,000 is reserved for conversion of 10-year, 6% debentures. Transfer agents: Guaranty Trust Co., New York, and National Shawmut Bank, Boston. Registrars: Bankers Trust Co., New York, and First National Bank, Boston. Listed on the New York and Boston Stock Exchanges.

Bonded debt: Consists of \$1,500,000 10-year, 6% convertible gold debentures, series "A"; dated March 1, 1915; due March 1, 1925; int. M. & S. 1, at Guaranty Trust Co., New York, Trustee, and \$1,500,000 10-year 6% convertible gold debentures, Series "B"; dated March 1, 1916, due March 1, 1926. Coupon, \$100, \$500, and \$1,000; principal may be registered. Authorized, \$1,500,000. These bonds were sold for purpose of providing funds for increasing the mining and milling operations of the Alaska Gastineau Mng. Co. Convertible at any time into stock of the company at \$30 per share. Subject to call as a whole, or in part, at 110 and interest at any time on, or after 3 years from their date. Company agrees that it will not, while any of these debentures are outstanding, mortgage or otherwise encumber any of its assets. Company is not, however, prohibited from issuing other debentures similar to series "A," and series "B," at any time and to any amount, provided that said debentures shall not be given priority over Series "A," and Series "B," debentures. Normal income tax deducted from interest. Listed on New York Stock Exchange.

Comparative Balance Sheet: year ending Dec. 31—

Assets:	1915	1914
Invest. in stock and bonds Al. Gast.....	\$ 4,045,101	\$4,045,101
Al. Gast. Mng. Co., notes rec.....	6,858,265	4,460,200
Int. accr'd on Al. Gast. bonds owned.....	571,900	375,820
Cash	8,313	965
Total.....	\$11,483,579	\$8,882,086

ALASKA GOLD MINES

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK

87 Milk Street, BOSTON

Liabilities:

Cap. stock issued	\$ 7,500,060	\$7,500,000
Gold debentures, series "A," issued.....	1,499,800	.....
Notes payable	1,525,000	750,000
Int. accr'd on debentures.....	30,000	.....
Int. accr'd on Al. Gast. bonds owned.....	571,900	375,820
Prem. on cap. stock issued in conv. of deb'nts.....	120	.....
Surplus	356,699	256,266
Total.....	\$11,483,579	\$8,882,086

ALASKA-ILLIAMNA COPPER CO.**ALASKA**

Presumably dead. See Vol. XI, Copper Handbook.

ALASKA IMPROVEMENT CO.

Office: Room 302, No. 65 Second St., San Francisco, Calif. Bonded Rip Van Winkle mine, at Lone Mountain, Elko Co., Nev., to Lone Mountain Mining Co., in March, 1916. Property produced \$13,813 net to the Alaska Investment Co., making a total of \$42,000 to date. Mine said to be sold to Stewart Mining Co., July, 1916.

ALASKA INDUSTRIAL CO.**ALASKA**

Office: 115 Broadway, New York. Mine office: Sulzer, Prince of Wales Island, Alaska. A. E. Spriggs, pres.; S. I. Frankenstein, v. p.; L. A. Sarecky, sec.; C. B. Thomas, treas.; Charles A. Sulzer, gen. mgr. Inc. Oct. 30, 1899, in New Jersey. Cap., \$1,000,000, shares \$1 par. Annual meeting, second Saturday in January.

Property: The Sulzer group of 35 claims, patented, area 700 acres, also 60 acres in mill sites, 80 acres in homestead, and miscellaneous properties. Eight outlying claims were leased, 1909, for 5 years, to Tye Copper Co., Ltd. Main holdings are near the head of Hetta inlet, 2 miles from the beach and 1,500 to 2,000' above tidewater.

Mine, known as the Jumbo, has a mineralized contact metamorphic zone-up to 1,000' in width, with granite foot and limestone hanging, ore fading into the lime. Property shows 7 lenses and irregular masses, ore being mainly chalcopyrite, with some bornite and a little tetrahedrite in a gangue of magnetite, garnet, epidote and other contact minerals, together with occasional molybdenite. Ore averages 4 to 5% copper, with \$3 gold and silver per ton. Average recovery said to be 100 lbs. copper per ton of rock, at cost of seven cents per lb. copper produced.

Development is mainly by tunnel, with 4 shallow shafts and numerous open cuts. The tunnels are in series, lowest 500' vertically below the highest, all connected by winzes, and the mine has over 3 miles of workings; greatest depth of workings is 1,000'. The ore stands well, requiring little timbering, even in stopes up to 50' in width.

The property carries an available water power, rated at 5,000-h.p., and this has been partially developed by a 36" Pelton wheel, taking water from Beaver creek and actuating a 6-k.w. generator, and a 16" Pelton wheel taking water under a 330' head from Jumbo creek, through a 10" pipe line of 3,000' length, this actuating a 55-k.w. 3-phase 2,300-volt 60-cycle generator, current being stepped down to 220 volts for lighting and power. Mine is equipped with electric fans, blowers and Temple-Ingersoll electric drills.

A 9,000' Riblet aerial tram has 14 wooden towers with 22 half-ton buckets, operated by gravity with a 600' auxiliary tram. Capacity of tram line is 12 tons per hour. The main tram has small bins at the mine and 4,000-ton storage bins at tidewater, where there is a 200' wharf. Company has a 47' gasoline launch.

Equipment includes a 200-h.p. electric hoist and an Allis-Chalmers duplex air compressor, electrically driven. Buildings include a 35x40' warehouse, 30x35' power house, smithies, store, office, dwellings, bunkhouses and various smaller buildings.

Production was begun 1907, and now aggregates 127,000 tons, over \$1,000,000. Earnings have gone back into the property for development and permanent improvements. Company now shipping about 2,500 tons monthly to the Tacoma smelter.

Property considered valuable and management good.

ALASKA JUNEAU GOLD MNG. CO.

ALASKA

Office: Crocker Bldg., San Francisco, Cal. Mine office: Juneau, Alaska. Officers: F. W. Bradley, pres.; Wellington Gregg, Jr., v. p.; A. B. Davis, v. p.; G. D. Abbott, sec.-treas.; J. S. Wallace, ass't sec.; directors, F. W. Bradley, Wellington Gregg, Jr., J. H. MacKenzie, A. B. Davis, and M. L. Requa; P. R. Bradley, gen. supt. Inc. Feb. 17, 1897, in West Va. Cap., \$150,000, consisting of 1,500,000 shares, increased April, 1915, to \$15,000,000, shares \$10 par, outstanding 1,400,000 shares. Increase of capitalization to represent more correctly the value of the property and provide funds for its development. Registrar, Metropolitan Trust Co., New York; transfer agent, Central Trust Co., New York. Listed on the New York Stock Exchange. Annual meeting first Tuesday after third Monday in March.

General Balance Sheet: year ending Dec. 31—

Assets—							
	Property	Devel.	Const. & Equip.	Cash	Other Current	P. & L. Surplus	Total
1915	\$9,638,037	\$791,954	\$729,657	\$2,232,123	\$80,918	\$561,983	\$14,034,672
Liabilities—							
	Capital Stock		Misc. Supply Accounts, Etc.	1st Nat. Bk. Juneau	Total		
1915	\$14,000,000		\$31,324	\$3,348	\$14,034,672		

Income Account: year ending Dec. 31—

Total					
	Income	Mining Expense	Treas. Stock Sales Exp.	Other Exp'n's (a)	Total Deficit
1915	\$253,483	\$162,245	\$544,760	\$91,178	\$798,183
(a) After deducting \$71,341, property carrying charges.					

Property: The mineral area of the company covers a tract of land adjoining the property of the Alaska-Gastineau Mng. Co. on the west and that of the Ebner Gold Mng. Co. on the east, located one mile inland from Gastineau Channel. In addition the company owns a large tract of land stretching along the east side of the Channel south from the city of Juneau. This area, used as the mill site, is connected with the large mineral area by two narrow strips of land, one along Gold Creek and the other farther south through which a long transportation tunnel connects the mine and mill.

The mining claims include the first quartz claims located on the wide vein called "The Juneau Gold Belt" and are supposed to be in the center of the mineralization of the belt. The property owned by the Alaska-Juneau covers the outcrop of the vein or mineralized zone, for over a mile in length. The lode has a width between walls of 900' and dips 70° east. The orebody is composed of slate with gold bearing quartz, irregularly distributed through it in the form of veinlets, stringers and masses. Metagabbro dikes, intrusive into the vein, carry gold bearing quartz similarly distributed. The quartz distribution is not regular, but it is probable that, where the gold content of the vein is too low for commercial extraction, sorting can be

resorted to and a mill feed obtained that will be higher than the average mass. Associated with the gold in the quartz is pyrite, pyrrhotite, galena and a little sphalerite. The foot-wall is greenstone, the hanging wall schist.

The vein had been operated in a superficial way for a great many years. Deep development was first planned in 1899, started in 1909, but not actively pushed until 1910, when a main working crosscut, 8'x10', called the Gold Creek tunnel, was commenced at an elevation of 425' above sea level, starting from a point immediately behind the town of Juneau. At 6,540' from the portal, where the surface could be reached in the shortest possible distance, an 800' inclined raise in the hanging-wall was put through to surface. In driving the tunnel that portion of the vein lying west of the Silver Bow fault was crosscut diagonally for 650', disclosing orebodies of average assay values slightly less than \$2 per ton. The true width of the vein where cut is 500' with average assay value close to \$2 per ton. Although this is better than shown by any surface developments, it is believed this width and assay value will persist for considerable distances longitudinally and vertically. This belief is based on the result obtained from a 30-stamp mill working 5 months each year, from 1896 to 1914, on ore mined by open-pit work along the outcrop of the vein. During this time 295,807 tons were milled, yielding \$2.26 free gold per ton, obtained by milling 63% of ore mined. The rejected vein matter was gold bearing, but of lower grade. No attempt was made to save the values in the sulphides, which would have added about 20c per ton.

Ore extracted from the Gold Creek tunnel and the intermediate level opened from the incline raise at an elevation of 495' above the tunnel was milled in the new 40-stamp mill on Gastineau Channel. A total of 50,000 tons milled up to Dec. 1, 1914, averaged \$1.36 per ton, the low value undoubtedly being due to the dilution of ore with waste attendant upon the opening up of the two levels preparatory to stoping. In Dec., 1914, there was milled 9,657 tons of average assay value of \$1.74 per ton; in Jan., 1915, there was milled 12,000 tons of average grade of \$2.09 per ton.

Confidence in the persistence of the vein and its value is also derived from milling records of the 100-stamp Perseverance mill, now part of the Alaska Gold Mines Co., adjoining on the East, and the milling results obtained by a small mill operating on the Ebner property on the west.

The mine development work as outlined, and now under way, will give a daily tonnage of not less than 8,000 tons, making available for caving and extracting 7,500,000 tons of ore in one section of the vein. Management expects to complete this work by Oct., 1916. All tunnels are being double tracked and so equipped that 16,000 tons of ore daily can be transported from the mine to the mill. The mining method to be employed will be a combination of those used on Douglas Island with the caving system used by the Alaska Gold Mines Co.

The approximate total tonnage of the vein above the Gold Creek tunnel level and between the eastern and western ends of the property amounts to 500,000,000 tons of slate, metagabbro and quartz. From this by means of selective mining there should be taken 80,000,000 to 100,000,000 tons of vein matter suitable for milling that should yield, according to estimates made by the management, a net profit of from \$0.70 to \$1 per ton. That part of the vein below the Gold Creek tunnel would seem to promise an additional tonnage of the same value, but twice as great as that which lies above the tunnel level, inasmuch as a parallel vein 2 miles distant on Douglas Island is being mined at a depth of 2,000' below sea level.

New work in 1915 totaled 16,775' compared with 5,671' in 1914.

Forty stamps of the first unit of the new mill started operating early

in Jan., 1914. Ten of these stamps were used as a pilot plant, with total duty per stamp per day of 20 tons. The pilot stamps are followed by 2 Wilfley roughers, 1 Chilean mill, amalgamating plates and 2 Wilfley concentrators. A mill with daily capacity of 8,000 tons has been designed and construction work will be started this Spring. Present plans call for 4 No. 9 gyratory-crushers, 2 jaw-crushers, 12-6' by 8' ball-mills, 12 7' by 10' tube-mills, 48 roughing tables, and 120 finishing tables. The plant will be in 4 units of 2,000 tons each, the first of which is expected to be in operation early in 1917. Battery water for the mill will be obtained from Gold Creek and also from the ocean when fresh water is scarce. The power plant will be built on the beach and will contain two 5,000-k. w. turbo-generators. Hydro-electric power will eventually be transmitted from Nugget Creek, about 15 miles distant, and, in case this is not enough, Speel river, 45 miles distant, will furnish additional requirements. Wharf facilities allow large ocean-going steamers to approach within a few feet of the mill!

	Tons Milled	Value p. Ton	Cost per Ton		Rec. p. Ton	Total Recovery
			Oper.	Total(a)		
1915....	179,892	\$1.4797	\$2.853	\$ 3.819	\$1.118	\$201,036
1914....	60,026	1.4326	3.573	10.813	1.156	69,390

(a) Total of all expenditures.

In 1913 F. W. Bradley made comparison between the average costs per ton in the 4 operating Douglas Island mines, and the estimated costs per ton at the Alaska-Juneau as follows: Douglas Island total mining costs \$0.95, total milling costs \$0.25, concentrate treatment, plant construction, etc., \$0.20, total \$1.40. Alaska-Juneau total mining costs \$0.40, total milling costs \$0.20, concentrate treatment, plant construction, etc., \$0.20, total \$0.80.

The Juneau gold lode is not a new discovery, for mining operations have been carried on there for 25 years. All such work was on a small scale, however, and directed toward mining only the quartz veins and zones of enrichment. To make a profit on ore that carries only \$1.50 gold per ton it is absolutely necessary to mine and mill a large tonnage. When present plans of the Alaska Juneau materialize a daily tonnage of 8,000 tons will be treated, from which the management expects to pay dividends of at least \$1,400,000 per annum, or 10% on stock now outstanding. The property adjoining on the east is that of the Alaska Gastineau, Alaska Gold Mines Co. Its ore is similar to that of the Alaska-Juneau and about the same average grade. Both companies are managed by the most successful mining engineers of the day, but entirely different methods will be pursued in working the properties. According to present plans, Alaska Gastineau will begin Mch., 1917, to treat 10,000,000 tons per year, extracting everything from the vein and doing no sorting. In the mill crushing will be effected by means of rolls, a decided novelty in gold milling. Alaska-Juneau will treat 2,500,000 tons per year and will use selective mining—that is, extracting only the richer portions of the lode. In the mill the company will adhere to the conventional stamps. The net results obtained by these two entirely different methods will be awaited with much interest.

ALASKA METALS CO.

Idle. Mine office: Bruce, Prince of Wales Island, Alaska. Harry Corbin, supt., at last accounts. Property, on the west coast of Prince of Wales Island, formerly known as the Corbin mine, and the Copper Mountain Mine. No recent returns secured. Slightly developed.

ALASKA MEXICAN GOLD MINING CO.

Address: Mills Bldg., San Francisco, Calif. Mine office: Douglas Island, Alaska. Under same management as the Alaska Treadwell.

Inc. April, 1892, in Minnesota. Cap., \$1,000,000 in 200,000 shares, \$5 par;

120,000 of which went to pay for the Alaska Mexican Gold Mine, and 60,000 were issued to the public by the Exploration Co., Ltd., of London. Annual meeting in May. Registration & Security Co., of San Francisco, registrars.

Comparative General Balance Sheet:

Assets—						
	Property & Plant	Cash	Reserve Fund	Bullion Suspense	Accounts Rec., Etc.	Total
1915.....	\$674,195	\$5,175	\$93,909	\$15,314	\$146,332	\$934,926
1914.....	785,692	6,955	93,909	20,532	12,298	919,386

Liabilities—						
	Capital Stock	Accounts Pay. etc.	P. & L. Account	Total		
1915.....	\$900,000	\$24,736	\$10,190	\$934,926		
1914.....	900,000	8,572	10,814	919,386		

Comparative Income Account:

	Total Income	Operating Constr'n, Etc.	Net Profit	Divid's	Deprec.	Balance
1915	\$401,761	\$302,284	\$ 99,477	\$ 90,000	\$10,101	\$ 624 (d)
1914	513,318	343,298	170,020	144,000	25,451	569
1913	496,007	324,210	171,797	180,000	21,552	29,775 (d)

(d) Deficit.

Dividends paid from 1894-1915 inc. aggregate \$14.48 per share.

Property: Located on the east side of Douglas Island, between the 700' claim of the Alaska United on the west and the Ready Bullion mine of that company on the east. For a general description see Alaska Treadwell Gold Mining Co.

Development: includes the 1,570' Mexican shaft, devoted to general use, while all ore is hoisted through the 2,354' Central shaft on the 700' claim of the Alaska United, adjoining on the west. The orebody has been opened by levels from the 110' level to the 1,570' level; distance between levels is 110'. During 1915 development work done by the A. M. Co. amounted to 2,153' on its own property, 354' on the adjoining 700' claim of the A. U. Co., and 3,054' done jointly with the A. T. and the A. U. Cos.

Ore reserves: Estimated Dec. 31, 1914, 688,738 tons ore in sight, average grade \$2.68 per ton; revised Dec. 31, 1915, 1,188,866 tons averaging \$1.87 p. t.

The company has a 120-stamp mill that, in 1915, operated 42% of the time with steam power and 58% of the time with waterpower. Duty per stamp per day was 5.24 tons, 1 lb. of Chrome shoe crushed 2.48 tons ore, and 1 lb. of Treadwell die crushed 5.34 tons ore. Mill sands are used for filling stopes.

A cyanide plant is owned and operated jointly by the Alaska Mexican, Alaska Treadwell and Alaska United G. M. Cos., the A. M. Co. owning 13.64% of the plant. Power plants are in conjunction with those of the Alaska Treadwell, which see.

Average number men employed daily in 1915 was 121, with average wage paid each \$3.36. Miners received \$3.50 per day.

Production and profits since 1909 are as follows:

	Concentrates		Total		Oper. Costs	Oper. Profits	Div. Paid	
	Tons Crushed	Yield Free Gold	Tons Treated	Yield p. Ton				
1915....	216,428	\$190,980	4,769	\$188,816	\$1.75	\$1.29	\$0.46	10%
1914....	233,457	238,756	4,340	270,267	2.18	1.45	0.73	16%
1913....	227,112	225,369	4,795	264,327	2.15	1.39	0.76	20%
1912....	233,299	307,951	4,956	371,169	2.91	1.58	1.33	25%
1911....	227,081	323,965	5,150	353,442	2.98	1.84	1.14	14%
1910....	218,960	390,198	4,166	375,523	3.50	1.76	1.74	38%

Costs per ton for 1915 were: Mining, \$0.85; milling, \$0.31; cyaniding same as Alaska Treadwell. Mining costs include charges for 3,047' of development at \$14.74 per ft., and stoping 70,446 tons at \$1.11 per ton. Milling costs include crushing, 4.0c; tramming, 1.6c; stamping, 19c; concentrating, 6c.

ALASKA TREADWELL GOLD MNG. CO. ALASKA

Address: Mills Bldg., San Francisco, Cal. Mine office: Douglas Island, Alaska. **Officers:** F. W. Bradley, pres.; A. B. Davis, v. p.; F. A. Hammersmith, sec.-treas.. **Preceding officers:** E. W. Hopkins, H. S. King, directors; P. R. Bradley, gen. supt.; R. G. Wayland, asst. gen. supt.; R. A. Kinzie, supt. **Inc.** June 1, 1890, to take over the property of the Paris mine on Douglas Island, where operations had been conducted since 1882. Purchase price was \$5,000,000 in fully paid shares. **Cap.**, \$5,000,000; shares \$25 par. Metropolitan Trust Co., New York, registrar and transfer agent.

Comparative General Balance Sheet:

Assets—						
Property & Plant	Cash	Other Current	Supplies	Other Assets	Total	
1915	\$3,775,173	\$365,365	\$603,961 (a)	\$565,337	\$308,618	\$5,618,454
1914	3,685,306	295,587	558,053 (b)	599,471	309,965	5,448,382

(a) Includes: special fund (cash), \$250,000; accts. rec., \$120,600; bullion suspense, \$233,361. (b) Includes: special funds (cash), \$250,000; accts. rec., \$79,668; bullion suspense, \$228,385.

Liabilities—						
	Capital Stock	Accounts Pay. Etc.	Draft Account	P. & L. Acc't	Total	
1915	\$5,000,000	\$524,926	\$3,438	\$90,090	\$5,618,454	
1914	5,000,000	394,520	5,182	48,680	5,448,382	

Comparative Income Account:

Earnings		Other Construc'n					
Gross	Net	Income & Repairs	Divid's	Deprec.	Balance		
1915	\$1,828,723	\$706,610	\$177,399	\$24,822	\$650,000	\$167,777	\$41,410
1914	2,367,562	1,314,933	67,813	31,343	1,100,000	250,953	450
1913	2,358,423	1,286,498	62,592	38,599	1,000,000	487,261	176,770 (d)

(d) Deficit.

Dividends to Jan., 1916, aggregate \$77.68 per share.

Property: The Treadwell group of mines, consisting of the Alaska Treadwell, the Alaska Mexican and the Alaska United, which operates the 700' mine and the Ready Bullion, are under one management and are located on the east side of Douglas Island near the shore of Gastineau Channel. The A. T. property is farthest west. Geological conditions are the same in the mines of the 3 companies. Hanging wall of Treadwell is 1,000' distant from present shore line, while that of the Ready Bullion lies for the most part under tidal water. Though several orebodies have been found, the mines are all situated on the same lode and ore is practically of identical origin throughout. In the Alaska Treadwell, 700', and Alaska Mexican mines, the lode has been developed continuously for 3,500'. Between the Mexican and Ready Bullion mines is an undeveloped interval of 2,500'. Width of orebodies is from 300' to 400'.

Geology: the orebodies consist mainly of mineralized albite-diorite occurring in the form of intrusive dikes in black slate, whose structure they closely follow. They strike N. W.-S. E. and dip 50 degrees toward the N. E. The slates are metamorphosed shale. The ore-bearing dikes belong to a series of intrusives that appear interruptedly along the strike for a distance of about 3 miles in a zone 3,000' wide. Next to the shore of Gastineau Channel the border is defined by a heavy bed of greenstone that forms the hanging wall of both the orebodies and the intrusion zone. Many of the

dikes of albite-diorite at a distance from the hanging wall have been greatly altered and impregnated with pyrite and no workable orebodies have yet been found in them. The ore consists mainly of rock impregnated with sulphides, principally pyrite, and in part shattered and filled by veins of calcite and quartz, which also contain sulphides. The ore-bearing dikes are considerably mineralized throughout, and often the whole mass can be mined. The characteristics of the deposit are believed to indicate that it was formed by ascending waters, with little, or no, subsequent secondary concentration. If this is correct there is little doubt that the ore will continue to a much greater depth than has been reached, and the limit of mining will probably depend finally upon increased costs, attendant upon operating at great depth.

Development: is by an 1,850' shaft with levels from the 110' to the 1,750' level. Upper four levels are at intervals of 110', below this at an interval of either 150' or 200', thus saving a large development expense. The 700' claim of the Alaska United adjoins on the east. During 1915 development work done by the A. T. Co. amounted to 7,284' on its own property, 14' for its own use on the adjoining 700' claim and 3,054' done jointly with the A. T. and the A. U. Cos. There was also 1,047' of diamond drilling done. **Ore reserves:** estimated to Jan. 1, 1916, were 7,012,755 tons, average grade of \$2.28 per ton as compared with 7,159,253 tons, average grade \$2.48, for the preceding year.

In 1882 a 5-stamp mill was built, followed in 1887 by a mill of 120 stamps, and in 1888 by an additional 120 stamps. Between 1893 and 1896 the Mexican, 700', and Ready Bullion mines were equipped with mills, and in 1899 a new 300-stamp mill started operating at the Treadwell. In 1915 the 240-stamp mill operated 27% of the time with steam power and 50% with water, 23% with electric power. Duty per stamp was 4.31 tons per day. In the 300-stamp mill electric power was used 41% of the time and water power 59%. Duty per stamp per day was 5.31 tons. In the 240-stamp mill 1 lb. of chrome steel in shoes crushed 2.70 tons of ore, in the 300-stamp mill 2.44 tons. In the 240-stamp mill 1-lb. of iron in the dies crushed 5.83 tons ore, in the 300-stamp mill 4.09 tons ore.

The Alaska Treadwell owns 61.36% of the cyanide plant operated by the 3 companies.

Steam power was formerly used, but this has been gradually changed to hydro-electric or steam electric power. Recent equipment at the Central power plant includes three 500-h. p. Stirling boilers, one 500-h. p. Heine boiler, one 2,000-k. w. turbo-generator, one 750-k. w. turbo-generator, and all accessories. Total capacity of completed plant is 4,750-k. w. Total cost to 1916 was \$266,173, of which the A. T. Co.'s share was \$159,704. The company's hydro-electric power is obtained from its plants on the mainland on Nugget Creek and Sheep Creek. The Treadwell Co. will furnish power to the Alaska-Juneau Gold Mng. Co.

The average number of men employed per day in 1915 was 718, with average wage of \$3.61. The company has ample facilities, dwellings, store, etc., for taking care of its employees. It also has its own fire department.

	Recent production:		Concentrates		Total Oper. Oper.			
	Tons Crushed	Yield Free Gold	Tons Treated	Yield	p. Ton	Costs	p. Ton	Profits	Div. Paid
1915...	900,211	\$ 936,092	19,177	\$ 892,631	\$2.03	\$1.23	\$0.80	13%
1914...	910,285	1,264,945	19,324	1,102,616	2.60	1.08	1.52	22%
1913...	886,057	1,221,642	17,603	1,136,780	2.66	1.21	1.45	20%
1912...	892,192	1,159,401	17,397	1,046,487	2.47	1.18	1.29	13%
1911(a)	1,348,504	1,879,613	25,673	1,378,818	2.42	1.40	1.02	16%

(a) May 15, 1910, to Dec. 31, 1911.

Costs per ton for 1915 were: Mining, \$0.78; milling, \$0.33 in 240-stamp mill and \$0.30 in 300-stamp mill; cyaniding, \$3.25. Mining costs include charges for 9,663' of development at \$18.42 per ft., and stoping 595,099 tons at \$0.52 per ton. Milling costs for the 240-stamp mill include crushing 3.8c, tramming 1.4c, stamping 21.0c, concentrating 6.6c. Costs for the 300-stamp mill include crushing 3.8c, tramming 1.6c, stamping 18.9c, concentrating 6c. Cyaniding costs include grinding 74c, dissolving \$1.02, filtering 40c, precipitation 56c, refining 53c, proportioned to labor \$1.02, supplies \$1.10, misc. \$1.12.

ALASKA UNITED COPPER EXPLORATION CO. ALASKA

Office: 551 Coleman Block, Seattle, Wash. Mine office: Dan creek, Copper River district, Alaska. L. C. Dillman, pres. and gen. mgr.; Jas. A. Munday, v. p.; E. V. Dillman, sec.; W. A. Mears, treas.; preceding officers, A. Ingraham, W. Hughes, Frank L. Huston, Jas. J. O'Keane and Thos. M. Dunn, trustees; C. C. Jones, cons. engr. Inc. Nov. 14, 1906, in Washington. Cap., \$12,500,000, shares \$1 par. Debentures, \$150,000, 6% bonds. Annual meeting, first Monday in January.

Property: 23 claims, area 460 acres, comprising the Finch, Dillman and Porcupine groups, all five miles from the Copper River railroad, on branches of the Chitina and Nizina rivers, in the Copper River district, Alaska.

Exploratory work has been done on the various groups, property having a number of small tunnels and numerous trenches and opencuts, showing copper ore said to average 35%.

The company is primarily a holding company, prospecting and developing properties in its possession for sale to other parties.

Management expects to start shipment from the Finch group in 1916. Company controls the Alaska Westover Copper Co., which see.

ALASKA UNITED GOLD MNG. CO. ALASKA

Address: Mills Bldg., San Francisco, Calif. Mine office: Douglas Island, Alaska. Under same management as the Alaska Treadwell. Inc. Aug. 6, 1895. Cap., \$1,000,000, shares \$5 par, issued \$901,000.

Comparative General Balance Sheet:

Assets—						
	Property & Plant	Cash	Reserve Fund	Bullion Suspense	Accounts Rec., Etc.	Total
1915.....	\$726,180	\$10,192	\$201,810	\$50,245	\$ 3,900	\$992,327
1914.....	634,004	4,663	201,810	51,924	34,171	926,572
Liabilities—						
	Capital Stock	Accounts Pay., Etc.	P. & L. Account	Total		
1915.....	\$901,000	\$55,312	\$36,015	\$992,327		
1914.....	901,000	10,411	15,160	926,572		

Comparative Income Account:

	Total Income	Operating Constr'n, Etc.	Net Profit	Divid's	Deprec.	Balance
1915	\$1,072,412	\$705,162	\$367,250	\$252,280	\$94,115	\$20,855
1914	975,329	727,391	247,938	162,180	81,153	4,605
1913	1,054,018	668,953	385,065	414,460	30,050	59,445 (d)

(d) Deficit.

Dividends to Jan., 1916, aggregate \$11.05 per share.

Property: Located on the east side of Douglas Island, includes the 700' mine, lying between the Alaska Treadwell and the Alaska Mexican properties, and the Ready Bullion mine east of the property adjoining the Mexican. For a general description see Alaska Treadwell G. M. Co. Apparently the ore shoot of the adjacent properties is rapidly diminishing in length, with depth, and at 2,150' level, the bulk of the ore will come from the 700'

mine. The Ready Bullion property is opened by incline shaft No. 1 to the 2,200' level. As this shaft crosses the orebody, and large pillars of ore are left, incline shaft No. 2 was started, 1914, in the footwall, with dip of 70° and depth to the 2,200' level of 1,885'. Levels from the 300' to the 1,800' are 150', and below the 1,800' level are 200' apart, this distance between levels eliminating much development expense. In 1915 exploration and development work amounted to 4,777', with 1,639' of enlarging No. 2 shaft.

The 700' Claim is developed by the 2,354' Central shaft with levels from the 98' to the 2,300' level. Workings of the Alaska Treadwell on the west and the Alaska Mexican on the east are connected with Central shaft levels, and the hoisting through this shaft is done for the 3 companies. Of 1,353,430 tons of ore hoisted in 1915, 23,097 tons was waste. In 1915 exploration and development work totaled 5,197' for the United Co., and 3,054' was done jointly by the United, Mexican and Treadwell Cos. Ore reserves of the Ready Bullion mine at the end of 1915 were estimated as 2,583,105 tons, average grade \$2.86 per ton, of the 700' claim mine, 4,893,907 tons average grade \$1.75.

The company owns two stamp mills. In 1915 the Ready Bullion 120-stamp mill crushed 252,154 tons ore, operating 15% of the time with steam power and 49% with water power, and 36% with electric power. Duty per stamp per day was 5.64 tons; one lb. chrome steel shoes crushed 2.59 tons of ore and one lb. of dies crushed 6.12 tons of ore. Thirty stamps were added to the mill in 1914 and 30 more in 1915. The 700' claim mill of 120 stamps crushed 278,058 tons ore, operating 37% of time with steam power, 43% with water, and 20% with electric power. Duty per stamp per day was 5.25 tons, one lb. chrome steel shoes crushed 2.88 tons ore, and one lb. dies crushed 6.07 tons ore.

The company owns 25% of the cyanide mill, operated jointly by the 3 Treadwell companies. Of the 35,502 tons of concentrates treated in 1915, 11,556 tons were from A. U. mines. Power plants are in conjunction with those of the Alaska Treadwell, which see. During 1915 the average daily number of men employed was 276, with average wage of \$3.46.

Recent production: (1) Ready Bullion mine, (2) 700-ft. claim mine.

	Tons Crushed	Yield Free Gold	Concentrates		Total Oper.		Div.	
			Tons Treated	Yield	p. Ton	Oper. p. Ton		Oper. p. Ton	Pd.(a)
(1)								
1915....	252,154	\$272,274	5,621	\$249,638	\$2.07	\$1.31	\$0.76	28%
1914....	233,100	282,036	5,700	252,370	2.29	1.47	0.82	18%
1913....	222,992	268,444	5,651	242,947	2.29	1.45	0.84	46%
1912....	216,454	317,970	6,128	300,188	2.85	1.50	1.35	36%
1911 (b)	223,663	278,034	5,461	241,248	2.32	1.71	0.61	9%
(2)								
1915....	281,265	\$263,319	5,934	\$256,943	\$1.85	\$1.31	\$0.54	
1914....	225,214	230,509	4,409	200,874	1.91	1.62	0.29	
1913....	225,435	284,097	4,495	248,055	2.36	1.44	0.92	
1912....	234,339	282,180	4,704	294,951	2.46	1.38	1.08	
1911 (b)	224,968	284,430	4,477	244,193	2.35	1.56	0.79	

(a) Total for both mines. (b) Dec. 16, 1910-Dec. 31, 1911.

Costs per ton for Ready Bullion mine in 1915 were: Mining, \$0.89; milling, \$0.29; cyaniding same as Alaska Treadwell. Mining costs include charges for 1,865' of development work at \$15.17 per ft., and stoping 174,860 tons at \$0.73 per ton. Milling costs include crushing 2.2c, tramway 1.9c, stamping 18.2c, concentrating 7.0c. Costs per ton for 700-ft. claim mine in 1915 were: mining, \$0.90; milling, \$0.27; cyaniding same as Alaska Tread-

well. Mining costs include charges for 6,135' of development work at \$13.31 per ft., stoping 169,913 tons at \$0.63 per ton. Milling costs include crushing 37c, trammung 1.5c, stamping 16.9c, concentrating 5.2c.

ALASKA WESTOVER COPPER CO.**ALASKA**

Office: 551 Coleman Block, Seattle, Wash. Mine, 18 miles from Copper River railroad in the Chitina district. **Officers:** L. C. Dillman, pres.; W. A. Mears, sec.-treas.; preceding officers, F. B. Whiting, F. J. Perine, F. B. Chandler, trustees.

Property: The Westover group, title to which was transferred from the Alaska United Copper Explor'n Co. Owns 23 claims, about 460 acres, covering a contact between limestone and greenstone. The contact lies horizontally and the ore outcrop is from 6 to 14' thick and 43' long in a perpendicular bluff at 4,990' elevation.

Development consists of 1,000' of tunnels. One tunnel started at the south end is reported to have shown 4 to 20' of ore for 45' in a S. E. direction, and a crosscut on the orebody shows 2' of glance claimed to assay 50% copper. It widens to 14' for about 36'; is then cut off by a fault, but continues about 12' to the north.

Management plans installing machinery and starting production in 1916.

ALBANY COPPER CO.**NEVADA**

Idle. Mine: Morningstar, Lyon Co., Nev. John E. Lutz, pres., treas. and gen. mgr.; E. R. Tutt, v. p.; Wm. G. Williamson, sec.; Ulrich Keck, supt., at last accounts. Inc. June 29, 1907, in Nevada. Cap., \$200,000, shares 10 cts. par, non-assessable. Annual meeting, last Tuesday in November.

Property: 700 acres, with 400 acres miscellaneous lands, giving total holdings of 1,100 acres, 3 miles from a railroad, in the Buckskin district, showing 3 orebodies, carrying mainly nickeliferous malachite and melaconite, estimated by management to average 3.5% copper, 2% nickel, 0.2 oz. silver and \$2 gold per ton. Development includes 5 shafts, of 30', 37', 54' and 253', and 8 tunnels of 30 to 188' length, with total underground workings of 1,400'. Equipment includes a 15-h. p. gasoline hoist, good for 800' depth. No recent returns secured.

ALBERT BEACON GOLD MINING CO.**COLORADO**

See Prince Albert Mine.

ALBERT COPPER CO.**QUEBEC**

Office: 25 Broad St., New York. Mine office: Capelton, Sherbrooke Co., Que. Was organized to take over the mining interests of the Nichols Copper Co. in Quebec and is controlled by that company.

The Albert mine, area 640 acres, at Capelton, carries lenses of chalcopyrite and pyrite, assaying up to 5% copper and 38% sulphur. Development is by 6 shafts, 4 under 500' depth each, with one of 800' and one of 2,000', the mine having upwards of 5 miles of workings.

The works at the Albert mine include a 150-ton concentrator, a smelter and an acid plant. The chemical works, completed, 1907, at a cost of about \$1,000,000, with capacity of 150 tons of commercial sulphuric acid daily, are among the most complete in existence, manufacturing sulphuric, nitric and hydrochloric acids and glauber salts. The cinder remaining from the burning of cupriferous pyrite for sulphuric acid is smelted in a small blast furnace, producing 1 to 2 tons daily of matte assaying up to 40% copper, with small silver contents, shipped to the Laurel Hill works for refining, and copper production is estimated at 350,000 lbs. yearly.

ALBION MINING CO.**UTAH**

Office: 703 McIntyre Bldg., Salt Lake City, Utah. Mine office: Alta, Utah. **Officers:** Wm. Hatfield, pres.; C. E. Loose, v. p.; H. T. Hatfield,

sec-treas.; with P. G. Peterson and W. M. Bradley, directors; Col. Geo. H. Watson, gen. mgr.; Sol Snyder, supt. Inc. 1903 in Utah. Cap., 1,000,000 shares, 10 cents par; 735,000 shares outstanding. Stock listed on Salt Lake Exchange and New York Curb.

Property: 11 patented claims, 250 acres, in the Alta Cottonwood district adjoining the South Hecla ground on the south, includes the Wellington mine of the Albion Group, formerly owned by the Wellington Mining Co. and credited with a \$1,000,000 production from shallow workings. Company advertised March 29, 1910, as delinquent in payment of Utah corporation tax, but refinanced in May, 1915, and operations resumed in June, after an enforced shutdown since the panic of 1907.

Present development is expected to cut the Greeley fissure through the 3,800' Quincy tunnel of the South Hecla at a depth of 1,300'; a raise driven up 110' to explore the Hays fissure discovered the Connor vein, carrying bunches of copper-silver-gold ore, said to assay 37 ozs. silver per ton.

Equipment includes machine drills, water power and a 30-ton mill, with jigs, putting about 4 into 1, giving concentrates with small and variable assays in copper, 35 to 40% lead, 40 to 45 oz. silver and 0.15 oz. gold per ton. Employs eight men. Royalties received from lessees on the Wellington cover operating expenses, and company is expected to realize a profit next year.

The Albion Group, being developed under lease by R. S. Witcher, covers about 2,000' of the Cardiff lode, intersected by the Greeley, Kate Hayes, Garfield fissures; on the first two a high grade shoot of black sulphides 4' wide has been opened up on a porphyry and limestone contact; this ore is said to assay 1.7% copper, 22% lead, \$1 gold and 26 ozs. silver per ton. Shipments begun in October, 1915, reported to average \$50 per ton and netting about \$30 to the leasers.

ALCO MINING & MILLING CO.

COLORADO

Idle. Address: Georgetown, Colo. Inc. 1910, with same officials as Accord Mng. Co.

Property: Group of lode claims on Saxon Mt., near Idaho Springs, Clear Crook Co., Colo., reported to show ore assaying \$30 to \$125 per ton.

Equipment: Includes hoisting plant.

Company said to be out of debt and plans resumption of development work in 1916.

ALDER GROUP MINING & SMELTING CO.

WASHINGTON

Idle. Mine near Twisp, Okanogan Co., Wash. Lands, about 3 miles from Twisp, have 3 tunnels, of 3,000' aggregate length, longest said to show a 60' vein, claimed, in the press, to be solid ore, without any waste. Mine is said to have blocked out a considerable amount of silicious ore, mainly auriferous chalcopyrite. Company awaiting construction of railroad up the Columbia river from Pateros to Twisp.

ALEXO MINES, LTD.

ONTARIO

Address: Porquois Junction, Ontario. E. F. Pullen, mgr. Operates a mine in Dundonald twp. The ore, nickeliferous pyrrhotite, is shipped to the Mond Nickel Co.'s smelter at Coniston. Production was begun in 1913. In Nov., 1915, shipments amounted to 1,305 tons; in Dec., 875 tons.

ALGOMA CUSTOM SMELTING & REFINING CO., LTD. ONTARIO

Idle several years. Works office: Thessalon, Algoma, Ont. See Vol. XI, Copper Handbook.

ALGOMAH MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. Mine office: Lake Mine, Ontonagon Co., Mich. Officers: R. M. Edwards, pres. and gen. mgr.; S. L. Powers, v. p.; Albert L. Wyman, sec.; Henry Tolman, treas.; R. M. Ed-

wards, J. H. Rice, Henry Tolman, S. L. Powers and Arthur C. Paine, directors; Thos. Bennetts, supt.; Wm. Wearne, mg. capt.

Inc. June, 1910, in Michigan. Cap., \$2,500,000, shares \$25 par; issued 70,000 shares; paid in \$13. Last assessment, May 18, 1916, \$1. Of the capitalization, 60,000 shares were given land owners in full payment for property and 10,000 shares were sold to public at \$10 per share. Annual meeting, third Tuesday in April. American Trust Co., Boston, transfer agent; Federal Trust Co., Boston, registrar. Stock is listed on the Boston Stock Exchange.

The treasurer's statement, Dec. 31, 1915, showed excess of liabilities \$18,133, as compared with \$14,597 surplus assets at close of 1914 and \$27,707 in 1913.

Property: 480 acres, adjoining the Lake mine in Ontonagon Co., Michigan, being the N. $\frac{1}{2}$ and S. W. $\frac{1}{4}$ of Sec. 3, T. 50 N., R. 30 W. Property was owned formerly by a company of the same name, which began work 1852, and did a little prospecting, with negative results, expending about \$65,000.

An 8x12' exploratory shaft, started in an amygdaloidal bed, without definite data as to pitch, was over 560' deep, May, 1916. For the first 95' the shaft continued in vein material, passing into the hanging wall at about 95' from surface. The first level, opened at 104', has about 2,350' of drifts, and a 90' crosscut to the eastern sandstone. The second level, 212' from surface, has a crosscut northwest across the formation which, for more than 1,000', exposes almost solid trap, a small amygdaloid, 560' from the shaft, showing some native copper in about 680' of drifts. The Algomah bed, in which the shaft is sunk, apparently has a dip of about 80° and a width ranging from about 40' at the first level to about 60' at a depth of 470', indicated by diamond-drill borings.

The Algomah bed is peculiar in both strike and contents, strike apparently being nearly north and south, in line with the strike at the Lake mine, next north, and the bed carrying copper oxide instead of native copper, as is the case with all of the other copper mines of the Lake Superior district opened on the bedded formation of the Keweenawan series. Ore is mainly black oxide, or melaconite, carrying traces of native copper, and chrysocolla of 16 to 19% assay tenor was found in a test pit near the shaft. Assays made of a small quantity of selected ore, removed in the course of shaft sinking, gave a copper value of 24.1%, this selected ore representing one-eighth of the entire body of material taken from the shaft.

Considerable diamond drilling has been done in the area west of the orebody, and to great depth, but results are conflicting and nothing definite is known concerning either the dip, strike or value of the several copper-bearing formations there encountered. No mining work was done on the property during 1914, but one shipment of selected ore was made, which yielded 5,005 lbs. copper and sold for \$1,695. A few shipments of ore, taken from above the 40' level, were made in 1915, the first assaying 14% copper. Shaft sinking, resumed in the summer of 1915, to be continued to 500' depth, and development work will be done on this level. It is expected that in depth the shaft will encounter some of the lodes worked in the Lake and South Lake mines, as they flatten downward and dip toward the Algomah ground. Property is a likely prospect only.

Equipment includes a steam hoist, with capacity to lift a 3-ton load from a depth of about 500', and an air compressor. Buildings include a power plant, office and boarding houses. Property considered promising and management good.

ALGONIAN DEVELOPMENT CO.

Haileyburg, Ont., Canada. Holding company of the Jualin-Alaska Mines Co., which see. Also has done development work on a molybdenite property in Brome Twp., Renfrew Co., Ont. Hector Drolet, mgr.

ONTARIO**ALICE G. MILLS CORPORATION.****COLORADO**

Mine office: Idaho Springs, Clear Creek Co., Colo. Inc. 1910, as successor of Alice Development Co. Mine is opened by a tunnel, said to show a vein upwards of 75' in width, carrying ore averaging about \$4 per ton in combined copper, gold and silver values. Equipment includes a 12-stamp mill. Mine and mill reported sold at sheriff sale, April, 1914.

ALICE GOLD & SILVER MINING CO.**MONTANA**

Office: Salt Lake City, Utah. Former mine office was Butte, Silver Bow Co., Mont. Officers: John D. Ryan, pres.; Wm. D. Thornton, v. p.; J. W. Allen, sec.-treas.; preceding officers, Arthur C. Carson and E. S. Ferry, directors. Inc. May 16, 1880, in Utah. Cap., \$10,000,000, shares \$25 par. Total dividends paid, from March 15, 1881, date of first, to March 15, 1888, date of last, were \$1,500,000. Control was purchased, 1906, by Butte Coalition Mining Co. Stockholders voted, May, 1910, by a large majority, to sell the property to the Anaconda Copper Mining Co. at the ratio of 15 shares of Alice for 1 of Anaconda, and deed to property was given May 31, 1910, the company receiving in return 30,000 shares of Anaconda stock.

A suit by minority stockholders to set aside the sale, resulted in a decree annulling the sale and ordering a public resale, Nov. 10, 1915, no bid to be less than \$1,904,391. No bid being made, the sale was declared off, which under the decree confirms the previous sale. In January, 1916, an appeal was taken by the litigants to the U. S. Supreme Court.

Property: The Alice, Magna Charta, Curry, Valdemere, Rooney and many other claims on the Rainbow lode and its neighbors.

The mine had a 1,500' shaft, and was operated actively, 1880-1893, and intermittently thereafter. Production, 1906, was 3,170 tons of ore, giving gross returns of \$7.70 per ton, and costing \$9.30 per ton to mine, mill and smelt.

ALICE MINING CO.**ALASKA**

Address: Valdez, Alaska. Property consists of the Alice mine, situated at sea level on west side of Shoup Bay, 1½ miles northwest of the Cliff mine. The vein, located in March, 1910, is a well-defined fissure, strike N. 60° W., dip 70° S., width from a few inches to 2½'. Ore minerals include gold, pyrite, chalcocopyrite, arsenopyrite, and sphalerite. The country rock is composed of graywackes, slates and green schists.

Development: At beginning of 1915 consisted of a 247' tunnel, a two-compartment shaft, 170' deep, and 100' of drifting at the bottom of the shaft. **Equipment:** Includes 100-h. p. boiler, 3-drill air compressor, 50-light dynamo, 5-h. p. steam engine, steam hoist, pumps, blacksmith shop, mess house and bunk house. Small shipments were made to Valdez in 1913; no returns available. At last reports, Aug., 1914, work was at a standstill, pending a settlement of financial difficulties. See U. S. G. S., Bull. 622, pp. 175.

ALICE MINING CO.**IDAHO**

Address: Wallace, Shoshone Co., Idaho. F. M. Russell, supt. **Property:** The Alice mine, located between Wallace and Mullan, output of which is lead, silver ore. Developed by 640' shaft. **Equipment:** Includes a compressor and 125-ton concentrator. Electric power is used.

ALKALI MINES CO.**NEVADA**

Office: 1417 First National Bank Bldg., Chicago, Ill. Mine address: Eureka, Eureka Co., Nev. W. E. Sanders, supt. **Property:** The Windfall mine, developed by a 500' shaft. **Ore:** Contains gold, silver and lead.

Equipment: Includes a crushing plant and 150-ton cyanide plant. About 25 men are employed. Returns not available.

ALL RIGHT MINING CO.

COLORADO

Address: Cheyenne, Wyo. Inc. Jan., 1915, in Wyoming. **Cap.,** \$500,000, shares \$1 par. N. D. Jones, F. B. Woodson and G. W. Logan, incorporators. Property at Cripple Creek, Teller Co., Colo.

ALLGROVE M. & M. CO.

COLORADO

Office: Cardinal, Colo. **Officers:** K. W. Hunt, pres.-gen. mgr.; Hudson T. Morton, v. p.; G. W. Nicholas, sec.-treas. Operates a lease on the properties of the Pine Grove M. & M. Co. and the Alton group, about 200 acres, 1 mile above Nederland, Boulder Co., Colo.

Development: 300' shaft with 2,000' of levels, and the 2,400' Alton tunnel, which has reached the bottom of the shaft, thus enabling economical development at depth. The Alton mill, remodeled in 1916, includes 15 stamps, a Monel slimer, Wilfley and Card tables, 1 Sampson crusher and a 50-ton oil flotation unit. Mine, heretofore solely a gold-silver producer, is now outputting 25% tungsten product.

ALLIANCE COPPER CO.

MONTANA

Idle several years. Mine office: 3 Lewisohn Bldg., Butte, Silver Bow Co., Mont. Donald Campbell, pres. Inc. May 19, 1906, in Montana. **Cap.,** \$400,000, fully issued, shares \$2 par. Statement of Dec. 31, 1914, gave debts of \$129.19. Property is very small acreage in the northeastern portion of the Butte district, with surface rights to sundry town lots. Development is by shaft, sunk jointly by the Alliance and Farrell companies, and a little ore of good grade was shipped, 1907, from the 200' level. Stock listed on Butte Exchange.

ALLIANCE MINING CO.

WASHINGTON

Address: 622 Old National Bank Bldg., Spokane. **Officers:** C. M. Hansen, pres.; F. H. Hunter, v. p.; W. W. Gifford, sec.-treas.; preceding officers, M. C. Hunter, B. T. Manchester, directors. Inc. Sept. 9, 1913, in Wash. **Cap.,** \$1,500,000, shares \$1 par, outstanding \$1,302,000; assessable, not exceeding 5 assessments of 5 mills each year. Bonds authorized \$100,000, outstanding \$32,400. In 1914 the company took over for \$171,000 the property of the Anaconda Gold Mng. & Reduction Co., paying \$120,000 in Alliance stock, and assuming an indebtedness of \$51,000 for the remainder.

Property: 9 claims, 90 acres, patented, in the Eureka mining district, Republic, Wash., adjoining the property of the Republic mine, cover 3,500' along the strike of the Republic vein, 12' to 30' wide, and the Princess vein, 2' to 10' wide.

Early development of the properties was done when only high grade ore was shipped, and the Alliance Co. acquired the holdings of 4 different companies for the purpose of mining and milling the low grade ore. The veins are developed to a depth of 600' by means of a 385' tunnel and a 400' winze, with total workings of 5,000'. Company claims to have ore reserves of 100,000 tons, assaying \$5 to \$8 in gold per ton. No development work has been done since organization, the company endeavoring to put in a cyanide plant, which it hopes to have complete in 1916. Equipment includes gasoline hoist and a 3-drill compressor.

ALLIE ISLAND COPPER MINE.

ONTARIO

Office: 225 Water St., Kenora, Ont., Can. Owned by F. W. Moore et al. **Property:** 4 claims, the S 777, K 312, K 314 and K 315, 156.64 acres in all, at the east end of Allie Island, about 15 miles from Kenora. Claims cover an outcrop of serpentine, or chlorite-schist carrying small pellets or crystals of native copper. Country rock is dolomite, altered traps and greenstones. Ore body claimed to be ½ mile long with a maximum width of 700'.

Development is surficial only, 40' and 20' pit holes, showing ore in bottom. Ore said to average $1\frac{1}{2}\%$ copper. Owners plan development work in summer of 1916.

ALLIE MINING CO., LTD.

IDAHO

Edgar C. Ross, of the Ross Syndicate, Salt Lake City, pres.-gen. mgr. Company inc. 1905. Property, 18 claims, including the Allie mine in the Texas district, near Gilmore, Lemhi Co., Idaho. Lead-silver ores occur in fissure veins in flat Devonian limestone underlain by Cambrian quartzite.

A development tunnel 4,500' long has been driven into Gilmore mountain jointly by this, the Gilmore and the Pittsburg-Idaho companies. This crosses a dozen silver-lead and one gold vein. Development 1915 was on the Latest Out lead vein at 800' below the outcrop. For geological features see Umpleby, Bull. 528, U. S. Geol. Survey, 1913, p. 107.

The Allie vein, closely parallel to the lead veins, has a gangue of iron oxide with no lead, only a trace of silver and almost exclusively gold values, averaging 1 ounce gold with 50% iron.

In 1914 ore reserves were claimed to be 15,000 tons, with average assay of \$12 per ton gold. Extensive prospecting had not up to 1913 shown any commercial silver-lead deposits, but had opened up good gold ore.

Production: First shipment in Feb., 1914, of about 26 tons gold ore showed smelter returns of \$11,060. Total production was 50 tons, averaging better than \$300 per ton. Later returns, if any, are not available.

ALLOUEZ MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Allouez, Keweenaw Co., Mich. Rodolphe L. Agassiz, v. p.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding officers, Harry F. Fay, W. L. Frost, D. S. Dean, F. L. Higginson and Walter Hunnewell, directors; Geo. G. Endicott, asst. sec.-treas.; F. W. Ridley, supt.; A. Warne, mg. capt. Inc. Sept., 1859, in Michigan. Cap., \$500,000, shares \$25 par; reorganized and reincorporated, 1889, with capitalization \$2,500,000, shares \$25 par; paid in, \$22.25. Last assessment, \$3 per share, was levied 1904. Annual meeting, second Wednesday in April. Old Colony Trust Co., Boston, registrar. American Trust Co., Boston, transfer agent. Owns a half interest in the Lake Milling, Smelting & Refining Co. Is controlled through ownership of 41,000 shares, by Calumet & Hecla Mining Co.

Initial dividend, \$1 per share, was paid July 31, 1915; a second dividend, \$1 per share, paid Jan. 12, 1916, and a third of \$1.50 paid April 5.

Balance sheet of Dec. 31, 1915, shows quick assets and cash of \$1,214,160, and accounts payable of but \$250,349. Construction expenses for 1915 were \$19,037; mine expenses, \$729,899; smelting, etc., \$184,695, with a gain from mining operations of \$924,680.

Lands: 3,400 acres, including mineral ground 640 acres, adjoining the Ahmeek Mining Co., which contains the Kearsarge amygdaloid at great depth.

The old mine, opened 1859, is on the Allouez conglomerate, a bed underlying the greenstone. The conglomerate, 30' wide in many places, with strike of N. 39° E., and dip of 39°, averages 0.7 to 1% copper, and is very refractory under the stamps. There are 3 shafts, deepest about 3,700'. Mining was begun actively in 1869, and stopped in 1877, with an exhausted treasury. The mine was then leased to Watson & Walls, who made money from it, after paying a royalty of one-eighth on gross production. In 1880 the company resumed control, to quit once more, financially exhausted, in 1885. Watson & Walls took the mine again, and once more did well; the company resumed work on its own account for the third time, and again lost money, stopping all work in 1892. The old mine has been idle for

some years, except for exploratory and development work in 1898 to 1900, when a shaft was sunk 1,200' on the Osceola lode, and nearly 4,000' of openings secured thereon, with indifferent results. The shafthouse at the Osceola shaft has been demolished. The old stamp mill, on Hills creek, has 3 old-fashioned heads, and is too antiquated for use. The old Allouez made 26,051,528 lbs. fine copper, 1869 to 1892.

Development: at the Allouez mine is on the Kearsarge amygdaloidal bed, which does not outcrop on Allouez lands, though underlying the entire 640-acre tract, hence was opened on the underlay. The mine had but one producing shaft, until late 1909. Shafts Nos. 1 and 2 are connected by crosscuts and drifts, on several levels. The Kearsarge bed, above the 14th level, is opened by crosscuts, uppermost being at the 6th level, below which plats have been cut in the shafts at the 8th, 10th and 12th levels, for crosscuts to be run to the bed. The Kearsarge bed averages about 16' width in the Allouez mine.

New underground openings totaled 8,517' in 1912; 4,400' in 1913; 3,526' in 1914 and 4,858' in 1915.

No. 1 shaft, at the extreme southeastern corner of the tract, with 3 compartments, started May, 1903, and 3,544' deep, leaves surface at an angle of 75°, but at slight depth takes an angle of 80°, continuing thereon to about 1,435' depth, when a curve of 60' brings the shaft to an angle of 38° 30', which is the dip of the bed. At the change of angle, on reaching the bed, a single idler with a very wide flange cares for the cables passing at either end. Owing to the steep pitch of the shaft, back rails of 6x10" timber are set so close to the wheels of the skips that their flanges cannot leave the steel rails, the wooden timbers serving as guides. The first level is opened at depth of 1,264'. In order to save pumping charges on surface water, a gutter, cut entirely around the shaft, leads to an incline 36' long, used as a sump. This shaft showed very fine ground in its upper levels, but deeper openings are not so good. Equipment at No. 1 shaft includes a 42x62' steel shaft rock house having two 18x34" crushers.

No. 2 shaft, 1,500' northeast of No. 1, is similar to No. 1 in general design, but changes pitch when entering the bed at 2,307' from surface, from 80 to 42°. The bed above the point of intersection will be reached, to the boundary, by crosscuts. This shaft is sunk further in the hanging than No. 1, owing to the proximity of a lake. A new record in shaft sinking was established, 1908, at No. 2, when, with 2 drills, the shaft was sunk a total of 1,275', in addition to which 4 plats were cut, and 105' of crosscutting was done. The collar of No. 2 shaft is of concrete. Washington fir and 16x24" steel I beams, with 14x14" square timber wall plats and 4" plank sheathing. The interior, from collar to solid rock ledge, is lined with 22" of concrete, dividers having their ends bedded in concrete, this giving an impregnable shaft, sunk through 52' of treacherous quicksand overburden. Both shafts can be sunk to about 9,400' before reaching the western boundary line. No. 2 shaft is 3,408' deep.

Machinery equipment includes a Nordberg hoist with 32x72" duplex cylinders and 18' double-conical drum for No. 1 shaft, and No. 2 has a 20x30" engine good for depth of 5,000'. No. 1 engine house, of mine rock, with redstone trimmings, has 12-drill and 18-drill air compressors, and No. 2 engine house has a 60-drill Laidlaw-Dunn-Gordon air compressor. The stone boiler house has five 125-h.p. boilers and a 120' self-supporting steel smokestack. Buildings include a redstone machine shop and smithy, and a large warehouse. There is a very considerable mine location, with numerous dwellings, some remaining from 40 years ago, and some new. The mine is reached by a spur of the Mineral Range railroad.

Recent production has been as follows:

	Tons R'k Treated	Lbs. Min. Prod.	Lbs. Cu. Mine Cost		Lbs. Cu. Prod.	Total Cost Rec'd	
			Per Ton R'k Stpd.	Per Ton (a)		Per Lb. Cts.	Per Lb. Cts.
1915	534,705	10,043,459	18.78	\$1.365	10,043,459	9.31	18.166
1914	354,457	9,408,470	17.09	1.583	6,056,548	11.18	12.853
1913	236,663	6,640,000	17.29	1.687	4,091,129	12.09	15.672
1912	333,618	8,787,120	16.56	1.613	5,525,455	13.52	16.668
1911	288,610	7,532,490	16.56	1.668	4,780,494	13.30	.....
1910	247,119	7,406,970	18.84	1.769	4,655,702	11.57	.....

(a) Includes mining, transportation, stamping and taxes.

The strike, called July 23, 1913, by the Western Federation of Miners and declared off April 12, 1914, interfered with production during that time. After the European war broke out in 1914 the property was operated on a three-quarter time basis from Sept. 1, 1914, to Feb. 1, 1915. At the present time, Jan., 1916, the output is gradually being increased and the management hopes to be able to reach 60,000 tons per month in the near future.

The Allouez, a considerable disappointment in earlier years, earned a net profit of \$171,264 in 1912, turning a deficit of \$77,700 of former years into balance of assets of \$93,564 over all liabilities, and in 1914 net profits were \$114,530. Earnings in 1915 were \$924,680, so that with a working capital of \$963,810, the company is now on a sure dividend paying basis. Is regarded as a good investment.

ALMADEN MINES CO.

COLORADO

Property of the company, located in the Lower Fall mining district, near Idaho Springs, Clear Creek Co., Colo.; was sold in Nov., 1915, to satisfy a judgment of \$27,596. Purchased by Geo. Neill, of Topeka, Kan., and J. A. Greenfield, of Bellaire, Ohio, principal bondholders and stockholders, who plan to resume operations. The property is said to have been a good producer of silver-ore in its day.

ALMEDA CONSOLIDATED MINES CO.

OREGON

Office: 207 Board of Trade, Portland, Ore. O. M. Crouch, pres.; L. B. Simons, v. p.; R. C. Kinney, sec.-treas.; John F. Wickham, gen. mgr. Inc. July 18, 1905, in Oregon. Cap., \$15,000,000, shares \$5 par, as successor of Almeda Mining Co. Annual meeting, second Tuesday in December.

Property: 17 claims, area, 340 acres, also 500 acres of placer ground, in Josephine county, about 22 miles northwest of Grant's Pass, 17 miles from Merlin, nearest railway station, on the Southern Pacific, with daily stage line to Galice. Lands include a 200-acre platted town site, connected with the mine workings by bridge. Lands are well timbered, and have a considerable water power available from the Rogue river. Quartz claims are in 4 groups, known as the Almeda or North Side, Rocky Gulch, which is a continuation of the Almeda, and sometimes known as the Big Yank, both on the north side of the Rogue river, and the Bull Pine and Rand groups on the southern side of the river. Property was worked to slight depth, 1850-1870, for gold.

The Almeda group, including the Rocky Gulch, has 3 claims and 30 acres of placer ground, with 300' of tunnels, showing a strong orebody, of 40 to 60' width, with diorite foot and slate hanging, carrying 10 to 20' of ore on the hanging, ore being strongly auriferous and slightly argenteriferous chalcopyrite. While ore values are not high, they seem fairly constant and dependable, and the orebody is large. Paralleling the main vein is a body of low-grade ore of 20 to 30' width, highly silicious, mainly chalcopyrite, with occasional bornite, giving promise of greater values at increased depth. Development is by tunnels, the longest being the Riverside tunnel

having a back of about 250', and No. 1 tunnel a back of about 500', and by the Alameda 300' vertical shaft, planned to be sunk to 500'. Mine has about 1 mile of workings, with considerable ore blocked out for production.

The Bull Pine group, of 2 quartz claims, 4 miles southwest of the Rocky Gulch group, has a 100' crosscut tunnel, intersecting a 3' vein. The Rand group of 7 claims, with 500 acres of placer ground, has a 900' tunnel, the outcrop giving small assay values in copper, silver and gold.

Equipment includes a 24-drill air compressor, and company has made plans for a steel and concrete dam, the Rogue river being estimated as capable of developing up to 8,000-h.p., under a 20' head.

Buildings include a boarding house, bunk house, office, laboratory, smithy, and a number of dwellings. There also is a 15,000' sawmill.

The 16-mile mountain road, from Merlin to Galice, is not in the best of condition during the wet season, and company plans a motor line, with improved roads, until completion of which the mine cannot ship profitably.

A smelter, completed 1910, was in operation July, 1912, after a winter's shutdown, and overhauling, while roads were bad. The plant has a 100-ton 36x72" blast furnace, for matting. The 80x110' smelter building covers the power plant and ore crusher also, and is planned for an additional 100-ton furnace. The coke bins are at Merlin. Company has made a contract with the government, by which it is to pay for damage to trees and vegetation, the smelter being within the limits of a national forest reserve.

Company was thrown into hands of receiver, June, 1912, on the representation of minority stockholders that company had been mismanaged and that misrepresentations had been made in the sale of the stock. Robert S. Tucker, Portland, Ore., receiver.

ALMOLOYA Y ANEXAS; CIA DE.

MEXICO

Pedro Suinaga, pres.; P. A. Babb, cons. engr.; M. M. Barney, mgr. Organized under laws of Mexico, 1909; capitalization 200,000 pesos. Property the Almoloya copper mine at Ameca, Jalisco, containing veins in diorite said to average 2.5% copper, 2 oz. silver and a few grams in gold. Company began operations 1910, erected a concentrating plant with Merrill stamps and 3 Wilfley tables handling 30 tons per day and saving 75% of the copper and 25% of the silver values. Was a steady shipper of concentrates throughout 1910 and 1911 and paid dividends of 8,000 pesos in 1910.

The Cerritos copper mine was held under option for 50,000 pesos until 1912 and was developed by a shaft 300' deep equipped with hoist, pumps and steam power.

Mill enlarged to double capacity 1912 and ran steadily. Probably idle owing to revolutionary disturbances.

ALMOLOYA MINING CO.

MEXICO

Office: 46 Cedar St., New York. Mine office: Baca, Chihuahua, Mex. Officers: Nils O. Bagge, pres.; W. H. Schlofield, v. p.; C. I. Morey, sec-treas.; preceding officers and W. M. Jermyn, directors; Victor C. Joslyn, mine mgr. Inc. 1903, in Arizona. Cap., \$2,000,000, shares \$1 par, in \$800,000 participating noncumulative 10% preferred stock, and \$1,200,000 common stock, all outstanding. New York Trust Co., registrar. Holds title to lands through Minas de Almoloya, S. A., a Mexican corporation.

Property: 177 hectares, including the San Enrique group adjoining the Cigarrero mine, and 4 other groups, about 4 miles from Baca, in the Allende district, with rail transportation over a standard-gauge line to the Cigarrero mine.

The Sierra de Almoloya is an isolated mountain range, about 9 miles long and 2 wide, carrying limestone beds of the Comanche series of the Lower Cretaceous, extensively fractured by several systems of faulting, with

shear zones of 50 to 90 metres width, principal zones being the northeast system, of Eocene age, of which the most prominent is the San Pedro fault zone, and the N. 40° W. system of Miocene age, which are the sources of large and rich ore chambers, the most important orebodies occurring at the intersection of these faults. Lands adjoin the Cigarrero mine on the northeast, and carry the extension of the San Pedro fault, proven by diamond drilling to occur between the 800' and 900' levels.

Development: several shafts, deepest 700', and 4 tunnels, longest 1,600'. Present development is confined to the San Enrique and Exploradora groups, having 1,186' of shafts and winzes, with 2 main and several shorter tunnels, and a total of 4,400' of workings.

Equipment, includes gasoline and air power, with one 15-h.p. and two 60-h. p. hoists. Property will use commercial electric current as soon as available.

Ore so far found has been in pockets, in leached shear zones, carrying low copper values, which are expected to increase at depth, with about 30% lead, 700 grams silver and 8 to 80 grams gold.

Development work has been almost entirely along the San Pedro fault which shows ore in depth. Revolutionists practically stopped all work in 1913, holding the superintendent for ransom in April and stopping mail and telegraphic service. Work will be resumed when conditions are again stable.

ALOHA GOLD MINING CO.

COLORADO

Property: the Coriolanus mine on Battle Mountain, Cripple Creek, Colo.; under lease in 1914 to Ajax Gold M. & M. Co., whose property adjoins on the north.

Ore: gold occurs in footwall of intrusive dike, phonolitic in character. See Ajax G. M. & M. Co.

ALPENA COPPER MINING CO.

MONTANA

Office: Wallace, Idaho. **Mine office:** Saltese, Missoula Co., Mont. C. W. Beale, pres.; A. H. Featherstone, sec.-treas.; preceding officers, Alex. Muir and A. P. Cochrane, directors. Mine in the St. Joe district, near the Monitor, and 2 miles from the Adair on the Milwaukee railroad, is developed by 2 long tunnels and shaft, showing a 2' vein of quartz with chalcopyrite. At last account face was 400' from ore shoot exposed on surface, which is goal of present work. Equipment includes several buildings. No recent returns secured.

ALPHA MINE

NEVADA

Owned by Horace Palmer, of Chicago. Chas. Nelson, mgr. **Property:** at Jarbridge, Elko Co., Nev., contains veins of gold-silver ore in Tertiary volcanic rocks. **Development:** crosscut tunnel, several hundred feet long. **Equipment:** 5-stamp mill. Employs 20 men. **Production:** \$10,000 bullion per month by amalgamation. Plan installing cyanide plant to treat tailings. See Bull. 497, U. S. Geol. Survey, 1912, by F. C. Schrader, for geology, etc.

ALPINE GALENA MINING CO.

UTAH

Owned and operated by Alpine and Provo men. **Property:** in Alpine Canyon, near Bingham, Salt Lake Co., Utah, contains ferruginous lead ore, in bunches in black limestone. **Development:** by 312' tunnel and incline shaft. Plans to drive tunnel to reach blowout 350' below surface. Assessment called in 1914 in order to provide funds for further development.

ALTA CONSOLIDATED MINING CO.

UTAH

Office: 201 Judge Bldg., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake Co., Utah. A. O. Jacobson, pres.; R. S. Lewis, v. p.; Val. S. Snow, sec.-treas.; W. H. Weyher, director; M. J. Dailey, mgr.; A. O. Jacobson,

supt. Foregoing are all directors; V. S. Snow, sec.-treas. Inc. Aug., 1911. **Cap.**, \$300,000, shares \$1 par, the promoters taking 100,000 shares, and 200,000 shares being placed in the treasury of which amount 100,000 shares were sold at 20c per share; capitalization was increased Oct. 10, 1913, to \$500,000, to provide stock for treasury purposes, practically all issued, Jan., 1916.

Property: 17 claims in the heart of Alta's mineralized zone between the Emma and the Michigan Utah properties, include several old mines. Ores are lead and copper sulphides, highly argentiferous. Ores occur as bedded tabular replacement deposits adjacent to crosscutting fissures and are parallel to the bedding and fissure intersections. The Braine fissure, the most important ore-bearing channel of the camp, known for 2 miles and explored on Alta Consolidated ground for 800'. The existence of cross-cut fissures and a porphyry dike are favorable geologic features.

Development: 5,000' of tunnels exposing a deposit of copper ore 20' wide, carrying 2% copper, 80c in gold and silver and excess iron and worth about \$6.00 at the Garfield smelter, 24 miles away. With cheaper freight (present teaming and freight is \$3.65) it could be worked. Ore occurs at contact between flat dipping quartzite and limestone. The main working, or Silver King tunnel is 300' below the Brooklyn tunnel and an equal distance above the new Alfred tunnel. All recent development is from the main tunnel which follows in a general way the Braine fissure. Drifts east and west from this tunnel have raises to reach the ore. Shipments were made during 1915 from Hoboken lease and from small orebodies encountered in the company workings.

Past representations of mine management have been misleading and unduly optimistic. While the property has merit the company has no stock in reserve, cannot pay expenses under present conditions and a reconstruction seems inevitable.

ALTA COPPER MINING CO.

IDAHO

Idle. Office: 6 West Second South St., Salt Lake City, Utah. Mine office: Mackay, Custer Co., Idaho. Frank M. Foote, pres.; Ernest R. Woolley, v. p. and mgr.; Fred R. Woolley, sec.-treas.; H. C. Parker, cons. engr.; L. S. Rampton, supt., at last accounts. Inc. 1908 in Utah. **Cap.**, \$1,000,000, shares \$1 par; issued, \$600,000. Is a close corporation.

Property: 7 claims, well timbered and watered, 22 miles from a railroad, including several good water rights on Lost river. **Development:** by 2 tunnels, the 250' upper tunnel showing a vein up to 14' in width, carrying a 2' paystreak of high-grade argentiferous copper and lead ore, and lower tunnel is said to show a 7' vein carrying auriferous and argentiferous lead and copper ore, mainly of smelting grade. Has secured ore assaying up to 174 oz. silver and 1.02 oz. gold per ton. No recent returns secured.

ALTA COTTONWOOD MINING CO.

UTAH

Address: Salt Lake City, Utah. A. O. Jacobson, pres.; Franklin Webb, v. p.; Val. S. Snow, sec.-treas.; preceding officers, J. C. Wood and R. S. Lewis, directors. Inc. 1915. **Cap.**, \$250,000, shares 25c par.

Property: 28 claims, 18 patented, known as the Argenta group, located in the Big Cottonwood district, 7 miles southwest of Park City. Claims adjoin the Maxfield mine on the south and the Cardiff on the north. In 1915 the company was planning to start work on a long drainage and exploration tunnel that had already been driven 1,300': No later information.

ALTA DIVIDE GOLD MINING CO.

UTAH

Officers: A. F. Ellgren, pres.; L. H. Hardy, treas.; A. Y. Hardy, sec.; with C. W. Knudsen, and E. M. Tyson, directors. Inc. April 22, 1916, in Utah. **Cap.**, \$100,000, shares 10c par; 600,000 shares in treasury.

Property: 34 unpatented claims, in Big and Little Cottonwood districts, near Alta, Salt Lake Co., Utah, shows gold values in a vein up to 30' wide in a shale quartzite contact. **Development:** commenced in Spring of 1916.

ALTA MINE

Located on Josephine Creek, 4 miles west of Kirby, Josephine Co., about 15 miles north of the Oregon-Calif. state line. There are 3 claims, originally worked as a placer, which show a porphyry dike 25' to 40' in width between vertical serpentine walls. It strikes N. 40° E. and has been traced 1½ miles. The ore which is chiefly pyrite occurring in scattered grains in the rock and in small quartz veins, is said to assay about \$5 gold per ton. **Equipment:** includes a Chilean mill run by a 25-h. p. steam engine. The ore, after coming from the mill, is run over plates to concentrators. No recent returns. See U. S. G. S. Bull. 546, p. 70.

ALTA MINING & DEVELOPMENT CO.

An old corporation controlled by J. R. and C. A. Walker, of the banking house of Walker Bros., and J. M. Moore, all of Salt Lake City. **Cap.**, \$600,000; shares \$1 par; 300,000 shares are held in the treasury. In May, 1915, it was reported that 150,000 shares of treasury stock had been underwritten to net the company 60c per share.

Property: about 160 acres, is in the Alta Cottonwood district and located at the head of Little Cottonwood canyon. Lands include the townsite of Alta. Adjoining on the west are the Wasatch mines, and on the north, east and south the South Hecla. In 1915 the management planned to continue a 330' tunnel that had been started in 1907 at a distance of 3,600' from the townsite down Little Cottonwood Creek. The object in driving the tunnel was to explore the ground under the townsite at a depth of 500'. Several contacts and well-defined fissures are said to cross the property. In Oct., 1915, a 6" stringer of high-grade copper-silver-lead ore is said to have been cut at a distance of 700' from the portal of the tunnel.

ALTA MINING & SMELTING CO.

Idle. Mail returned from former offices at Superior, and Florence, Pinal Co., Ariz. **Officers:** L. H. Sherman, pres.; Col. G. W. Griffey, v. p. and agent; H. A. Austin, second v. p.; J. C. Ferrall, sec.-treas.; preceding officers and G. R. Charters, directors. **Inc.** Sept. 8, 1905, in Arizona. **Cap.**, \$5,000,000, shares \$1 par. Annual meeting, first Tuesday in September.

Property: 25 claims, area 470 acres, and a 200-acre patented ranch, including a water right on the Gila river, in the Mineral Creek district, at Superior P. O., near the Lake Superior & Arizona mine. Lands have veins in schist and contact deposits between schist and porphyry, ranging 5 to 50' in width, opened by shafts of 96', 127' and 150', with upwards of 3,000' of workings, showing ore giving assays of 2 to 57% copper, with gold and silver values, also a lead vein giving assays of 2 to 57% lead, 4 to 15 oz. silver and 80 cts. to \$14 gold per ton.

Equipment: at the Black Copper shaft includes boiler house and power house, with steam hoist good for 1,000', 4-drill Leyner air compressor and 14,000-gal. oil tanks. There are 9 mine buildings.

A suit against H. W. Augustine, H. F. Clough and I. A. Wood, promoters, for money claimed to be illegally appropriated for their own use, was decided in favor of the present management, compromised by the surrender of 1,190,000 shares of stock to the company.

ALTA PRINCE MINING CO.

C. W. Frees, pres., 739 E. 12th St., South, Salt Lake City, Utah; E. B. Frees, sec.-treas. **Cap.**, 1,000,000 shares, par 25c. Treasury stock, 450,000 shares, of which 100,000 have been sold. Listed on Salt Lake Exchange.

OREGON**UTAH****ARIZONA****UTAH**

Property: has bond and lease on 2 claims, located at Alta, Salt Lake Co., between the Michigan-Utah and the Prince of Wales Mining Co.'s property. Development tunnel 1,065' at 500' depth. Working 2 shifts of 3 men each.

ALTA SILVER MINING CO.

NEVADA

Address: Russ Bldg., San Francisco, Calif. **Directors:** Geo. S. Sturges, Edw. B. Sturges, Edw. S. Spring, R. B. Worthington and Chas. H. Seoy. **Edw. S. Spring, sec.-treas.;** Geo. S. Sturges, Nevada agent. Since Feb., 1912, assessments levied totaling 8c per share on 82,183 outstanding shares, have furnished necessary capital for repairs and development work, leaving a balance of \$1,700 in the treasury, Dec. 26, 1914.

Property: in Gold Hill section of the Comstock, Nevada. **Development:** Mostly old workings and 1,050' shaft. Rumored that operations will be resumed in connection with the Yellow Jacket, Crown Point, and Belcher properties, which are controlled by same interests. See Jacket-Crown-Point-Belcher Co.

ALTA TIGER MNG. CO.

UTAH

Address: Alta, Utah. **J. E. Phillips, pres.;** A. T. Sanford, sec.-treas.; J. R. Jones, supt. **Inc. 1915. Cap., \$7,000,** divided into 700,000 shares, assessable, with 200,000 remaining in the treasury. Report of June, 1915, gives cash \$1,910, bills receivable \$490, bills payable \$25.

Property: the Tiger patented claim, 6 acres and an interest in the Highland Chief claim, in the Alta-Cottonwood district, north of the town of Alta. The management intended to work the Tiger claim ground through the Highland Chief claim tunnel. The tunnel was cleaned out in the summer of 1915 when it was found that the Tiger ground had been mined to a considerable extent in early days. The work since has been devoted to the unexplored ground. In Jan., 1916, company claimed to have 500 sacks of silver-lead ore ready for shipping. This ore was supposed to assay 48% lead and 28 oz. silver per ton. Final returns not available.

ALTA TUNNEL & TRANSPORTATION CO.

UTAH

Office: 618 Newhouse Blk., Salt Lake City, Utah. **F. V. Bodfish, pres. and mgr.;** Jas. Owen, v. p.; John Cain, sec.; preceding officers, Chas. Peter and Geo. H. Rathman, directors; R. L. Mack, cons. engr. John Forsman, supt. **Inc. Sept., 1911, in Utah. Cap., \$1,000,000,** shares \$1 par, 800,000 issued.

Property: 250 acres, includes the Lucky Dutchman group of 16 claims and the old Alta tunnel ground. Ore occurs in fissure veins in limestone with stringers of ore said to assay 9.7% copper, 21% lead and 13½ ozs. silver per ton. **Development:** by drifts and raises which have opened up several rich veins. Company is driving a mile-long drainage and transportation tunnel (1,500' long in September, 1915) to open its own and adjoining properties, with portal 3,500' from Silver Fork on the Big Cottonwood, and 8,500' above sea level. Tunnel will be 600' lower than any mine workings of the district and will cut all the great veins of the section.

Equipment: 50-h. p. motor and compressor, drills, a 10' fan for ventilating purposes, a 2-mile power line, boarding house and other buildings. Mine being worked under lease by the Mines Development Company in 1915.

ALTEZUMA GOLD M. & M. CO.

COLORADO

Office: Montezuma, Summit Co., Colo. **Chas. F. Kennedy, v. p.-mgr. Inc. in Arizona. Cap., \$5,000,000,** shares \$1 par; 2,399,190 shares in treasury.

Property: 4 claims, 2½ miles from Montezuma. **Ore:** lead-silver, picked ore said to assay \$100 per ton. **Development:** 4 tunnels, longest 190' known as the Franco tunnel. Plans in 1915 included the refinancing of company and driving the Franco tunnel an additional 200'.

ALUMINUM COMPANY OF AMERICA.

Offices: Oliver Bldg., Pittsburgh, Pa., and 120 Broadway, New York. **Officers:** Arthur V. Davis, pres.; G. R. Gibbons, v. p.-sec.-asst. treas.; R. E. Withers, treas.-asst. sec., Pittsburgh, Pa. **Directors:** Arthur V. Davis, George H. Clapp, D. L. Gillespie, Roy A. Hunt, Alvah K. Lawrie, A. W. Mellon and R. B. Mellon.

Inc. 1888 in Pa., as the Pittsburgh Reduction Co.; name changed to present title, Jan. 1, 1907. **Cap.**, authorized, \$20,000,000; shares \$100 par; outstanding, \$19,000,000. No bonded debt. Dividends: 6% per annum, paid quarterly, Feb., etc.

Controls the St. Lawrence River Power Co., the Northern Aluminum Co., the St. Lawrence Transmission Co. and the Tallassee Power Co. On Nov. 1, 1915, acquired control of the **Southern Aluminum Co.**, with its unfinished hydro-electric and aluminum manufacturing plants near Whitney, N. C. This company was controlled by French interests until the outbreak of the European war in 1914. The plants were to have cost upward of \$10,000,000. The Aluminum Co. of America formed the Tallassee Power Co., capital \$1,000,000 to complete the hydro-electric plant; it is expected to have this finished early in 1917. The aluminum reduction plant will also be completed.

Company owns extensive bauxite deposits in Saline Co., Ark., from which it secures most of its aluminum ore. Equipment at the property consists of crushing and drying machinery. The bauxite is shipped to a refining plant at East St. Louis, Ill., where the impurities are removed. There are also reduction works at Niagara Falls and Massena, N. Y., where there is a wire and cable mill, and at Maryville, Tenn. The company has a general fabricating plant at New Kensington, Pa., also a plant for the manufacture of aluminum bronze powder and aluminum foil.

The Northern Aluminum Co. is a Canadian corporation, which has a reduction plant and wire mill at Shawinigan Falls, Que., and a fabricating plant at Toronto, Ont.

ALVARADO MINING AND MILLING CO.**MEXICO**

Offices: 60 State St., Boston, Mass., and Mills Bldg., El Paso, Texas. **Mines and reduction plant:** Parral, Chihuahua, Mexico.

Officers: A. J. McQuatters, pres. and gen. mgr.; Gordon Dexter, v. p. and Ch. of Board; J. Dudley Clark, treas.; R. F. Parker, sec. and asst. treas.; with S. R. Kaufman, F. W. Clifford, N. M. Kaufman, Junius Beebe, Herbert Dumaresq, Dr. Leonard Wheeler, and Frederick Parker, directors. Wm. J. Freeman, asst. treas.; T. G. Hawkins, Jr., asst. gen. mgr.; D. V. Fennessy, cons. engr.

Inc. 1910, in Maine. **Cap.**, \$6,000,000; shares \$5 par. Bonds: \$935,500, 1st mtge., 6% convertible, matured Jan. 1, 1916, extended to Jan. 1, 1926. Old Colony Trust Co., Boston, Mass., transfer agent; State Street Trust Co., Boston, Mass., registrar.

Comparative General Balance Sheet

	Assets:		Power		Cons. & Stock		Current	Total
	Property	Plant	Devel.	Discs.				
1915	\$5,355,935	\$100,000	\$1,099,388	\$20,000	\$536,310	\$7,111,634		
1914	5,355,935	100,000	910,616	30,073	371,495	6,768,120		
Liabilities—								
	Cap. Stock	Bonds & Notes (a)	Res. for Bond Conv.	Misc. (b)	P. & L. Surplus		Total	
1915	\$4,305,025	\$ 996,700	\$665,333	\$124,730	\$355,191	\$664,655	\$7,111,634	
1914	4,305,025	1,007,100	665,333	129,000	289,354	371,603	6,768,120	

(a) Bonds, \$935,500; (b) includes power plant No. 2, \$92,000.

Comparative Operating Statement

	Gross Earnings	Oper. Costs	Oper. Profit	Deductions	P. & L. Surplus
1915	\$1,296,631	\$871,156	\$425,475	\$132,423	\$293,052
1913	871,156	650,629	412,567	243,046	169,521

Property: at Parral, Chih., includes the Presena, Las Cruces, and Palmilla groups of mines, the latter including the famous Palmilla mine of Pedro Alvarado. These are old mines which were worked in former days by Mexicans.

Ore: silver, gold. New work in 1915 totaled 13,409', said to have increased ore reserves by 250,000 tons. Total reserves not reported.

Company operates a 400-ton cyanide plant; a 50-ton flotation mill was recently built. Employs, when working, over 1,000 men. Electric power obtained from the Mexican Northern Power Co.

Production:

	Ore to Mill		Gms. Per Ton		Contents	
	Metric Tons		Silver	Gold	Silver-oz.	Gold-oz.
1915	128,612		530.2	1.19	2,192,444	4,932
1914	82,728		548.1	1.06	.....	.....
1913	118,383		570.1	0.79	.....	.....

In 1914 company lost 131 days of operating time; in 1915 operations covered 93.2% of the total time; loss was due mainly to shortage of fuel which had to be transported chiefly from El Paso on special trains operated by the company.

ALVIN DEVELOPMENT CO.**ARIZONA**

Office: Houghton, Mich. Controlled by Tank Pass Consolidated Mining Co., Salome, Yuma Co., Ariz. Temporarily idle except for annual assessment work. Described Vol. X.

AMAJAC MINES CO.**MEXICO**

Address: Guadalajara, Mexico. At last accounts C. A. Sidler, Sunbury, Penna., was trustee for sale of stock. Inc. Dec. 16, 1910, in Delaware. **Cap.**, \$2,500,000, shares \$1 par. Company was formed for purpose of purchasing the Refugio, Animas, and Tres Estrellas mines in the Hostotipaquillo district. Later an option was taken on the Trinidad and Mexicano mines.

The Refugio property, 125 acres, was worked for 25 years prior to its acquisition by present owners, down to the 500' level. The main vein has a width of 5' to 15' with well-defined walls. Ore is said to carry gold and silver with average assay value of \$12.50 per ton. The Animas property, 144 acres, lies west of the Refugio and is apparently on the same vein. The ore is said to contain 20 ounces silver and \$3 to \$5 gold per ton. **Development:** at both mines is by means of tunnels, the Animas having over 2,500' of workings. The Tres Estrellas property, 120 acres, is a mile from the mill and has not been developed at depth.

Equipment: includes a 15-stamp mill and a 50-ton cyanide plant in course of construction in 1914. Hydro-electric power is used. The revolution in Mexico has interfered with operations and the mines have presumably been idle since 1914.

AMALGAMATED COPPER CO.**U. S.**

In liquidation. 42 Broadway, N. Y. City. Stock stricken from N. Y. Exchange, July 30, 1915. In 1914 and 1915, preparatory to dissolution, company disposed of its former holdings; 154,000 shares Greene Cananea Copper Co., 150,000 shares Inspiration Cons. Copper Co., 1,000,000 bonds Butte, Anaconda and Pacific Railway, and entire capital stock of the United Metal, Selling Co., controlling the International Smelting and Refining Co., to the

Anaconda Copper Mining Co., so on April 30th, 1915, practically the entire property of company consisted of \$83,198,425 stock of the Anaconda Co., out of a total of \$116,562,500 issued. On Aug. 16, 1916, the company began a distribution of Anaconda stock share for share and \$3.77 cash to Amalgamated shareholders.

AMALGAMATED PIOCHE MINES & SMELTERS CORP. NEVADA

40 Cedar St., New York. Mine office, Pioche, Nev. Officers: W. J. Palmer, pres.; E. S. Snow, v. p., sec.-treas.; above with E. L. Godbe and M. S. Browning, directors. H. S. Van Wagenen, supt.

Inc. July 27, 1911, in Maine, to take over the properties of the Nevada-Utah, Prince Cons., Ohio-Kentucky, and Pioche Cons. companies. It is the operating company of the Cons. Nev.-Utah Corp.; property is described under that title.

Cap., \$1,000,000; shares \$1 par; in treasury Mar. 31, 1915, \$499,500. Annual meeting 1st Tuesday in June. Treasurer's report of Mar. 31, 1915, shows assets of \$1,153,534, which includes property \$499,575, cash \$9,636, mine development \$66,683, machinery and equipment \$35,125, accounts receivable \$3,508, excess liabilities \$25,901; liabilities; accounts payable, \$16,948, Cons. Nev.-Utah Corp. \$18,118, Pioche Pacific R. R. Co., \$1,442, Pioche accounts payable \$10,520, notes payable (Cons. Nev.-Utah Corp.) \$106,504. Inventory does not include ore on hand or in transit. \$18,753.

AMALGAMATED ZINC & LEAD CO.

MISSOURI

Inc. in New Jersey. Cap., \$200,000. Operates on land of the Granby Mining & Smelting Co., in Jasper County. Has 5 shafts, average depth 186', and a concentrator with daily capacity of 250 tons. Product is zinc concentrate.

AMAZON-DIXIE MINING CO.

MONTANA

Office: Wallace, Idaho. Mine office: Mullan, Shoshone Co., Idaho. Wesley Everett, pres. and gen. mgr.; Hugh Tool, v. p.; Herman J. Rossi, sec.-treas.; preceding officers, W. W. Woods and A. W. Ellenburger, directors; F. W. Calloway, mg. engr. Inc. 1908 in Montana. Cap., \$750,000, shares 50 cts. par, assessable; 1,450,000 shares outstanding. Stock pooled since organization.

Property: 8 claims, 180 acres, well timbered, at Sildix, Mont., near Lookout, just across the Montana line, adjoining the Leslie Copper Mining Co. Property shows a 15' vein in quartzite, exposed by surface trenching for 2,000', carrying galena, chalcopryrite and lead carbonates, associated with pyrite, with values mainly in galena. Development is by a 35' shaft and 2 tunnels, upper, 1,250' long, giving a back of about 200'. lower, 3,750' long, with back of 700', and to be the main working tunnel, with mouth near the Northern Pacific railway. Tunnels are connected by a 400' raise.

Company claims to be blocking out an orebody, 3'-8' average width and 600' long, of milling ore that assays 7% lead, 2% copper, 1.5% zinc and 6 oz. silver per ton. Plans sinking 500' shaft, 1916, and, if results of development warrant it, building a concentrator. Operating expenses in 1914 and 1915 were \$50,000. Mine has about 5,761' of openings.

Equipment: includes a water-power plant developing 110 h. p., a 10-drill air compressor, 20,000' sawmill, machine shop, smithy, carpenter shop and other necessary mine buildings. Property is served by the Northern Pacific railway, 160' from the mine.

AMAZON GOLD CO.

MEXICO

Mine office: Chacala, Durango, Mex. Jas. T. Dugan, pres.; Edward B. Sowers, mgr.; J. S. Wilkinson, supt., at last accounts. Mine, known as the Candalaria, has auriferous, argentiferous and bismuthiferous copper ores.

Equipment includes a Bryan mill, 6-ton chlorination plant and 10-ton smelter. Closed down and no reports received owing to Mexican revolution.

AMERICAN BALLAST CO.**TENNESSEE**

A subsidiary of the Amer. Z. L. & Sm. Co., and described under that title.

AMERICAN BOY MINE**ARIZONA**

Owned by Geo. Clarke, J. Petersen and J. B. David, Patagonia, Santa Cruz Co., Ariz. **Property:** 6 claims near Patagonia, shows several veins from 8' to 12' wide. Ore contains gold, silver, copper and lead and is said to average \$50 per ton. **Developed:** by an 80° incline shaft, 120' deep, and a 370' tunnel that cuts the bottom of shaft. On the 40' level 200' of drifting has been done, on the tunnel level 250'. The small shipments made have consisted of ore extracted by development work.

AMERICAN CELTIC COPPER CO.**ARIZONA**

Office: Allen G. Shaw, sec., 504 I. W. Hellman Bldg., Los Angeles, Cal. **Inc.** 1912. **Cap.**, \$3,000,000, shares \$5 par; issued \$2,000,000. Is a successor of the Arizona-Morenci Copper Co. and owns all its property.

Property: 98 claims, 2,000 acres, in 9 groups in Clifton-Morenci district, Greenlee Co., Ariz. Mines are adjacent to and surrounded by the Phelps-Dodge, Arizona Copper and Shannon properties. Mill and town sites are on the San Francisco river and the Morenci Southern railway crosses the ground.

AMERICAN COMMANDER M. & M. CO.**IDAHO**

Address: Mullan, Shoshone Co., Idaho. **E. J. Cark, pres. Cap.**, \$1,250,000, increased in 1915 to \$2,500,000, shares \$1 par. **Property:** 2 claims patented, 40 acres, located 3,000' north of Mullan, shows lead-silver ore of good grade in a vein 50' wide on surface. It is claimed that the You Like vein of the Federal M. & S. Co. and the Hunter vein cross the claims. Property is developed to a depth of 1,000' by several tunnels varying in length from 500' to 1,200'.

AMERICAN CONSOLIDATED COPPER CO.**UTAH**

Office: Judge Bldg., Salt Lake City, Utah. **Mine office:** Brighton, Salt Lake Co., Utah. **Officers:** John C. Barnard, pres. and mgr.; John Brandborg, v. p.; D. C. Dart, sec.-treas.; with L. L. Smith and G. W. Alexander, directors; G. Malmborg, supt. **Inc.** 1907, in Utah. **Cap.**, \$500,000; shares \$1 par; non-assessable; 480,000 shares issued. Stock listed on Salt Lake Stock Exchange in September, 1915.

Property: 16 claims, 1 patented, in Big Cottonwood district, adjoin the Tar Baby mine on the west. **Development:** Several tunnels, longest 1,200', driven to cut the Silver King & Garfield fissures, showing heavy mineralization. Samples said to assay 48% zinc, with lead, gold and silver values. **Equipment:** Includes machinery and necessary mine buildings. Operations resumed Dec., 1914, after an idleness of several years.

AMERICAN COPPER MINING & MILLING CO.**UTAH**

Office: Lehi City, Utah. **J. N. Butt, pres.;** Charles Anderson, v. p.; A. O. Slade, treas.; preceding officers, Howard Murdock and Chas. Herron, directors; William Asher, sec. **Inc.** Aug., 1912. **Cap.**, \$100,000, shares 10 cts. par. An assessment of 1 mill called March, 1914. Property is in Tooele county, but as officers do not reply to letters, no details of the company's holdings are available.

AMERICAN EXPLORATION CO.**UTAH**

Office: 618 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit Co., Utah. **Frederick V. Bodfish, mgr.**

Property: American Flag mine, and other claims 266 acres, patented, adjoining the Ontario and Silver King Coalition mines, and including the Constellation group. Ground covers 3,000' along the strike of the main

veins, which lie in a central area of Weber quartzite, dipping 20° N. and cut by porphyry dikes. The veins are fault fissures, the main vein running N. W.-S. E., dipping 63°-80°, and filled with iron and manganese stained quartz and crushed rock. The Eastern vein between limestone and quartzite is faulted by the other. It is 30 inches wide and carries gold, silver and very little copper.

The property is a meritorious prospect since it has much virgin ground and carries the apex of the McGregor fissure. The mine is drained by the Ontario tunnel, and has a 1,120' shaft, and the Curtis tunnel, aggregating about 2½ miles of workings, and yielding gold and silver ore.

Equipment: includes steam power and a 60-h. p. air compressor. In the summer of 1915 a small number of men were employed, and an output of 20 to 25 tons per day of second-class ore secured and sent to the Park City milling plant for treatment.

AMERICAN EXPLORATION & MG. CO. MEXICO & NEW MEXICO

Office: 60 State St., Boston, Mass. Operating office: 518 Trust Bldg., El Paso, Tex. Mine offices: Steeple Rock, Grant Co., N. M.; Ahumuda, Bravos, Chihuahua, Mex., and Terrazas, Iturbide, Chihuahua, Mex. W. Franklin Burnham, pres., sec. and gen. mgr.; Henry A. Haile, treas.; preceding officers, Jas. Duckworth, Geo. Empsall, Hinsdale Smith, Arthur Smith, Jesse W. Morton and Harry Hinckley, directors; Wm. A. Farish, cons. engr.; John A. Rice, engr.; John Searls, supt. Ahumuda mines; Frank Hickman, supt. Steeple Rock mines. Inc. Sept. 28, 1907, in Maine. Cap., \$500,000, shares \$1 par, non-assessable; issued, \$275,748.

Lands: 600 acres, including 16 claims in New Mexico and 12 different properties in Mexico, also 3 mill sites at the different properties.

Property includes mines known as the Burnham at Terrazas, San Ignacio at Ahumuda, and Hinckley at Steeple Rock. The New Mexican property has tunnels of 100' and 313' and shafts of 100', 100' and 150', with 1,223' of workings, carrying mainly silver ore. The property at Ahumuda has shafts of 25', 100', 160' and 474', giving ore assaying about 30% lead, 6% zinc and 12 to 20 oz. silver per ton. The property at Terrazas shows contact deposits between limestone and porphyry, giving assays of about 3% copper, 24% lead, 8 to 20 oz. silver and \$2.50 to \$12 gold per ton. Development is by shafts of 187' and 200'. Equipment includes a 55-h. p. gasoline plant and necessary mine buildings.

Company plans milling about 30 tons daily at Ahumuda, concentrating 6 into 1, and continuing development work at the various properties.

AMERICAN FINANCE & SECURITIES CO. (THE) NEW YORK

Malcolm G. Buchanan, receiver, Trenton, N. J. **Office:** Drexel Bldg., Philadelphia, Pa. Owns majority of stock of the El Tiro Copper Co., which see. Inc. Dec. 29, 1903, in New Jersey. Cap., \$500,000 (decreased Dec., 1903, from \$5,000,000), shares \$10 par. Receiver appointed by Vice-Chancellor of the Chancery Court, Feb. 25, 1915, and made permanent Apr. 13, 1915. Bonds \$1,250,000, 6% issued, Jan., 1904. Interest defaulted Jan., 1913, to 1915, inclusive. Empire Trust Co., trustee.

Company owns a majority of the stock of the Empire Lumber Co., the N. J. Steel Co., and the El Tiro Copper Co., and controls the Guanajuato Red'n & Mines Co. by a voting agreement, though it owns less than a majority of the stock. The receivership was made on application of stockholders, who alleged that proceeds of sale of large amounts of bonds had been used to pay extravagant salaries and that large sums had been loaned insolvent corporations.

AMERICAN FIREPROOFING & MINING CO. WYOMING

Address: Investment Clearing House, Fin. Ag'ts, 513 Denham Bldg.

Denver, Colo. A. E. Minium, pres.; S. E. Coyler, mgr. Inc. 1913. Cap., \$10,000,000, shares 10 cents par. Stock was offered at 2c with a guarantee of refund attached should the company's statement not be verified.

Property: 8 and a fraction claim, 200 acres, in the South Pass mining district, 35 miles from Lander, Fremont Co., Wyo., the nearest railroad, comprising the Jerry Dain and Hidden Hand Fraction group, a bond and lease on the Bobtail. Denver and Bluebird Claims, near Lewiston, and control of 120 acres of partially developed mineralized land. **Ore:** quartz, with gold in oxidized iron, occurring in fissure veins, 15-24" wide; ore said to average better than \$100 per ton in gold. **Development:** Includes several shafts 40-70' deep, drifts, opencuts, including 500' of underground workings on the Bobtail claim. **Equipment:** Shaft house, blacksmith shop, pumping station, engine, boiler, crusher, electric plant and other machinery.

AMERICAN FLAG MINING CO. UTAH

Office: 815 Newhouse Bldg., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. **Officers:** Geo. H. Rathman, pres., treas. and gen. mgr.; Wm. M. Curtis, v. p. and mgr.; John Cain, sec.; F. V. Bodfish, supt. Inc., 1902, in West Virginia. Cap., \$500,000, increased to \$1,000,000 on reincorporation in Nev., 1910; shares \$1 par, assessable; fully issued. American Flag property is leased to the Park City Mines Co. and described under that title.

AMERICAN METAL CO., LTD. (THE)

61 Broadway, New York City. **Officers:** Berthold Hochschild, pres.; C. M. Loeb, v. p.; Theodore Sternfeld, treas.; Julius Goldman, sec. Otto Sussman, remaining director and cons. engr. Inc. 1887 in N. Y. as exporters, importers and dealers in metal. Cap., \$3,500,000, \$100 par, all issued. No bonded debt. Dividends not reported. Controls the Consolidated Interstate Callahan Mng. Co., Wallace, Idaho; American Zinc & Chemical Co., Langeloth, Pa.; the Compania Minera de Penoles, of Mapimi, Mex.; Compania de Minerales y Metales de Mexico; Ohio & Colorado Smelting & Refining Co., of Salida, Colo.; Bartlesville Zinc Co., of Bartlesville, Okla.; Lanyon-Star Smelting Co., of Bartlesville, Okla., and Metallurgical Company of America, of New York. Company is American agent for Henry R. Merton & Co., Ltd., of London; Metallgesellschaft and Metallurgische Gesellschaft, of Frankfurt am-Main; Société le Nickel, of Paris, and Balbach Smelting & Refining Co., of Newark, N. J.

AMERICAN-MEXICAN SMELTING & REFINING CO. MEXICO

Is a subsidiary company of the Pacific Smelting Co. T. C. Kirkland, mgr., Fundicion, Sonora, Mex. Idle owing to revolutionary conditions during most of 1914-15, but began intermittent shipments, 1916.

AMERICAN-MEXICO MINING & DEVELOPING CO. MEXICO

Office: Watertown, S. D. Mine office: Velardena, Cuencame, Durango, Mex. In July, 1915, company had debts amounting to \$14,518, and creditors began action for appointment of receiver. Is not regarded favorably. See description by Horace J. Stevens in Vol. X.

AMERICAN MINE. COLORADO

Wm. Mitchell, supt., Breckenridge, Summit Co., Colo. Property shows a fissure vein with ore shoot of gold and silver-bearing copper ore, developed by shaft. **Equipment:** Includes steam plant and air compressor. Three men employed.

AMERICAN MINES CO. COLORADO

Address: 328 Foster Bldg., Denver, Colo. **Officers:** A. E. Blakesley, pres.; E. M. Howell, v. p.; J. N. Caldwell, sec.-treas.; preceding officers, W. A. Burke, L. M. Beck, directors. J. W. Kirkbride, supt. Inc. in Wyo. Cap., \$1,500,000; issued \$1,300,000; shares \$1 par.

Company owns one claim in the Gold Hill district, 12 miles north of Boulder, Boulder Co., Colo., which management claims has a body of ore 200' wide, proven for a length of 600', and assays \$4 in gold per ton. **Development:** by 300' tunnel. A 25-ton stamp mill has recently been put in commission.

AMERICAN MINES SYNDICATE.**UTAH**

Office: Houghton, Mich. Mine office: Eureka, Juab Co., Utah. Walter Fitch, pres.; J. H. Rice, v. p.; Wm. P. Seager, sec.-treas.; preceding officers, M. M. Duncan and F. W. Denton, directors. **Inc.** 1907, in Arizona. **Cap.**, \$100,000, shares \$100 par; paid in, \$80 per share; issued, \$86,350. Is a holding company, controlling the Chief Consolidated Mining Co. through ownership of 361,000 shares.

AMERICAN MINING CO.**CALIFORNIA**

Address: Redding, Shasta Co. **Inc.** and controlled by Jas. Sallee. In 1914 the company started to work the old American mine in the French Gulch district, whose holdings consist of 11 claims. **Development** work of the old mine includes 4 tunnels from 50' to 1,400' in length, and one stope 125' long and 240' in height. When mine shut down under former management ore is said to have assayed \$20 in gold per ton. It occurs in a fissure vein, strike N. 70° W., dip S. 75° E., slate walls. Pay shoot is 2' wide. A 10-stamp mill is on the property. Results of work of the new company not known.

AMERICAN MINING CO.**UTAH**

Office: 27 Latimer Bld., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. I. A. Benton, pres.; A. L. Headberg, first v. p. and gen. mgr.; Wm. Crome, sec.-treas.

Inc. 1896 in Utah. **Cap.**, \$500,000, \$1 par; assessable; all issued; 18 assessments levied to end of 1910. Annual meeting 3rd Monday in May.

Property: 10 patented claims, on Scott hill, in Big Cottonwood district, 5 miles from a railroad. Ore occurs as sulphides in lime. Orebody is from 2" to 2' wide and average assays run from 5-18% copper, 10 oz. silver and \$3.50 gold. **Development:** About 1,800' of shafts and tunnels. Only assessment work done in 1915. Plan driving tunnel to reach the Silver King orebody.

AMERICAN MINING CO., LTD.**IDAHO**

Office: 630 Monroe Ave., Helena, Mont. Mines are located in the Seven Devils district, Washington Co., Idaho. A. H. Kleinschmidt, pres.; Maria Kuphal, sec.; A. H. Kleinschmidt, treas.; preceding officers and Louis Hillehecht are directors. **Inc.** Oct. 2, 1910, in Montana. **Cap.**, \$50,000, shares \$1 par, non-assessable; issued 25,000 shares, sold at \$1.

Property: A number of patented claims and also a one-half interest in the Blue Jacket and Queen mines, near Landore, Washington Co., Idaho. The Blue Jacket mine, 295 acres, has a 400' shaft, and the Queen has a 1,500' tunnel having a back of about 300'; these properties said to have produced about \$250,000 in ore, with smelter returns up to 47% copper. The company's half interest in this group was leased Oct., 1909, for 10 years to P. H. Miller and Franz Kleinschmidt, Landore, Idaho, on a royalty basis, giving the company 15% of the gross product of the mines.

Holdings also include a five-eighths interest in the Peacock, White Mountain, a two-third interest in the Helena mines, held jointly with A. M. Holter and S. T. Houser; and a one-half interest in the Blue Jacket No. 2, Norma, Legal Tender, Copper Crescent and Calumet mines, held jointly with Messrs. Johnson and Kleinschmidt. The old American Mining Co., Ltd., whose charter expired Oct. 1, 1910, owned nine-sixteenths of the Peacock, White Mountain and Helena claims and one-half of the Blue

Jacket claim in Idaho and various other claims in Montana. On the dissolution of the company Albert, R. H. and Ellen Kleinschmidt, holding 50% of the company's stock, became joint owners of one-half of the company's holdings; the above individuals are in no way connected with the new American Mining Co., organized by R. H. Kleinschmidt. The new company is understood to have acquired a one-half interest in Mr. C. A. Johnson's one-half interest in the Queen and Blue Jacket groups, which with the one-quarter interest derived from the old company makes a one-half interest. These properties are also in the Seven Devils district, 20 miles west of Homestead, Ore., the nearest railway point.

The Peacock mine, discovered 1869, is the most noted property and the largest producer in the Seven Devils district, having 1,500' of workings, said to have produced 15,000 tons of high-grade ore, and estimated to show 200,000 tons of 4½% copper ore with about \$5 combined gold and silver values per ton. Ten shipments, 1903, to the Bingham smelter, returned 13.3 to 18.3% copper, from 3 to 5 oz. silver and from nothing to \$1.33 gold per ton; and 11 shipments to the Oregon Smelting & Refining Co. gave returns of 20.5 to 40.2% copper, 1.15 to 8.7 oz. silver and \$1.20 to \$3.40 gold per ton. Mine is said to have considerable ore ready for shipment, as soon as railroad transportation is available, and the Oregon-Washington railroad line, when extended down the Snake river from Homestead, will pass within 3½ miles of the mine. Production, 1905, was 500 tons of ore, of about 15% copper tenor, equal to 150,000 lbs. fine copper. Property idle since 1909, owing to litigation.

AMERICAN NETTIE MINE.

COLORADO

Property an old-time producer, near Ouray, Ouray Co., Colo. **Ore:** gold in broad, flat shoots, in quartzite, about 7' thick and proven for 700' in length. These orebodies believed to be the northerly continuation or downward faults of the Wanakah orebodies, which intersect the great monzonite porphyry dike running due east through the Nettie ground. **Development:** 700' tunnel and upraise. **Equipment:** Compressor, drills, and machinery. **Production:** In gold since 1889, \$1,500,000.

AMERICAN PIPE LINE CO.

KANSAS-OKLAHOMA

A subsidiary of the Amer. Z. L. & Sm. Co., and described under that title.

AMERICAN REDUCTION CO.

WASHINGTON

Address: Republic, Ferry Co., Wash. **Inc.** in 1915 by F. R. Clark, of Spokane, P. N. Clark and G. W. Sommer. The property of the North Wash. Power & Reduction Co., which had been held by a receiver for 2 years, was purchased together with adjoining holdings. **Equipment:** Includes concentrator, mill, and power plant. No returns available.

AMERICAN RUTILE CO.

VIRGINIA

Address: Pacific Bldg., Washington, D. C. W. M. Slater, pres.; Albert Harper, sec.-treas.; H. Wanke, supt. **Inc.** in Va. **Cap.**, \$100,000; shares \$100 par; issued \$97,500.

Property: 5 claims at Roseland, Nelson Co. Rutile, containing 96% titanium oxide, is mined from open-cut workings. Equipment includes steam hoist, pump, a 2,500' aerial tram, and a 10-stamp mill. The mill, with a daily capacity of three tons, is equipped with Wilfley tables, and a Wetherill magnetic separator. Gross earnings for 1914-1915 were \$70,000, with operating expenses of \$25,000. Production amounted to 250 tons of rutile, with ilmenite as a by-product.

AMERICAN SM. SECURITIES CO.

UNITED STATES & MEXICO

Office: 120 Broadway, New York. Mine and works offices, at numerous points, given hereinafter. **Inc.** March 25, 1905, in New Jersey, and name

changed to present title, May, 1905. Cap., \$77,000,000, shares \$100 par, in \$17,000,000 Series A cumulative 6% preferred stock; outstanding Dec. 31, 1915, \$16,649,800; \$30,000,000 Series B cumulative 5% preferred stock, and \$30,000,000 common stock Series A has preference as to dividends, and both preference series have equal rights as to assets, both having priority rights to assets and dividends over common stock. Is controlled by American Smelting & Refining Co., through the ownership of the entire issue of common stock, and the American Smelting & Refining Co. guarantees the Series B. preferred stock. An issue of \$15,000,000 of 15-year 6% debenture bonds, outstanding Dec. 31, 1915, \$12,720,500, created Feb., 1911, to liquidate a floating debt of \$10,816,406, and going entirely to the American Smelting & Refining Co., are convertible into common stock of that company any time before Aug., 1918, that bonds may sell at or above par. Bonds are redeemable Feb. 1, 1926, at par, or, after Feb. 1, 1915, at 105, on 90 days' notice.

Assets:	1915	1914
Property account	\$ 76,503,857	\$74,952,981
Investments in other companies.....	630,167	1,167,602
Metal stocks	9,614,970	8,522,630
Materials and supplies.....	1,273,089	1,098,413
Prepayments	87,831	235,459
Cash	9,710,690	3,453,202
Demand loans .....	.....	2,400,444
Advances to affiliated companies.....	4,471,249	2,110,734
Accounts and notes receivable.....	2,863,798	1,488,054
Sinking fund	595,817	77,020
Unextinguished discount on bonds.....	504,167	554,167
Total	\$106,255,634	\$97,060,707
Liabilities:		
Preferred stock, Series "A".....	\$ 16,649,800	\$16,830,000
Preferred stock, Series "B".....	30,000,000	30,000,000
Common stock	30,000,000	30,000,000
Bonded debt	12,720,500	13,351,000
Accounts, drafts and wages payable.....	7,873,358	1,155,230
Interest unclaimed	10,470	14,910
Interest accrued	375,000	375,000
Dividends unclaimed	6,908	5,400
Dividends payable	485,160	488,676
Accrued taxes	240,281	135,204
Reserves	2,395,883	124,663
Profit and loss surplus.....	5,498,275	4,580,624
Total	\$106,255,635	\$97,060,707

Profit and Loss Account: For year ended Dec. 31:

	1915	1914	Inc.	Dec.
Total income	\$9,397,120	\$6,152,971	\$3,244,149	.....
Charges	2,827,625	2,193,368	634,257	.....
Surplus	6,569,495	3,959,605	2,609,890	.....
Previous surplus	4,580,624	4,338,471	242,153	.....
Total surplus	11,150,119	8,298,074	2,852,045	.....
Dividends	3,701,844	3,717,450	.....	\$15,606
Surplus	7,448,275	4,580,624	2,867,651	.....
Reserve appropriation	1,950,000	.....	1,950,000	.....
P. & L. surplus.....	5,498,275	4,580,624	917,651	.....

Owms in fee mines in 7 different districts in Mexico, and controls the principal copper and lead smelting and refining plants of the United States. It also owns all or a controlling part of the stock of a large number of subsidiary companies.

AMERICAN SMELTING & REFINING CO. U. S. & MEXICO

Gen. offices: 120 Broadway, New York; Corporate office: 15 Exchange Place, Jersey City, N. J.; City of Mexico office: Cio Bancaria de Obras Bldg., Mexico, D. F.

General officers: Daniel Guggenheim, pres.; E. L. Newhouse, Edw. Brush, S. W. Eccles, v. p.'s; Isaac Guggenheim, treas.; Judd Stewart, gen. aud. and asst. to the pres.; F. W. Hills, compt.; L. A. Chapin, asst. treas.; W. E. Merriss, sec.; F. R. Foraker, asst. sec.; R. P. Reese, aud.; John N. Steele, gen. counsel.

Directors: Simon Guggenheim, chairman; Jos. Clendenin, Silas W. Eccles, Karl Eilers, Chas. Earl, Leopold Frederick, Daniel Guggenheim, Isaac Guggenheim, Murry Guggenheim, S. R. Guggenheim, F. W. Hills, Wm. Loeb, Jr., John K. MacGowan, W. S. McCornick, W. S. Morsé, C. P. Neill, E. L. Newhouse, Walter T. Page, Wm. C. Potter, H. A. Prosser, Grant B. Schley, John N. Steele, Judd Stewart, M. D. Thatcher, C. W. Whitley.

Executive Committee: S. R. Guggenheim, chairman; Edward Brush, Jos. Clendenin, S. W. Eccles, Karl Eilers, Chas. Earl, Daniel Guggenheim, Murry Guggenheim, Simon Guggenheim, F. W. Hills, Wm. Loeb, Jr., J. K. MacGowan, W. S. Morse, E. L. Newhouse, H. A. Prosser, Judd Stewart.

Finance Committee: Murry Guggenheim, chairman; Edw. Brush, S. R. Guggenheim, Daniel Guggenheim.

Operating officials: Jos. Clendenin, mgr. copper sales dept.; John K. MacGowan, gen. purch. agt.; E. R. Reets, asst. gen. purch. agt.; L. G. Eakins, gen. mgr. Colo. dept.; C. W. Whitley, Salt Lake City, gen. mgr. Utah dept.; C. L. Baker, Mexico City, gen. mgr. southern dept.; F. R. Raiff, traffic mgr.; W. M. Drury, Mexico City, mgr. mng. dept.; H. A. Guess, cons. engr., mng. dept.; S. Metzger, mgr. ins. dept.; E. A. Behr, sales agt., lead sales dept.

Foreign representatives: Paul Koning, Berlin, Germany; Kleinwort, Sons & Co., London, Eng.; W. A. Price and Geo. J. Ewart, fin. agts., Mexico City, Mex.; F. D. Aller, agt., Antofagasta, Chili, S. A.

Transfer agt., Ralph M. Leonard, New York; registrar, Chase National Bank, New York.

Inc. April 4, 1899, in New Jersey. **Cap.**, \$115,000,000, with \$65,000,000 common and \$50,000,000 cumulative 7% preferred stock; shares \$100 par. Original capitalization was \$54,600,000, increased to \$100,000,000 and again increased Jan., 1911, by \$15,000,000 common stock authorized to exchange for 6% debenture bonds of American Smelters Securities Co. at any time before Aug., 1918, that bonds may sell at par. Annual meeting, first Wednesday in April. Has about 11,000 shareholders.

The American Smelting & Refining Co. controls the American Smelters Securities Co. through the ownership of the entire common stock issue of \$30,000,000, and has guaranteed 5% dividends on the entire stock issue of Series B preferred stock of the American Smelters Securities Co. Company's consolidated balance sheet of Dec. 31, 1915, shows assets of \$201,816,351, including \$14,642,460 cash, \$4,080,652 demand loans, \$320,509 advances made to affiliated companies; \$12,103,766 accounts and notes receivable, metal stocks \$23,618,862. Surplus same date was \$20,525,139.

Consolidated Income Account:			
	1915	1914	1913
†Earnings	\$14,472,612	\$10,667,822	\$10,926,254
Earnings from mining property.....	1,984,977	935,193	1,185,154
Other income	1,788,142	1,222,514	1,318,525
Total income	18,245,731	12,825,530	13,429,933
Taxes	280,645	179,859	210,698
Adm., res. exp.....	902,296	979,691	987,176
Miscellaneous deductions	554,429	240,000	.....
Depreciation	1,646,565	1,540,850	1,525,518
Appropriation	795,000	.....	.....
Depl. ore res.....	193,122	.....	.....
Total deductions	4,372,055	2,935,900	2,723,392
Net income	13,873,676	9,889,630	10,706,541
Interest, discount	820,371	858,064	950,000
Preferred dividends	6,001,844	6,017,450	6,020,000
*Balance	7,051,461	3,014,116	3,736,541
Common dividend	2,001,080	2,000,000	2,000,000
Surplus	5,050,381	1,014,116	1,736,540
Previous surplus	19,510,058	18,495,942	16,759,403
Total surplus	24,560,439	19,510,058	18,495,943
Special appropriation	5,000,000	.....	.....
Previous and last surplus.....	19,560,438	19,510,058	18,495,943

*Equal to 14.1 per cent on the company's \$50,000,000 common stock after allowing \$1,646,565 for depreciation; 6.03 per cent was earned on the same amount of stock in 1914, when \$1,540,350 was charged off.

†Of smelting and refining plants and industries dependent thereon.

Cash in bank amounted at the close of the year to \$18,642,460, an increase over the preceding year of \$10,607,682. Of this, \$4,000,000 is loaned against Stock Exchange collateral.

The increase in cash was partly the result of the payment of loans secured by copper in process of refining, amounting to \$4,453,292.

During the year there has been added to the cash working capital of the company the sum of \$2,903,737.

The par value of the bonds held by the sinking fund trustees and in the treasury now amount to \$2,387,500, an increase during the year of \$738,500.

Of the issue of series "A," preferred stock of the American Smelters Securities Company, there were drawn for redemption during the year \$180,200 par value.

In accordance with the privilege granted to the holders of the bonds of the Securities Company these were exchanged for common stock of the Smelting Company to the extent of \$108,000, making the common stock now outstanding \$50,108,000.

The business of the company is so varied that it almost defies analysis, save by a certified accountant. It mines gold, silver, copper, lead, zinc ores and coal. It smelts its own ores of all these metals, and most of the ore produced by the lesser mines of America. It refines not only these five metals, but manufactures them into copper sheets, rods, tubes, etc., at Baltimore; makes white lead, sheet lead, etc., at Selby; zinc white, etc., at its zinc smelters; sulphuric acid at Perth Amboy, N. J., and Garfield, Utah, and coke at its mines. It refines and sells bismuth, cadmium, arsenic, nickel and platinum, palladium and selenium largely from the slimes of its electrolytic refineries, and makes blue vitriol.

It owns and operates ten mines in Mexico. It owns and operates a number of railways in Mexico under the title of the Mine Lines of Mexico, and the Mexican Union R. R.

The American Smelters Securities Co.

Most of its mining and smelting business is done through the American Smelters Securities Co., owned entirely by the A. S. & R. Co., the mines mostly held in fee or by lease, the smelting plants by subsidiary corporations.

Following is the list of metallurgical plants of the company:

Lead Smelting

Plant—	Location	Manager	Supt.	No. FCS.	(c) Tons
Globe	Denver, Colo.....	L. G. Eakins, g. m.	F. Roesser.....	7	1,600
Pueblo	Pueblo, Colo.....	L. G. Eakins, g. m.	G. A. Marsh.....	7	1,300
Durango	Durango, Colo.....	F. C. Gilbert.....	M. H. Kaufman..	3	550
Ark. Valley.....	Leadville, Colo...	W. B. MacDonald..	B. Hogarty.....	10	1,700
Murray	Murray, Utah.....	C. W. Whitley, g. m.	W. Norton.....	8	900
Helena	Helena, Mont.....	F. M. Smith.....	G. C. Riddell....	4	900
Perth Amboy.....	Maurer, N. J.....	H. H. Alexander....	G. G. Griswold..	4	600
Omaha	Omaha, Neb.....	Walter T. Page....	W. P. Olds.....	3	750
El Paso	El Paso, Tex.....	Kuno Doerr, g. m.	J. Heggle.....	6	1,200
Monterey	Monterey, Mex....	C. L. Baker, g. m.	J. F. Austin.....	10	1,600
Chihuahua	Chihuahua, Mex...	C. L. Baker, g. m.	J. R. Enlow.....	5	900
Selby	Selby, Calif.....	E. B. Braden, v. p.	E. N. Englehardt.	4	800
Federal	Federal, Ill.....	Rudolph Porter....	O. Ohnsorg.....	3	270
Velardena	Asarco, Mex.....	C. L. Baker, g. m.	L. B. Harrison...	3	450

Copper Smelting

Perth Amboy.....	Maurer, N. J.....	H. H. Alexander....	G. G. Griswold..	1	300
El Paso	El Paso, Tex.....	Kuno Doerr, g. m.	J. Heggle.....	2 (a)	1,900
				3 (b)	
Agua Cal's.....	Agua Cal's, Mex.	C. L. Baker, g. m.	A. McL. Hamilton	8	2,000
Matehuala	Matehuala, Mex...	C. L. Baker, g. m.	C. A. Grabill....	3	600
Hayden	Hayden, Ariz....	Kuno Doerr, g. m.	J. F. Ormsbee....	2	900
Tacoma	Tacoma, Wash....	H. Y. Walker.....	R. F. McElveny..	2	1,500
Garfield	Garfield, Utah...	C. W. Whitley, g. m.	W. D. Leonard....	4 (a)	5,200
Sasco	Silverbell, Ariz.	.....	.....			6 (b)
Velardena	Asarco, Mex.....	C. L. Baker, g. m.	L. B. Harrison...	3	750

(a) Blast furnaces. (b) Reverberatory furnaces. (c) Daily capacity.

Zinc Smelters

Blende	Blende, Colo.....	C. A. H. DeSaulles, g. m.	J. D. Thomas...	8	100
Sand Spgs.....	Sand Spgs., Okla.	C. A. H. DeSaulles, g. m.	F. P. Lannon...	10	130

Tin Smelters

Perth Amboy.....	Maurer, N. J.....	3,000 to 5,000 tons	Yearly Cap.
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Refining Plants

Plant—	Location	Oz. Gold	Yearly Capacity Oz. Silver	Tons Lead	Tons Copper
Omaha	Omaha, Neb..... W. T. Page, mgr.; E. B. Lefferts, supt.	500,000	36,000,000	180,000	.....
Perth Amboy.....	Maurer, N. J..... H. H. Alexander, mgr.; G. G. Griswold, supt.	500,000	48,000,000	108,000	120,000
Selby	Selby, Calif..... E. B. Braden, v. p.; E. N. Engelhardt, supt.	2,400,000	18,000,000	36,000	.....
Federal	Federal, Ill..... Rudolph Porter, mgr.; O. Ohnsorg, supt.	.....	.....	60,000	.....
Baltimore	Baltimore, Md..... W. H. Pierce, mgr.; C. N. Sappington, supt.	300,000	30,000,000	.....	168,000 (a)
Tacoma	Tacoma, Wash.... H. Y. Walker, mgr.; R. F. McElveny, supt.	.....	.....	.....	60,000 (b)

(a) To be increased to 240,000 tons in 1916. (b) Recently increased to 72,000 tons.

The mining properties of the company are under the general charge of Mr. W. M. Drury, general manager; R. F. Manahan, assistant. The operating mines are as follows:

Silver Lake Mine, L. R. Clapp, supt., Silver Lake, Colo.

Anganguero Unit, A. W. Edelen, supt., Anganguero, Mich., Mexico.

Bonanza, Unit, W. Davis, supt., Bonanza, Zac., Mexico.

Charcas Unit, S. F. Shaw, supt., Charcas, S. L. P., Mexico.
 Dolores Unit, E. E. Reyer, supt., Matehuala, S. L. P., Mexico.
 Federal Lead Co., H. G. Washburr, supt., Flat River, Mo.
 Sierra Mojada, W. B. Gates, supt., Sierra Mojada, Coa., Mexico.
 Santa Eulalia, W. J. Deavitt, supt., Santa Eulalia, Chi., Mexico.
 Santa Barbara, W. P. Schumacher, supt., Santa Barbara, Chi., Mexico.
 Velardena, R. E. Adams, supt., Velardena, Dgo., Mexico.
 Christmas Mine, S. H. Sherman, supt., Christmas, Ariz.
 Bush-Baxter Mine, Edw. Thornton, supt., Twin Buttes, Ariz.

American Smelters Securities Co.'s properties are all included in the above; the same applies to the National Metallurgica Co., the Tacoma Smelting Co., the Baltimore Copper S. & R. Co., the Selby Smelting & Lead Co., the Federal Lead Co. and the Garfield Smelting Co.

The Federal Smelter is supplied with ores principally from the Company's mining operations in Southeast Missouri. At present the output of ore is, roughly speaking, 1,200,000 tons per annum, which is concentrated into approximately 60,000 tons of concentrates, containing more or less 43,000 tons of lead.

The plant at Chihuahua is largely supplied with ores from the Company's Mines in the Santa Eulalia and Sierra Mojada Districts of Mexico.

The Velardena Smelters are supplied largely from the Company's Velardena Mines.

Matehuala Smelter handles principally the ore from the Company's Dolores Mines, which are in the same district.

The recent installation of an electrolytic zinc plant at the Murray, Utah, smelter, and construction of a 100-ton sulphuric acid plant, using the chamber process, at Garfield, Utah, show that the company is still in the fore in its metallurgical-practice.

The American Smelting & Refining Co. is much the largest general smelting and metallurgical enterprise in the world. There has been much complaint, through the mining districts of the United States and Mexico, regarding the exactions of this so-called "Smelter Trust," but it seems obvious that the company continues to expand and prosper, mainly because of its superior metallurgical and business ability, backed by large and modern works and adequate capital, rather than because of special advantages.

AMERICAN STAR MINING CO.

UTAH

Office: 403 Dooly Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Imer Pett, pres. and gen. mgr.; Jas. P. Graves, v. p.; Fred R. Sands, sec.-treas.; preceding officers, Geo. E. Davis and Thos. P. Billings, directors. Inc. 1909 in Utah. Cap., \$1,000,000, shares \$1 par; issued 599,500 shares. Lands, 2 claims, 25 acres, including the Town View group and other properties lying between the Victoria and Chief Consolidated mines, and touching the Plutus on the east and Eagle & Blue Bell on the west. Mine has about 1,000' of workings, made from the 900' level of the Eagle & Blue Bell mine, and plans a 1,100' shaft, about one-half mile south-east of the Chief Consolidated. Workings show an ore channel of about 60' width. Property considered promising.

AMERICAN TUNGSTEN CONS. CORP'N.

WASHINGTON

Address: Hutton Bldg., Spokane. Wm. Sheck, gen. mgr.; Henry Becker, supt., at last account. Company a reorganization, 1912, of the Germania Mng. Co. Cap., \$1,000,000, shares \$1 par. The Germania Co., composed principally of German investors, was organized 12 years ago to develop the Roselle mine, 25 miles west of Springdale, Stevens Co. It is said that \$500,000 was spent in driving tunnels, in the concentrator and buildings. In 1911 the company became involved in litigation, later going

into bankruptcy. In Jan., 1916, eastern interests, represented by F. T. Hamshaw, of Seattle, obtained a lease and bond on the properties held by the Corporation and started operations. Holdings include the Germania and Roselle mines. Development, consisting of a 200' shaft and 3 tunnels with 3,000' of work, is said to have exposed a considerable tonnage of ore that the new management is planning to extract. Electric power is used.

AMERICAN VANADIUM CO.**PENNSYLVANIA**

Vanadium Bldg., Pittsburgh, Pa. Plant at Bridgeville, Pa. **Officers:** James J. Flannery, pres.; E. E. Fernandini, 1st v. p.; J. C. Gray, 2nd v. p.; J. L. Replogle, 3rd v. p.; C. B. Aylesworth, sec. and asst. treas.; H. A. Neeb, treas., with Jos. M. Flannery, J. R. Flannery, P. J. Barry, G. H. Gerding, and G. H. B. Martin, directors. Inc. Feb. 15, 1916, in N. J., to mine vanadium ores and manufacture vanadium alloys. **Cap. \$700,000;** shares \$100 par. Oakland Savings & Trust Co., Pittsburgh, registrar. Controls the Standard Chemical Co. Company gives out no information.

AMERICAN ZINC CO.**MONTANA**

Is a corporation created to take a 5-year lease and bond on the Emma mine, at Butte, Mont., from the Butte Copper & Zinc Co., which see.

AMERICAN ZINC CO. OF ILL.**ILLINOIS**

A subsidiary of the Amer. Z. L. & Sm. Co. and described under that title.

AMERICAN ZINC CO. OF TENN.**TENNESSEE**

A subsidiary of the Amer. Z. L. & Sm. Co., and described under that title.

AMERICAN ZINC, LEAD & SMELTING CO.**U. S.**

General offices: 55 Congress St., Boston. **Sales office:** 120 Broadway, New York City. **Corporate office:** 85 Exchange St., Portland, Me.

Officers: H. S. Kimball, pres.; C. W. Baker, L. A. Coolidge, C. A. Hight, P. E. Coyle, v. p.'s.; F. W. Batchelder, sec.; S. E. Farwell, treas.; M. A. Donovan, asst. treas. and asst. sec.; directors are H. S. Kimball, E. P. Brown, C. A. Hight, C. W. Baker, L. A. Coolidge, B. P. Bole, F. H. Goff, E. A. Clark, P. E. Coyle, E. G. Hothorn, N. B. MacKellvie, L. Vogelstein, W. H. Coolidge, J. N. Lovell, and C. G. Rice; H. I. Young, mgr. Mo. mines, Cartersville, Mo.; J. N. Houser, mgr. Tenn. mines, Mascot, Tenn.; W. F. Rossman, 1012 Pierce Bldg., St. Louis, mgr. smelters. Transfer agts.: F. W. Batchelder, 55 Congress St., Boston, and Guaranty Trust Co., New York; Registrars, First National Bank, Boston, and Bankers Trust Co., New York.

Inc. Jan. 26, 1899, in Maine. **Cap., \$500,000;** shares \$25 par; increased on Apr. 24, 1899, to \$2,500,000; on Oct. 17, 1906, decreased to \$1,250,000; on Dec. 19, 1906, increased to \$3,750,000; on Oct. 4, 1912, increased to \$7,500,000, outstanding Dec. 31, 1915, \$4,828,000. All bonds have been cancelled. Stock is listed on Boston and New York Stock Exchanges. Annual meeting, second Wednesday in April.

Balance sheet of Amer. Zinc, Lead & Sm. Co., and subsidiary companies as of Dec. 31, 1915, shows: assets \$10,919,679, which includes property account \$5,858,737, investments \$589,604, insurance fund investments \$26,291, deferred charges to operations \$48,184 and current assets \$4,396,862, which includes ore stocks \$1,299,153; spelter stocks \$631,013, sulphuric acid stocks \$6,556; cash \$640,414, inventories \$416,074; accounts receivable, m'fd products, \$1,342,039; accounts receivable, miscellaneous, \$61,611; liabilities include: capital stock issued \$4,828,000; depreciation and reserve funds \$2,540,360; insurance reserve fund \$26,291; surplus \$2,796,871; current liabilities of \$728,155, which includes accounts payable, \$3,057; notes pay-

able, property purchased, \$83,000; interest and taxes \$63,250; drafts in transit \$108,848. Operating statement for 1915 shows; total profits from results of sale of zinc and lead ores, sales of spelter and sulphuric acid, receipts from royalties, after deducting all cost of mining, manufacture, marketing ores, spelter and sulphuric acid, other expenses of operation and all administrative and general expenses, taxes and interest, \$5,135,055, plus miscellaneous profits, \$158,822; total \$5,293,878; appropriated to depreciation and reserve fund: \$2,642,377; balance carried to surplus \$2,651,500.

It is the aim of the directors to make the Zinc company a permanent business, regardless of the life of its present mines; to add to its mining properties, wherever possible; to strengthen and protect its manufacturing plants and to have a sufficient working capital so that the company need not borrow any more money. This use of earnings precludes the immediate distribution among stockholders of cash dividends. In order to guarantee something to the stockholders for these earnings retained as capital it is proposed to issue $\frac{1}{3}$ of the authorized capital as 6% cumulative preferred shares, to be preferred as to assets to the amount of \$100 per share; the company reserving the right to redeem at any time these preferred shares at \$100 per share.

Dividends: have been \$2 in 1899, \$1 in 1900, \$1.25 in 1907, \$1.50 in 1910, \$2 in 1911 and 1912 and \$1 in 1913.

The Amer. Zinc, Lead & Sm. Co. is an operating and holding company, owning the following: Amer. Zinc Co. of Tenn., Amer. Zinc Co. of Ill., Amer. Ballast Co., Amer. Pipe Line Co., Amer. Zinc Ore Separating Co., and 628,145 shares of 925,000 shares issued, of the Wisconsin Zinc Co. These companies are listed under their own title but are described below. Reported in June, 1916, that company had arranged to purchase property and assets of the Granby Mng. & Sm. Co. of Missouri, which see.

In the Joplin district, Mo., the company owns 2,160 acres of land. The principal operations are at the Davey mines, on the 655-acre Davey property, and the Vogey mine, on a 40-acre tract in the Porto Rico district. There are 4 mines in the Davey group, 2 worked out and 2 producing. The ore, sulphides of lead and zinc, is found in the horizontal Grand Falls chert in bands between the barren zones of flint that comprise the Grand Falls chert. It is from this formation the term sheet ground mines, is derived, and in it the ore is generally uniform in character and covers large areas. In the Davey mines 110 acres have been mined out in one continuous chamber. Ore faces are from 14' to 20' in height.

Development is by means of 6 vertical 2-compartment shafts, all in the ore formation. Two shafts are used for mining purposes, and 4 for ventilation. The ore level is at 250' depth. The ore is very low grade, zinc concentrates recovered representing 1.79% and the lead concentrates 0.67% of rock treated. Ore output has been approximately 50,000 tons ore per acre, from 15% to 20% ore, being left as pillars. Timbering is not necessary. The blanket formation permits of development in wide areas, average yearly advance on all faces in the mine is 125'.

There are 2 mills on the property, No. 3 mill of 1,200 tons ore and No. 4 mill of 1,000 tons ore daily capacity.

With normal output the estimated length of life of the Davey property is 5 years, this is without recent addition of 40 acres.

The Vogey mine is similar to the Davey. Operations have been irregular, depending on price of zinc and lead concentrates. Zinc concentrates recovered represent 1.76% and lead concentrates 0.20% of rock hoisted. There is a mill on the property, with daily capacity of 1,000 tons.

Production and costs at the two mines are as follows:

		-----Concentrates Produced-----				
Cost Per Ton		Zinc	Zinc	Lead	Lead	
Mine	Mill	Tons	%	Tons	%	Conc. Ratio
(D) \$0.755	\$0.222	93,451(b)	57.12(b)	35,039(b)	82.03(b)	45 to 1(b)
(V) .782	.172	10,387(c)	62.11(c)	1,177(c)	78.34(c)	.....

(D) Davey; (V) Vogey; (a) average for last 3 years; (b) since production was begun in 1905 to end of 1914; (c) 1909-1914 inclusive.

In addition to the above properties the company owns 4 separate tracts, about 2,150 acres, in the Joplin district, partly developed by churn drilling.

The company owns 2 smelting plants in the gas belt at Caney and Dearing, Kan. The Caney plant has 6,080 retorts, the Dearing, 4,480 retorts. Combined yearly capacity is 110,000 tons concentrates. The length of life of these smelters depends upon the fuel supply of natural gas, now obtained from the Oklahoma-Kansas belt.

Amer. Zinc Co. of Tenn.

Inc. Feb. 24, 1911, in Maine. Cap., \$10,000; shares \$1 par, all owned and issued by A. Z. L. & S. Co.

Principal mining operations of the Tennessee Co. are at Mascot, Knox Co., where the company owns 2,400 acres land. There has recently been acquired 4,000 acres mineral land in Jefferson Co., adjoining Knox Co. on the east, where drilling is now being done with encouraging results. Additional options on 1,000 acres farther east in Jefferson Co. have also been obtained.

Orebodies of the Mascot mines occur in the Knox dolomite, dip 15° to 30° south and strike north of east, in lenses of varying sizes and in well-defined brecciated areas which lie in certain recognized zones or bedding planes. The ore is a light colored sphalerite. The zinc formation may be followed for many miles from Knoxville, in an easterly direction. In 1910 the company obtained an option on the Holston property, started drilling and proved up a large tonnage of pay ore. A 3-compartment shaft, mine No. 1, was sunk in 1911 and the orebody developed in 1912. The main orebody is developed on the 280' level, and, as exposed, is 1,300' long, 700' to 880' wide, and 30' to 40' thick. Limits of the orebody have not been reached by development to date. In 1913 a 4-compartment shaft, mine No. 2, was sunk 2,000' east of No. 1 and a second orebody developed, with length of 1,500', thickness of 40' to 125', width of 300' and limits not yet reached. Average grade of ore as shown by drill records is 5% to 5½% zinc. Greatest depth of workings, 800', is at mine No. 2. A tramway connects No. 2 mine with No. 1 mill. Development has shown the ore to be continuous between No. 1 and No. 2 orebodies. Further drilling 3,000' east of eastern limits of mine No. 2 has indicated a third orebody; this will not be developed until some future time. Recently there has been acquired another ore deposit adjoining the Holston property on the West and 2,900' from No. 1 shaft. Drilling and underground developments have proved a good sized orebody with limits not yet known.

From the east to west the ore development as now shown is 7,900' in length. There has been blocked out 4,000,000 to 5,000,000 tons of ore which will average 4% to 5% zinc.

In May, 1913, mill No. 1, with 1,000 tons daily capacity, was completed. Additions to this mill were finished in July, 1915, bringing its daily capacity up to 2,200 tons. It is now treating over 2,000 tons daily. On the Roseberry property adjoining the Holston on the west there has recently been completed a mill of 700 tons daily capacity. Mill equipment at Mascot consists

of crushers, rolls, jigs and tables, followed by flotation treatment of slimes and fine sand.

Power is obtained from the Knoxville Railway & Light Co., a subsidiary of the Tenn. Power Co.

Costs and results of operations are as follows:

	Cost Per Ton		% Zinc in	
	Mine	Mill	Ore Milled (a)	Recovery
1914.....	\$0.97	\$0.233	4.06	75%

(a) In 1913 this was 4.19% and 3.99% in first 10 mos. of 1915.

Mascot concentrates average about 60% zinc and are, with one exception, the purest zinc concentrates produced in the U. S., the spelter produced therefrom commands a substantial premium per lb. over Prime Western quotations.

The company has developed the town of Mascot, owning 200 houses, a company store and hotel.

Amer. Zinc Co. of Wisconsin

Inc. June 27, 1908, in Maine. Cap., \$1,000,000, shares \$1 par, issued 925,000 shares, owned by A. Z. L. & S. Co., 628,145 shares. Properties lie in the southwestern part of the state in the Wisconsin District. The ore deposits exist in the forms of flats and pitches, the flats being horizontal deposits along the bedding planes of the rocks, while the pitches are dipping crevices. The chief deposits lie in the lower part of the Galena limestone at a depth of 100' to 200' and vary in length from 1,000' to 5,000', in width from 30' to 300', and in height from 12' to 60'. The ores consist of the sulphides of zinc, lead and iron, the latter in the form of marcasite.

The principal operations in the Wisconsin field are as follows:

Champion property, 434 acres, on which there has been developed an orebody 1,500' long, 800' wide, and 40' high. —A mill of 500 tons daily capacity is in operation.

Winskell mine, operated on leased land, 10% of gross output going to the land owners. A mill of 450 tons daily capacity is in operation. Total production to end of 1914 was 31,089 tons zinc concentrates, averaging 36.51% zinc, and 1,073 tons lead concentrates, averaging 76.28% lead.

East End property, operated on leased land at 10% royalty, has ore reserves of 50,000 tons high grade ore. A mill with daily capacity of 250 tons is in operation. Production to end of 1914 amounted to 11,485 tons zinc concentrates, averaging 44.11% zinc, and 117 tons lead concentrates, averaging 73.85% lead.

Federal property, operated on leased land, at 11% royalty, has only a small ore tonnage developed. There is a mill on the property with daily capacity of 350 tons. Production to end of 1914 amounted to 11,171 tons zinc concentrates averaging 32.21% zinc, and 109 tons lead concentrates, averaging 75.30% lead.

The company owns a number of other leases in the district, on which valuable ore discoveries have been made by drilling. Three of these properties, the Thompson, Longhorn and Birkbeck, will be developed by shafts, and equipped with mills in the near future. Most of the mines are from 1 to 3 miles from the railroad.

The life of the Champion property, with its surrounding leases, as estimated at present, is from 5 to 10 years.

The low grade of concentrates necessitates further treatment by means of partial roast and magnetic separation. Plants for this purpose are operating at Plattville, Wis., the Empire plant, and at Galena, Ill., while a third was recently completed near the Champion property.

Amer. Zinc Co. of Illinois

Inc. Aug. 15, 1911, in Maine. Cap., \$10,000, shares \$1 par, all issued and owned by the Am. Z. L. & Sm. Co.

Property consists of 200 acres land, on which is located a pottery, capacity 15,000 retorts, a modern smelting plant of 4,000 retorts furnace capacity, capable of handling 40,000 tons concentrates per year, 2 Hegeler muffle kilns, a sulphuric acid plant, machine shop, warehouse and large ore storage bins. The acid plant produces 30,000 tons of 60% sulphuric acid annually.

Amer. Ballast Co.

Inc. Nov. 9, 1911. Cap., \$2,000, shares \$1 par, 5 shares issued and owned by Am. Z. L. & Sm. Co. The company disposes of mill tailings of the Mascot mill of the Amer. Zinc Co. of Tenn. Table and flotation tailings are sold for fertilizing purposes, other tailings are sold for railroad ballast, road construction, etc. Company's operations are said to net over \$50,000 annually.

Amer. Pipe Line Co.

Inc. June 16, 1910, in West Va. Cap., \$50,000, shares \$100 par, all issued and owned by A. Z. L. & Sm. Co. Property consists of gas lands, and leases, gas wells and oil wells, located in the southeast corner of Kansas, near the Caney and Dearing smelters and a system of trunk pipelines in Kansas and Okla., with the necessary feeders. There are over 36 miles of main pipe line, 12" dia., now laid.

Amer. Zinc Ore Separating Co.

Inc. Oct. 13, 1908, in Maine. Cap., \$25,000, shares \$5 par, all issued and owned by A. Z. L. & Sm. Co. This company owns certain patents for the separating of zinc ores by the Huff electrostatic methods. Its business is to lease machines constructed under these patents on a royalty basis. Companies using Huff process are as follows:

Zinc: U. S. Sm., Ref. & Mng. Co., Midvale, Utah; Carnegie Lead & Zinc Co., Cananea, Mex.; Kittimac Mng. Co., Silverton, Colo.; Mary Murphy G. Mng. Co., Romley, Colo.; Sunnyside Mines Co., Eureka, Colo.; Pinos Altos Mng. Co., Pinos Altos, N. M. Copper: Tilt Cove Mng. Co., St. Johns, Nfld.; Det Metallurgiske Akt., Bergen, Norway. Graphite: Flaketown Graphite Co., Flaketown, Ala.; Jennings G. Co., Alabama G. Co., Ashland, Ala.; National G. Co., Toronto, Can. Misc.: Carborundum Co., Niagara Falls, N. Y.; Soc. Francaise des Metaux, Australia. Testing Plants: University of Illinois, Urbana, Ills., and Canadian Dept. of Mines, Ottawa, Can.

AMERICAN ZINC ORE SEPARATING CO.

A subsidiary of the Amer. Z. L. & Sm. Co., and described under that title.

AMY-MATCHLESS M. & M. CO.**IDAHO**

Wallace, Ida. Gus Smith, mgr. and principal owner. Inc. Dec., 1913, in Arizona. Cap., \$1,250,000, shares \$1 par.

Property: several developed claims on Pine Creek, 3 miles from a railroad. At last accounts company was planning to build a 50-ton mill.

ANACONDA COPPER MINING CO.**MONTANA**

42 Broadway, New York City. Mine office: Hennessy Bldg., Butte, Mont. Smelting works: Anaconda, Mont., Great Falls, Mont., Tooele, Utah and Miami, Ariz.

Officers: John D. Ryan, pres.; B. B. Thayer, v. p.; C. F. Kelley, v. p.; A. H. Melin, sec.-treas.; J. T. Roberts, asst. sec.; D. B. Hennessy, asst. treas. **Directors:** John D. Ryan, B. B. Thayer, George H. Church, Nicholas F. Brady, Wm. Rockefeller, C. F. Kelley, J. Horace Harding, Andrew J. Miller and H. H. Rogers.

Operating officials:**Mining Department**

John Gillie, gen. mgr. of mines; B. H. Dunshee, asst. gen. mgr.; C. W. Goodale, chairman Safety First committee. W. B. Daly, gen. supt. of mines; John O'Neill, asst. gen. mgr.; C. L. Berrien, asst. supt. The mine supts. are as follows:

Anaconda Group

Ed. Renouard, Badger State Mine.	D. J. O'Neill, Never Sweat Mine.
Jas. S. Egan, Mountain Con Mine.	Dan P. Sullivan, Original Mine.
Con O'Neill, Bell-Diamond Mine.	Dan Griffin, Steward Mine.
Thos. Chope, High Ore Mine.	W. H. Price, Moonlight Mine.
D. H. Crowley, St. Lawrence Mine.	Thos. McGrath, Gray Rock Mine.
Wm. Nevin, Anaconda Mine.	John Andrew, Belmont Mine.
R. S. Foster, Safety engr.	W. C. Douglass, Asst. Safety engr.

Boston & Montana Group

John Varker, Mountain View Mine.	E. M. Norris, Tramway Mine.
Herbert R. Tunnell, Pennsylvania Mine.	Geo. Bennett, Leonard Mine.
K. P. Krueger, West Colusa Mine.	John C. Gaul, Berkeley Mine.
G. E. Moulthrop, Tramway Mine.	Wm. McLain, Silver Bow Mine.
R. S. Foster, Safety engr.	Jas. McQuay, Tropic Mine.

Zinc Group of Mines

J. J. Carrigan, gen. supt.	Jas. Brennan, Emma Mine.
Herbert Tonkin, Poulin Mine.	John Hewitt, Alice Mine.
John Berkin, Nettie Mine.	M. Finnigan, Southern Cross Mine.
Wm. E. Kane, Lexington Mine.	R. S. Foster, Safety engr.

Reduction Departments**Washoe Red'n Works, Anaconda**

E. P. Mathewson, mgr.	W. M. Kelly, gen. smelter foreman.
L. V. Bender, gen. supt.	W. C. Capron, asst. chief engr.
L. E. Jones, supt. elec. dept.	R. B. Kelly, safety engr.

Boston & Montana Red'n Works, Great Falls

James O'Grady, mgr.	A. T. Elliott, gen. smelter foreman.
J. H. Klepinger, supt.	Edgar C. Maclay, chemist.
M. W. Krejci, asst. supt.	W. T. Burns, supt. elec. refinery.
E. S. Bardwell, Metallurgist.	Dan'l Tracy, supt. furnace refinery.
W. H. Gunniss, mgr. brick dept.	Peter Thill, asst. chief engr.

F. J. Brule, supt. surface dept.

International Smelting Co.

For Tooele, Utah and Miami, Ariz. smelters, the East Chicago and Raritan refineries, see International Smelting Co.

Coal Dep't

F. W. C. Whyte, mgr., Anaconda.
 Thos. Snedden, supt. Diamond Coal & Coke Co., Diamondville, Wyo.
 Thos. Good, supt. A. C. M. Co. Coal Dep't, Washoe.
 C. A. Sederholm, supt. A. C. M. Co., Coal Dep't, Sand Coulee, Mont.

Lumber Dep't

Kenneth Ross, mgr., Missoula, Mont.
 M. M. Ross, supt., St. Regis.
 J. E. Totman, mill supt., Hamilton.

B. A. & P. Railway

H. A. Gallwey, mgr., Anaconda.	C. F. Murphy, supt.
C. H. Spengler, master mechanic.	C. A. Lemmon, chief engr.

Inc. June 18, 1895, in Montana, as successor of Anaconda Mining Co. Cap., \$150,000,000, shares \$50 par, 2,331,250 issued. **Funded debt:** \$16,000,000, 2-year 5% gold notes, due March 1, 1917. Company has a very broad

charter permitting it to acquire, mortgage, lease, assign and transfer the capital stock, bonds or securities of any other corporation. National City Bank, N. Y., transfer agt.; Bankers Trust Co., N. Y., registrar. Pogson, Peloubet & Co., auditors. Annual meeting 3rd Wed. in May at Anaconda. Stock listed New York, Boston, London.

Dividends declared quarterly; present rate \$1.50 quarterly (1916).

Net earnings 1905-1915 were \$87,587,422, or \$32.68 per share and dividends paid \$27.79 per share, averaging \$2.50 annually. Earnings for 1915 were \$16,695,806, or \$7.16 per share.

Gross revenue:

1915	1914	1913	1912
\$87,273,886	\$51,533,659	\$61,258,755	\$67,262,041

Assets, Dec. 31, 1915, amounted to \$174,785,526, or \$75 per share of stock compared with \$54 Dec. 31, 1914.

Production:

	Lbs. Copper	Oz. Silver	Oz. Gold
1915.....	254,311,574	9,005,618	106,702
1914.....	223,720,292	8,314,116	99,651
1913.....	270,303,644	10,321,296	64,898
1912.....	294,474,161	11,014,737	61,314
1911.....	259,407,092	9,731,561	48,950
1910.....	266,608,461	9,534,888	57,260

Production and operating costs can be summarized as follows:

	Tons Ore Mined	Mining Costs p. t.	Reduction Costs	Trans- portation
1915.....	4,383,339	.....	.....	.....
1914.....	3,904,883	\$4.134	\$1.612	\$0.274
1913.....	4,651,445	4.124	1.679	.320
1912.....	4,579,957	3.912	1.749	.308
1911.....	3,848,673	3.766	1.820	.331

Copper content in 1915 averaged 2.85% and costs are estimated at 10 cts. per lb. of metal sold.

Smelting operations of company are shown in the following table:

Plant:	Smelteries				
	Ore Smelted tons	Copper lbs.	Silver oz.	Gold oz.	Lead tons
Washoe	4,421,629	189,483,047	6,982,822	75,680	.....
Great Falls	384,065	64,828,527	2,022,795	31,023	.....
Tooele	665,948	14,271,174	5,090,157	48,020	56,501
Miami	87,408	51,769,669	69,999	822	.....
Totals	5,559,050	320,352,417	14,165,773	155,545	56,501

Plant:	Refineries				
	Copper lbs.	Silver oz.	Gold oz.	Lead tons	
Great Falls	64,828,527	2,022,795	31,023	.....
East Chicago .....	.....	4,031,610	18,135	56,142	
Raritan	323,850,718	16,025,993	174,408	.....
Totals	388,679,245	22,080,398	223,566	56,142	

The figures for the refineries duplicate to a large extent those of the smelteries, the difference representing bullion that was refined for other smelters. In 1916 zinc will be added to the list of metals.

As company reports do not give details of operating costs, the actual cost of producing a pound of copper can only be calculated from the fig-

ures given which gives an apparent cost of 10c per lb. of copper produced. Inasmuch as this includes a \$1,900,000 depreciation fund, \$984,232 interest and there is an equity in metals inventoried at cost, this figure is high. It is believed that the cost is not over 9c per lb. of copper.

Property: Company owns 1,168 acres mineral claims at Butte including all the property formerly held by the following companies: (1) Boston & Mont. Cons. C. & S. Mng. Co.; (2) Butte & Boston Cons. Mng. Co.; (3) Red Metal Mng. Co.; (4) Washoe Copper Co.; (5) Parrot Silver & Copper Co.; (6) Alice Gold & Silver Mng. Co.; (7) Trenton (formerly Colorado) Mng. & Dev. Co.; (8) Big Blackfoot Lumber Co.; (9) Diamond Coal & Coke Co.; (10) Original Cons. Mng. Co.; (11) Colusa Parrot Mng. & Sm. Co. It acquired the Internat'l Smelting Co. in 1914 together with its subsidiaries the Tooele Valley R. R., a lead refinery at East Chicago, the Raritan Copper Refinery. In 1915 it acquired the United Metals Selling Co., 150,000 shares Inspiration Copper, 30,800 shares Greene Cananea and 1,100 shares Mountain Trading Co. It owns the Southern Cross Gold Mines near Anaconda. In 1915 it bought the Alex Scott mine at Butte and in 1916 the Pilot Butte mine, the latter purchase ending all existing apex litigation at the camp. Company owns 1,100,000 acres lumber land (Big Blackfoot Lumber Co.) and sawmills at Bonner and St. Regis, Mont., and 13,280 acres coal lands at Diamondville, Wyo., Washoe, Belt and Sand Coulee, Mont. The Raven mine was bought Aug. 4, 1915, for \$65,000. Company has a 5-year lease on the Emma mine (Butte Copper & Zinc Co.) and owns 88,300 shares of the stock thereof, operated as a zinc producer and bought the Czarroma claim fraction containing the continuation of the Emma vein for \$225,000 late in 1915. Company is also prospecting the big low grade gold property called the Porphyry Dike, near Rimini, under lease and bond.

The reduction plants at Great Falls and Anaconda, including the new zinc plant, are described later. The Anaconda plant produces fire and building brick and sulphuric acid as well as copper, zinc, gold and silver, with a small amount of arsenic, and in the future probably bismuth. Through ownership of the Internat'l Smelting Co., the Anaconda owns the Tooele, Utah, and Miami, Ariz., smelters, the East Chicago and Raritan refineries (described under International Smelting Company).

By the merger of the Anaconda and Boston & Montana, both among the six largest copper producers of the world, and the addition of a number of other mines of second and third rank in productive capacity, the Anaconda became the largest copper company in the world, employing about 12,000 men, at high wages, and with a payroll in Butte alone of over \$1,000,000 monthly, with very large additional payrolls, at its works in Anaconda and Great Falls. Since the absorption of the other mines of Butte has practically eliminated property lines so far as underground work is concerned and workings have been so connected as to permit the most economic mining regardless of claim boundaries, the property can be most usefully described in sections called by the familiar names used under former ownership, or by the names of the 22 operating shafts of the company.

The mines of the company produced in 1915 4,376,556 tons of ore and 6,783 tons of copper precipitate. The Anaconda mine was opened, 1880, as a silver producer, but at about 150' depth the oxidized silver ores were succeeded by high-grade copper ores, mainly chalcocite and bornite, while at depth there is a large amount of enargite. Net earnings of the mine, during the 15 years, 1880-1894, are unknown, but may be safely estimated as not less than \$50,000,000. At a depth of about 1,600' quartz pyrite veins

of the Anaconda showed impoverished values, there being considerable pyrite, but the fault veins showed large orebodies at depths of 1,200' to the deepest levels yet reached in mining which is 3,400' in the High Ore mine. The various mines of the Anaconda have immense reserves of ore of all grades.

The Anaconda mine proper has a 3-compartment shaft, 2,800' deep, connected underground with the Never Sweat, St. Lawrence, Bell, Belmont and Moonlight mines. Considerable trouble has been had, at times, with gases, from the adjoining St. Lawrence mine, and the fire has crept from the St. Lawrence into several of the upper levels of the Anaconda. The mine has electric locomotives for tramping, installed 1907, on several levels. Hoisting is by 8-ton skips, swung under double-deck cages and worked in counterbalance.

The St. Lawrence mine has a 2,600' three-compartment main shaft, connected underground with the Anaconda, Never Sweat, Mountain View and Pennsylvania mines. The St. Lawrence has been on fire since 1889, in an extensive area above the 1,100' level. The fire has been fought constantly, and walled off by cement bulkheads wherever possible, but cannot be extinguished, and must be allowed to burn itself out, though it is possible to control its progress to a considerable extent. While the fire is troublesome, it does not result in the loss of copper, as the sintered ore remaining after the burning of the sulphur can be mined later, and the mine waters are strongly charged with copper, much of which is recovered by precipitation on surface where it is run over scrap iron and "cement" copper made. The hoist has 32x72" cylinders, raising 5-ton skips swung under double-deck cages.

The Never Sweat mine has a 2,500' three-compartment main shaft. Square-set timbering is used in stoping as well as back filling. Some trouble has been had with fire from the St. Lawrence. The surface plant includes a 28x48" double drum Nordberg hoist, raising 3-ton skips swung under single-deck cages.

The Belmont mine, about 1 mile south of the main shaft of the Anaconda, and 375' lower, has a new 2,400' four-compartment working shaft, the largest in the district. Connections have been made with other mines and a 1,500-ton ore bin erected. Equipment includes a powerful new hoist, with capacity of 3,500', taken from the Corra mine.

The Diamond mine has a 3,400' three-compartment shaft, developing the Corra vein and other veins to the bottom level. Equipment includes a 34x72" Risdon hoist, operating double-deck cages with 8-ton skips.

The High Ore mine is one of the deepest in Butte, having a 3,400' three-compartment shaft, producing high-grade chalcocite. The High Ore does the pumping for a number of connecting mines of the Anaconda, handling all water from the Anaconda, Washoe and Parrot properties. The mine has 9 electric pumps, each good for 600 gals. per min., with 1,200' lift. These are located on the 1,200, 2,200 and 2,800' levels. Relief pumps to run by steam or air are also installed on different levels.

The Modoc mine has a 2,500' three-compartment shaft, connected with the 2,500' level of the High Ore mine. The Modoc has several veins besides the one of this name, its chief ore supply coming from the veins, which are stoped up to the North Butte Co.'s boundaries on the north and to the Ballaklava mine on the south.

The Mountain Chief mine, area 1.15 acres, lies next north of the Butte-Ballaklava, and is said to have produced about \$1,500,000 worth of ore from a shallow shaft. The Mountain Chief is developed to 500' by its own shaft but its deeper levels are worked through the High Ore mine.

The Parrot group of properties includes the former holdings of the Parrot Silver & Copper Co., 19 fractional claims, area 40.6 acres, embracing the Parrot, Little Mina, Bellona, Original No. 6 and the Oro Butte, Champion and Copper Reef mines, and various other small properties. Main shaft of the Parrot mine is now used as an air shaft and the ground is worked from the West Steward and Never Sweat shafts.

The Little Mina 1,200' shaft is now used for air only.

The Original, Steward and Gagnon shafts are on a western continuation of the Anaconda and Steward veins and in 1912 a continuous ore shoot of good grade, over 2,700' long, was opened in the bottom level of these mines.

The Original mine has a 3,100' shaft with 3 compartments below 1,100'. The mine was located, 1864, in the first stampede to the new Silver Bow diggings and was the first mine patented in Butte.

The Steward mine has a 3,000' vertical shaft, showing, in the bottom workings, a 30' vein carrying ore of good copper tenor, with fair silver values. Equipment includes a 120' steel headgear and a 34x72" first-motion duplex hoist, good for 3,500'.

The Gagnon old 2,300' three-compartment incline shaft, sunk at an angle of 74°, is now used as an auxiliary shaft, all ore being hoisted through the Original shaft. The new vertical 2,200' shaft near the west end of the property, is as yet used for ventilation only. Equipment includes a 22x48" Dickson hoist, raising 3-ton skips with capacity of about 800 tons daily.

The Gagnon is the westernmost of the productive copper mines of Butte. Its ores have carried more silver than those of the mines farther east and have held a number of minerals, such as hübnerite, unusual elsewhere in the camp.

The Moonlight mine, once the principal producer of the Washoe Co., has ore averaging about 1 oz. silver for each unit of copper. The Moonlight has a 1,700' three-compartment shaft, connected underground, with the Blue Jay, Never Sweat and Anaconda.

The Poulin mine, formerly owned by the Washoe Co., has a 1,200' shaft, but is operated through the 1,500' Buffalo shaft, and is to be operated for zinc ore.

The Silver Bow No. 1 mine has a 1,000' shaft, connected with the Pennsylvania, Berkeley and No. 3 mines. It has been a good producer for many years.

The Berkeley 1,500' three-compartment shaft has a 28x48" double drum Nordberg hoist handling 3-ton skips in each compartment.

The Rarus mine has a 2,000' three-compartment shaft, connected with the Tramway mine. The veins have divergent branches, and constitute a sort of stockwork, with an ore zone up to 300' in width, in places.

The Tramway mine, lying between the Minnie Healy and Rarus, formerly owned one-third by Butte Coalition and two-thirds by Butte & Boston, has a new shaft that is being made the central shaft for the Minnie Healy-Rarus group. The Tramway shaft, 2,400' deep, has 3 compartments, each 5'x4'x2" in the clear. The first of the new levels in the Minnie Healy is the thirteenth, about 50' below the old 1,500' level, in which fire was burning, 1908-1909. The Tramway has numerous bodies of ore, of 5 to 6% copper tenor, with good gold and silver values, the really great orebodies coming in between the 1,300 and 1,400' levels, and on the 1,700' level there is an orebody up to 75' in width, averaging nearly or quite 7% copper.

Equipment: at the Tramway mine includes a 92' steel headgear with 12' sheave wheels. A 34x72" Allis-Chalmers 2-cylinder Corliss hoist, with 12' drums, using 1½" round wire cables, has capacity to raise 7-ton skips from a depth of 3,500'. Each compartment has 5-ton skips changeable to

4-deck cages, for lowering men, an auxiliary hoist being used for sinking and handling supplies through the third compartment. The main surface plant of the department, at the Tramway shaft, includes a boiler house, engine house, carpenter shop, machine shop, office building, warehouse and changing house with hot and cold water and shower baths.

The Nipper mine of the Red Metal group, includes the Nipper, Chief Joseph, Balm and L. E. R. claims. The Nipper mine, area 15.18 acres, has 2 shafts, of 1,000 and 1,200' depth, with 12 exits, being connected underground with the Parrot, Never Sweat and Little Mina mines, and has been operated to some extent through the Parrot shaft.

The Green Mountain mine has a 2,200' three-compartment shaft, not deepened for several years.

The Mountain Consolidated mine has a 2,500' three-compartment shaft, with a good ore showing on the 1,400' level and below, and an especially good showing on the bottom level, at 2,500'. The mine has a 28x72" Union Iron Works hoist, operating 2 four-deck cages. The East Grey Rock shaft is used for ventilation only.

The West Grey Rock mine, producing ore carrying values mainly in gold and silver, with a small percentage of copper, has a 1,826' shaft, the 1,800' being the deepest level open in 1916. The veins, though small, carry good ore, rich in silver. The Corra shaft is kept open for ventilation.

The Leonard has an old 1,800' shaft, used for men and supplies and the main or No. 2, a new shaft of 4 compartments, 2,200' deep. Mine is timbered with 12x12" and 14x14" square sets, requiring monthly an average of about 1,000,000' of mine timber, board measure. The 2,000' level shows equally large and good orebodies. Water from the Mountain View, Pennsylvania, Tramway, East Colusa and West Colusa mines drains to the 1,200' level of the Leonard and is forced thence to surface by 4 electric pumps. Valves are of pot form, and the entire water end is phosphor-bronze, columns being lined with wood, thoroughly soaked in oil, to withstand the corrosive action of the mine waters.

The Leonard surface equipment is the show plant of Butte, and is very complete, including a 152' steel headgear and 2,000-ton ore bins. The power plant has ten 250-h. p. boilers, and a 34x72" Nordberg hoist, good for 3,500' depth, raising cages with 5-ton skips swung under, with 1½" round cable. There also is a 12x14" Risdon sinking engine. Plant includes 3 air compressors, of 3,000, 4,000 and 5,000 cu. ft. capacity per minute, respectively.

The West Colusa mine has a 2,200' three-compartment shaft, with levels 100' intervals to depth of 1,200', and thereafter at 200' intervals. Shaft was retimbered, early 1910, and cut down to 3 compartments, being given false sets, to obviate squeezing, which caused much trouble in the past. Mine is timbered with 10x10" and 12x12" square sets, and shows vein matter up to 400' in width. Connection is had underground with the Mountain View and Leonard mines. Surface equipment includes a 23x60" Nordberg hoist, operating 2 double-deck cages, and a 28x48" Nordberg single drum auxiliary hoist.

The East Colusa mine has a 900' three-compartment shaft with levels opened at 100' intervals from 300 to 700'. The mine has a vein of about 65' width, formerly averaging 3 to 4% copper, but mine is now an important producer of zinc ore for the new electrolytic zinc plant. Production is about 200 tons daily.

The Pennsylvania mine has a 2,400' three-compartment shaft, with levels at 100' intervals from 100 to 1,000', and at 200' intervals below. This property has extensive stopes above the 600' level, ore lying nearer

surface than in most of the Butte mines. Equipment includes a 350-gal. electric pump on the 1,800' level, forcing water to a crosscut to the Leonard mine, whence it goes to the precipitating plant. Surface equipment includes 2,000-ton ore bins, a 34x72" Allis hoist, operating 2 5-ton skips and a 28x48" single drum Nordberg hoist sinking engine.

The Badger State mine in the northwestern part of the camp, develops the Badger State, Jessie, Edith May, Emily and several other veins. Mine has a 2,200' four-compartment shaft with extensive orebodies opened up on the 1,100, 1,300, 1,400, 1,600, 2,000 and 2,200' levels. The Emily shaft, auxiliary to the Badger, was deepened from 400' to 917', or 1,000' level of the Badger and connection made in 1912. Property is now an important producer of copper-and-zinc ore.

The Mountain View mine has a 2,249' three-compartment shaft, and a 1,800' air shaft. The Mountain View shows 6 veins of 8 to 60' width, ore averaging nearly 5% in copper tenor, being among the richest mines in the camp. Equipment includes 4,500-ton ore bins, a hoist good for 3,000' depth, and a 28x48" single drum auxiliary hoist.

The Tropic shaft on one of the most easterly claims of the company is 900' deep and mine is now a producing property.

The Greenleaf mine, located east of the proven ore zone of Butte, has a 1,000' shaft, with a hoist good for 2,500'. Mine has about 800' of lateral workings. Work was suspended, July, 1908, but the property is by no means devoid of promise.

The Southern Cross mine, situated in the Georgetown district, west of Anaconda, purchased 1912, for \$370,800, is a gold property developed by a 500' shaft, equipped with electrical machinery.

Butte hill is a network of metalliferous veins, the older with nearly east and west strike being displaced by a number of northwest fault veins cut in turn by still later northeast fault veins and these all cut by the Rarus fault. The geology is fully described in Prof. Paper 74 of the U. S. Geol. Survey, which can be had free of charge from that bureau. The matter of clearly defining apex and extra-lateral rights, under the present Federal mining laws, is one of the greatest possible difficulty, and in the past had led to litigation costing millions of dollars, all of which ultimately had to be paid out of the profits from copper produced. In 1915 the mines now owned by the Anaconda were developed by 35.3 miles of new openings, of which 4,980' was shaft sinking.

The mine waters are highly charged with copper and precipitation tanks have been built at practically all of the big mines merged in the Anaconda. Old scrap iron, tin cans and wire rope are used as precipitating agents, these articles commanding a standard price of 1 ct. per pound. The flow of the water in the precipitation tanks and launders is much more rapid than is the case in the large Spanish lixiviation plants. The principal plant, at the Leonard mine, cost about \$20,000, and treats water from all of the Boston & Montana mines. It has a building for drying and shipping the copper precipitate.

The air compression plant at the Leonard mine has three 1,200-h. p. Nordberg air compressors, each with a capacity of 7,500 cu. ft. of free air per minute. A building 300' long, contains 25 receivers, each 10x30' on the ground, for the compressed air, this air-storage plant having reserve power for 8 hours. In connection with this plant is the largest steel water tank in the world, 100' in diameter.

Electric power, supplied by the Montana Power Co., is brought from Great Falls, 130 miles, and from Canyon Ferry, near Helena, 70 miles distant, current being wired to the mine with a primary voltage of 50,000

volts, reduced to 2,000 volts in a transformer station, just outside of Butte, power being distributed to the various workings from a main station at the Never Sweat mine, the current being used at 440 volts.

The Washoe Smelter: At present this plant can treat 16,000 tons of ore per day using 500 tons coke, 900 tons coal for reverberatory furnaces, 3,000 tons limestone flux and 260 tons for power and heating. 60 million gals. of water are used each day and 42,000 gals. per minute. 3,200 men are employed at a monthly wage of \$400,000 in and around the works.

The accompanying plate shows the course of the ore through the plant. From the storage bin the ore passes through an automatic sampler; thence to the concentrator plant of 2 great buildings, each housing 4 units comprising Black crushers, Harz jigs for coarse and Evans jigs for medium and fine concentrates, 4 sets of 55x24" rolls, 8 Wilfley tables using Butchart riffles, six 8' Anaconda classifiers, six 7½"x72" Hardinge mills, each with 225-h. p. motors and using steel linings and steel balls; 6 Dorr classifiers, 4 Mineral Separation flotation machines, each having 15 agitators and 14 spitzkasten with 150-h. p. motors.

No. 1 section differs from the other 7 in having Hancock instead of Evans jigs, and 8x12' tube mills using Forbes liners and pebbles.

The coarse concentrate goes to the blast furnace; the fine to settling tanks, the flotation concentrate to Dorr thickeners, 12x50', discharging 60% solids to Oliver filters.

The slime treatment is very fully described in the *Mining World*, Mar. 4, 1916, and in *Transactions of A. I. M. E.* for 1916.

There are 2 Roaster divisions, one having Evans-Klepetko type of McDougal roasters, each handling 215 tons per day of fine concentrate, fine limerock and first class screenings. A Ruggles Coles dryer prepares concentrate for the acid plant and for converter. Roaster No. 2 contains 28 Anaconda roasters, a modified Wedge-McDougal furnace and treats material from the Tank house and Oliver filter cake.

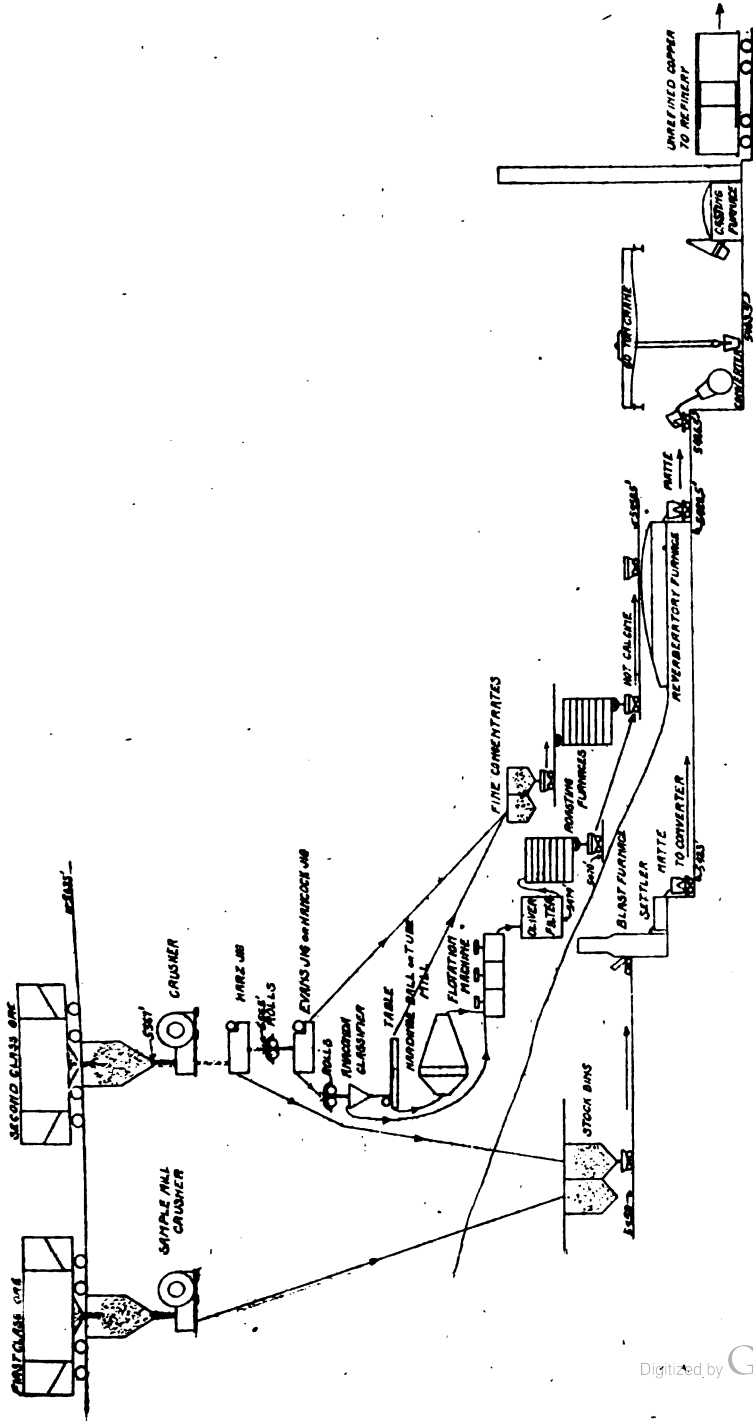
The reverberatory furnace plant is in 2 buildings, each with 4 furnaces and 5 boiler sets. Each furnace is 143x23' and handles 700 tons material per day when burning 100 tons coal in 24 hours. The coal previously ground in Raymond Bros. 5-roller pulverizer to 100 mesh, is blown into furnaces through Warford burners under 16 ounces pressure. Coal dust firing is much more efficient than grate firing and each furnace develops 6½ boiler h. p. per ton coal burned, hot gases passing through Sterling boilers. Furnaces are fed from top, banking concentrates against side walls. Slag flows off continuously instead of being intermittently skimmed and matte is tapped at intervals, running into 10-ton ladles trammed direct to converters.

The blast furnace building contains 2 51' furnaces, and one 87' long, each 56" wide at tuyeres. The latter handles 3,000 tons per day, the others 1,600.

Converter building contains 7 stands for Great Falls type converters. Latter are 20' diam., 17' high and weigh 450,000 lbs. with magnesite brick lining. The charge for each converter is 85 tons matte, 35 tons ore, blown to blister copper in one converter. Blister copper is poured into 2 casting furnaces, each of 140 tons capacity, with one in reserve. Air at 15 lbs. pressure oxidizes copper which is then skimmed and poled and poured into a casting machine. All handling of material is done by electricity.

The Sand leaching plant, 2,000 tons capacity, recovers the copper from sands of the old tailings dump. These sands are roasted in McDougal furnaces, cooled in a rotating drum, wetted to lay dust and conveyed to tanks 50' in diam. and 14' deep, each holding 1,050 tons, where it

ANACONDA COPPER



is leached by hot solution of salt and sulphuric acid and copper precipitated from solution by scrap iron.

The arsenic plant treats flue dust in Howell White rotary furnace, the dust-laden gas going to a Cottrell electrical treater for removal of dust, then cooled and condensed arsenic trioxide removed by a second Cottrell treatment, the fine powder being discharged by a screw conveyor into barrels.

A brick plant making 11,000 standard fire brick per day and another making 15,000 building brick from retreated tailings is one of the newer features of the works.

The reverberatory costs have been reduced from \$1.75 to \$1.25 per ton of ore by coal firing and other changes in practice, as compared with \$1.35 per ton of charge for the blast furnaces, but so much limestone has to be used in the blast furnaces charge that the cost, per ton of copper ore, is higher.

It has been found that leaching produces cleaner tailings than flotation, though other factors equalize the 2 processes, since for leaching the roasting costs are 25c-30c, excavating 14c, hauling 8c, and other costs 33c, a total of 80c per ton, using 65 lbs. of 60% acid for 9 lbs. copper.

Full descriptions of the new plant and the technical treatment have been published in the Trans. Am. Inst. M. E. and in Mining & Scientific Press, Feb. 26, 1916, and Mining World, Mch. 4, 1916.

The acid plant produces 150 tons a day of 60% acid, but a much bigger plant will be built in the next few years to supply acid for the zinc plant and other uses. In March, 1916, the leaching plant and zinc plant used 75% of the acid output, the balance being sold.

The changes in the Great Falls plant have been equally important. No ore is now received for concentration, but the refinery has been enlarged 50% and now turns out 620,000,000 lbs. of refined copper a year.

At the experimental 10-ton electrolytic zinc plant at Anaconda the company began late in 1915 to produce electrolytic spelter with such success that a new \$2,000,000 plant is now under construction at Great Falls, which will turn out 100 tons per day.

The Washoe smelter, where all the Anaconda ore is now concentrated and most of it smelted, is about 2 miles from Anaconda and 26 miles from Butte, all ore being hauled by electric power over the Butte, Anaconda & Pacific R. R., owned by the company. In 1914-15 the entire plant was remodelled, the capacity increased to 15,600 tons per day, leaching and flotation plants installed, an acid plant erected, a zinc plant put in operation and brick works built, the improvements costing, it is said, over \$6,000,000. The results are so remarkable as to be almost startling. The great items of saving of the remodelled plant comprise coal dust firing of reverberatory furnaces with greatly increased capacity (583 compared with 239 tons per day) with less slag loss; the abandonment of briquetting and blast furnace smelting in favor of the new reverberatory practice; the treatment of all ore in the Anaconda concentrator, instead of sending it to Great Falls; the introduction of flotation and the operation of the leaching plant. The saving has been increased from 75% to 96%, the tailings formerly carrying 0.62% copper now carry but 0.1% copper—that is, 2 lbs. of copper to the ton. The savings amount to 8.4 lbs. copper per ton, and paid the entire cost of reconstruction in the first half year of operation. This work has put the Anaconda company in the ranks of low cost producers and is a great triumph for its metallurgists.

ANACONDA GOLD MINING CO.

SOUTH DAKOTA

Address: Martin Brede, pres., Metropolitan Life Bldg., Minneapolis, Minn. A. E. Hale, supt.

Property: The Anaconda claim, in Roubaix district, near Deadwood, S. D., carries gold-quartz ore in a vein said to widen to 45' on 200' level.

Development: 300' shaft and crosscuts. **Equipment:** steam power and compressor. Work resumed 1914 after 2 years' idleness, owing to lack of working funds. Plans sinking 3-compartment shaft to depth of 1,000' and erection of mill on north end of property.

ANACONDA SKOOKUM COPPER GROUP. NEW MEXICO

Address: c/o E. H. Rodgers, 310 West Missouri St., El Paso, Texas. Owned by E. H. Rodgers, L. H. Davis and J. F. Dowling. **Lands:** 4 claims, unpatented, located at north end of the San Andres Mts., Socorro Co., New Mex., 26 miles west of Oscuro, on the E. P. & S. W. R. R. Claims are said to cover 6,000' of a quartz lode in granite, varying in width from 20' to 100', and to show disseminated copper sulphide ore, assaying 2½% copper, 1½ oz. silver and \$2 to \$3 gold per ton. **Development:** Opencuts and pits along the strike of the lode. Churn drilling and 100' tunnel are planned.

ANCHOR MINING CO. UTAH

Idle several years. **Office:** Calumet, Mich. Mine office: Myton, Wasatch Co., Utah. John D. Cuddihy, v. p.; F. W. Taylor, sec.-treas.; and Henry L. Baer, directors. Inc. June, 1908, in Michigan. **Cap.**, \$150,000, shares \$25 par; issued 1,800. Annual meeting, second Tuesday in June. **Lands:** 9 claims, patented, 131 acres; in the Snake Creek district, one-half mile south of Daly-Judge mine, near Park City. Company is the successor of the Wolverine Mining Co.

ANCHORIA COPPER MINING CO. WYOMING

Idle several years. **Office:** 55 High St., Oshkosh, Wis. Mine office: Copperton, Carbon Co., Wyo. Hon. David H. Craig, pres.; H. O. Granberg, sec.-treas. Inc. April, 1901, in Wyo. **Cap.**, \$1,000,000, shares \$1 par. **Lands:** 4 claims, 80 acres, patented, in the Battle Lake district, developed by a 200' shaft and tunnels of 45' and 60', showing an orebody estimated at 45' width, giving average assays of 17% copper, and from a trace to \$5 gold per ton. Has a 40-h. p. steam plant, with hoist good for 500', 3 power drills and 4 substantial mine buildings of logs.

ANCHORIA LELAND M. & M. CO. COLORADO

Address: Cripple Creek. Inc. about 22 years ago. **Cap.**, \$600,000; shares \$1 par. Irving Howbert, principal stockholder; Chas. Howbert, mgr.

Property: Anchoria mine on Gold Hill, Cripple Creek, is one of the old-time producers and dividend payers. In 1914 the company had a debt of \$30,000, due to attempts made in recent years to open up new orebodies. The mine has been worked down to the barren zone, reaching from a depth of 500' to 1,000', the lowest development. Recent work has been done by leasers. In 1915 company was planning to resume operations, sinking the shaft an additional 100', claiming there were large bodies of gold ore in the mine that could be worked profitably with modern methods.

ANDERSON-APACHE COPPER CO. NEW MEXICO

Robt. Anderson, El Paso, Tex., chief owner. **Mine address:** Hachita, Grant Co., N. M. Hon. Geo. H. Neale, pres.; Harry Duey, v. p.; Chas. H. Howe, sec.-treas.; Arthur Houle, cons. engr. Inc. June 1, 1907, in Arizona. **Cap.**, \$500,000, shares \$5. par. Held lands under a \$100,000 bond and lease, with \$20,000 paid.

Property: the Apache mine, 5 claims, 100 acres, 5 miles southeast of Hachita. Mine, opened 1883, was worked continuously until 1907, by leasers, producing approximately \$200,000. Property shows contact deposit 50'-150' wide between quartz-feldspar-hornblende-porphyr and Carboniferous limestone, with ore, oxidized to present depth, and running 4 to 30% copper

with one ounce silver to each unit of copper. Bornite ore occurs at the bottom of the shaft. **Development:** by a 360' shaft, for a length of 400' and along the surface for 600', said to show 200,000 tons of ore, with about 40,000 tons blocked out for stoping, which estimates are considered high. Equipment includes a 25-h. p. Fairbanks & Morse gasoline hoist. Shipments of low grade copper and silver ore with lime gangue were made in 1914 and 1915, to the El Paso smelter.

ANDERSON GROUP.**NEVADA**

Address: Luning, Esmeralda Co., Nev. **Property:** 5 claims, 4½ miles east of Luning and adjoining Nevada Champion Copper Co. ground. Development by tunnels and 120' shaft. Was under lease and bond to Mason Valley Mines Co., but bond relinquished.

ANDES COPPER CO.**CHILE**

Office: 42 Broadway, New York City. **Inc.** Jan. 20, 1916, in Delaware. **Cap.**, \$50,000,000, shares \$25 par. **Incorporators:** Herbert E. Latter and Norman P. Coffin, of Wilmington, Del., and C. M. Egner, Elkton, Md. Will acquire and develop mineral, timber and railroad lands in Potrerillas district, Chile. For officers and directors, see Andes Copper Mining Co.

ANDES COPPER MINING CO.**CHILE**

Office: 42 Broadway, New York City. **Inc.** Jan. 20, 1916, in Delaware. **Cap.**, \$50,000,000, shares \$25 par. **Incorporators,** Herbert E. Latter and Norman P. Coffin, Wilmington, Del., and C. M. Egner, Elkton, Md. **Officers:** B. B. Thayer, pres.; Wm. Braden, v. p.; C. F. Kelly, v. p.; A. H. Melin, treas.; with W. D. Thornton and Paul M. Herzog, directors; D. B. Hennessey, sec.

Property: A very large tract of ground at Potrerillas, Chile, held by the Anaconda Copper Co. under option in 1914-15, and drilled by that company. This work is reported to have shown the existence of a very large tonnage, over 50,000,000 tons, it is said, carrying 1.67% copper. The property is now being further developed and prepared for operation. Will acquire and develop mineral, timber and railroad lands in Chile (Potrerillas district).

ANDES SILVER MINING CO.**NEVADA**

381 Bush St., San Francisco, Calif., and Virginia City, Nev. **Officers:** H. Zadig, pres.; Wm. Bannan, v. p.; J. W. Twigg, sec.; Wells Fargo National Bank, treas.; Thos. F. McCormick, supt.; H. Zadig, F. R. Hadley, W. W. Turney, Wm. Bannan and A. F. Coffin, directors.

Inc. Dec. 18, 1873, in Cal. **Cap.**, authorized and outstanding Dec. 17, 1914, \$100,000; shares \$1 par. Registration Security Co., San Francisco, registrar. Annual meeting, third Tuesday in Dec. at San Francisco. Stock is listed on New York Curb and San Francisco Exchange. Gross receipts from assessments, for year ended Dec. 17, 1914, were \$5,997.

Property: In the Virginia mining district, Virginia City, Nev.

ANDY FITZ M. & M. CO.**CALIFORNIA**

Address: 1391 Fruitvale Ave., Oakland, Calif. Andrew Fitzgerald, supt.

Property: The Fruitvale mine, in the Allegheny district, near Downiesville, Sierra Co., carries a vein of gold quartz ore. Developed by tunnel.

Company refinanced 1914 and underground development work resumed. Plan construction of new surface plant.

ANGELICA MNG. & DEV. CO.**MONTANA**

Address: Wickes, Montana. **Officers:** C. d'Autremont, Jr., Duluth, Minn.; Geo. W. Wilson, v. p.; C. M. d'Autremont, sec.-treas.; preceding officers, T. T. Hudson, John D. Pope, directors; Geo. W. Wilson, mgr.; Chas. D. Horton, supt.

Inc. Jan., 1915, in Mont. Cap., \$200,000; shares \$10 par; nonassessable; outstanding Jan. 10, 1916, 14,320 shares.

Earnings: Gross income from ore sales in 1915 was \$47,278; operating expenses, \$60,421. Balance sheet for 1915 shows assets; property account, \$134,970; bills receivable, \$14,140; cash, \$612; development, \$41,067; ore breaking, \$10,942; liabilities; ore returns, \$22,639; bills payable, \$45,550.

Property: 6 claims, 110 acres, in Colorado mining district, 2 miles west of Wickes, Jefferson Co., show a contact vein in andesite and rhyolite, strike N. 80° W., dip 75° N. The ore, sulphides below the 400' level, contains lead, silver and gold occurring in shoots 100' to 200' long, with average width of 4½'. Average assay of shipping ore, \$13.80; concentrating ore, \$4 to \$12.

Development: 536' incline shaft, 1,830' tunnel and levels at 200', 300', 400' and 500'; total underground workings, 3,913'.

Equipment includes steam hoist, air compressor, capacity of 360 cu. ft. Work planned for 1916: connecting the tunnel and shaft, opening up and developing the 600', 700' and 800' levels, and construction of a 200-ton concentrating mill. Property has been examined and reported on by E. J. Collins, T. F. Field and Reno Sales.

ANGLO-NEWFOUNDLAND DEV. CO. NEWFOUNDLAND

Address: Grand Falls, Newfoundland. Mining properties transferred to Terra Nova Properties, Ltd., which see.

ANIMAS PEAK GOLD MNG. CO. NEW MEXICO

Property: at Hillsboro, Sierra Co., N. Mex., formerly owned by the defunct Hillsboro Cons. Mng. Co., of odious fame. Present management, in 1915, planned refinancing company and development along same lines in accordance with available funds. Work on 200' double compartment shaft started March, 1915. On the 200' level an oreshoot, 3' wide, is said to average \$35 per ton in gold.

ANITA COPPER MINES CO., S. A. MEXICO

Office: Fundicion, Sonora, Mex. Geo. M. Ryall, pres.; T. C. Kirkland, asst. gen. mgr. Organized 1904, under laws of Mexico, and now controlled by Pacific Smelting & Mining Co.

ANNA LEE MINING CO. MISSOURI

Inc. in Ariz. Cap., \$100,000. Operates on 120 acres of land of J. W. Allen in Newton Co., Mo. Has 7 shafts, average depth 100', and a 200-ton concentrator. Output is zinc concentrate.

ANNIE MINING CO. WYOMING

Mine office: Jelm, Albany Co., Wyo. L. A. Hancock, sec. **Inc. 1903 in Wyoming. Cap., \$250,000, shares \$1 par. Lands:** 100 acres, near Jelm, said to show two 4' contact veins between granite and schist, opened by a 140' shaft and a 138' tunnel, showing copper carbonates and bornite, assaying up to 20% copper and \$10 gold per ton. Idle since 1907, except for representation work performed each year.

ANTELOPE GROUP. NEVADA

Held by Louis W. Trankle, Yerington, Nev. Claims, 23, unpatented, 430 acres; in the Buckskin Range, Douglas Co., 16 miles from Yerington.

The ore bearing formation is a monzonite belt 4,200' wide, extending N. 7° W., dip 47° to east, for 1½ miles, with diorite on the west and andesite on the east. This monzonite is highly altered, showing strong kaolinization and sericitization to depth of 150 feet, deepest working. Surface shows scanty copper carbonates throughout length and breadth, with small streaks of copper sulphide ore near foot wall side. Water encountered in lower workings shows strong copper content.

The property is a promising prospect. Has been examined by L. A. Wright, V. A. Hart, E. R. Richards, Fred Alsdorf and W. H. Weed.
ANTELOPE & PRINCE OF WALES MINING CO. UTAH

Controlled by Walker Bros., of Salt Lake City. **Cap.**, 1,250,000, shares \$1 par; 400,000 shares held in treasury.

Property: 9 claims, patented, in the Alta-Cottonwood district, cover a mile of the Prince of Wales fissure, worked years ago to a depth of 900', said to have produced \$1,000,000 from one shoot alone, and was the "bone of contention" in a celebrated lawsuit in the seventies.

Development: 930' incline shaft and 600' "Annie" tunnel. In 1915 lessees continued the tunnel several hundred feet, cutting the vein 140' below bottom of shaft. Vein where cut is said to have shown good ore containing silver chloride and galena. Company, at last accounts, was planning to continue the work of the lessees.

ANTELOPE SPRING MINING CO. NEVADA

Office: 625 Dooly Bldg., Salt Lake City, Utah. Mine office: Jungo, Humboldt Co., Nev. Wm. H. Fitch, pres.; Gust Holm, v. p.; John W. Geiger, sec. and mgr.; Allen C. Eakin, treas.; preceding officers, Edith M. Brounzell, Fred Hubbard and E. R. Reitsch, directors. Inc. April 11, 1906, in Utah. **Cap.**, \$300,000, shares \$1 par, assessable; 200,000 issued; 8 assessments levied, amounting to 13 cts. per share.

Property: 17 claims, partly patented, 15 miles from Humboldt House, developed by several tunnels, longest 1,150' and a 95' shaft, with about 3,000' of workings, show argentiferous lead-zinc-copper ores, reported by management to average 2% copper, 13% lead, 12.9% zinc and 11 oz. silver per ton. Management estimates 10,000 tons of ore blocked out.

Shipments of crude ore in 1915 said to have averaged \$27.90 per ton. Gross earnings during past year from ore sales amounted to \$609, and about \$8,500 was expended on development work and erection of 25-ton wet concentrating plant.

ANTIMONY CORPORATION. MEXICO

Address: Room 1209, 71 Broadway, New York City. **Officers:** Chas. F. Rand, pres.; Jos. S. Fay and Olaf Wenstrom, v. p's; Chas. F. Smith, sec-treas.; preceding with Freeman Hinckley, Robt. A. Manning and Geo. Tyson, directors. Olaf Wenstrom, mine mgr.

Inc. Feb. 15, 1916, in Delaware. **Cap.**, \$1,000,000, shares \$5 par; 100,000 preferred; issued 10,000 preferred, 100,000 common, no bonds. Company organized to take over a remarkable deposit of jamesonite, a lead antimony ore, on one of the properties of the Cortez Associated Mines Co., in Zimapan, Mexico.

Property: 48 hectares, 120 acres patented, Zimapan, State of Hidalgo, Mex., shows a tabular replacement deposit 1,300' long in Cretaceous limestone, dipping 20° S. and exposed for 80,000 square feet, in a canyon wall.

Ore: Contains jamesonite, consisting of 50.8% lead and 29.5% antimony, and carrying silver. Nineteen samples aggregating 830' cut across the orebody, averaged 17.5% lead, 10.5% antimony and 1.25 oz. silver per ton. It is the most remarkable body of ore of this character ever found. The occurrence is fully described by W. Lindgren, and W. L. Whitehead, Econ. Geol., July, 1914, p. 435, and R. W. Raymond, E. & M. Journal, Jan. 2, 1915, p. 9.

Company plans to expend \$50,000 in 1916 in proving further tonnage available and in determining whether concentration or direct roasting and smelting is most profitable. Shipments of selected ore will also be made.

ANTIMONY-SILVER MINING CO. IDAHO

Address: Wallace, Ida. H. J. Rossi, Theo. Brown, John Fimmel,

directors. Inc. April, 1915. Cap., \$100,000, shares 10c par. Claims, on Pine Creek, are said to show silver-antimony ore in a vein 10 to 36" wide, exposed by tunnels and a shallow shaft. Management planning to develop the property in 1916.

ANTI-PERIODIC GROUP.**COLORADO**

Property, at Rain Gulch, Silverton, Colo. owned by Galena Mt. Gold & Silver Mng. Co., which see.

ANXIOUS SIX MNG. CO.**MISSOURI**

Address: Joplin, Mo. Company holds a lease on the Rex land, covering the site of the old Green Castle mine. Good zinc-lead ore is said to occur at 90' depth. Production started in a small way in Oct., 1915.

APACHE CONSOLIDATED COPPER CO.**ARIZONA**

Mine office: Globe, Gila Co., Ariz. Hon. John I. Mullins, pres.; F. S. Pfister, v. p. and gen. mgr.; Chas. T. Martin, sec.; E. M. Hurd, treas.; preceding officers and Joseph Pfister, directors; Frank Pfister, mine supt. Inc. May, 1906, in Arizona. Cap., \$2,000,000, shares \$1 par; issued \$1,200,000.

Lands: 15 claims, unpatented, area 300 acres, in the Richmond district, about 12 miles from Globe, showing fissure veins and contact deposits between limestone and quartzite, of which 1 vein, of about 5' width, is traceable about 1,200'. Mine has shafts of 65', 45' and 20', with 6 tunnels, longest 335', giving 719' of workings, showing about 400 tons of ore averaging about 3.5% copper, up to 15 oz. silver, and from a trace to \$2.50 gold per ton. Mine in hands of leasers at last accounts.

APACHE MINES.**ARIZONA**

See Morajeski Mines.

APEX CONSOLIDATED MINING CO.**UTAH**

Mine at Silver City, Juab Co., Utah. **Officers:** Jesse Knight, pres. and gen. mgr., Provo, Utah; Elmer B. Jones, v. p.; R. E. Allen, sec.; M. H. Walker, treas.; preceding officers, Lafayette Hanchett, W. Lester Manguam and Amanda M. Knight, directors. Inc. Oct., 1908, in Utah. Cap., \$1,000,000, shares \$1 par.

Lands: the Armandale group, carrying lead-silver ores, near the Grand Central mine, developed by a 3-compartment shaft of 2,200' depth. **Equipment:** includes a good hoist and air compressor.

APEX COPPER CO.**COLORADO**

Office: 304 Colorado Bldg., Colorado Springs, Colo. **Mine office:** Hayman Park Co., Colo. **Officers:** John K. Vanatta, pres.; J. J. O'Driscoll, v. p. and gen. mgr.; J. Vanatta, sec. Inc. March, 1903, in Ariz. Cap., \$2,000,000, shares \$1 par. **Lands:** 9 claims, 90 acres, on Apex hill, in the Lower Tarryall district, showing 2 nearly vertical contact veins of 3' average width, between spar and limestone, carrying chalcopryrite and bornite assaying 2 to 30% copper, 7 oz. silver and \$1.20 gold per ton, opened by shafts of 50', 120' and 250', and by 4 tunnels of 500' aggregate length. Has a 10-h. p. steam plant, with hoists, and a 7-drill Leyner air compressor.

APEX GROUP.**ARIZONA**

Controlled by S. O. Stewart, and Joe Lavell, Winkleman, Gila Co., Ariz. **Claims:** 7, unpatented, 5 miles north of Hayden, on top of the Dripping Springs Mts., adjoining the ground of London-Ariz. Cons. Co. on the north. Discovery was made in Jan., 1915. **Ore:** gold, silver and lead, occurs at contact of lime and shale, dipping 32° S. E. Shipments started in April, totaled \$4,800 at end of 1915, the ore shipped assaying about \$25 per ton.

APEX MINING CO.**WASHINGTON**

James P. Blaine, superintendent, Chesaw, Okanogan Co., Wash. **Property:** the Ben Harrison mine, showing fissure veins carrying gold-silver-

copper ores. Developed by a shaft with gasoline hoist. Mine intermittently operated.

APEX PORCUPINE MINES, LTD.**CANADA**

J. A. Jacobs, Traders Bank Bldg., Toronto, Can. Inc. 1911. Cap., \$2,000,000; shares \$1 par. Owns 80 acres in southern Tisdale Twp., Porcupine district, Ont., showing pyrite and free gold. Shaft 108'. Shut down 1912-15. Reopened March 16, 1915, with funds from stock sold at 15c.

APP MINE.**CALIFORNIA**

Owned by estate of T. W. Patterson, Fresno, Calif. Alex. Chalmers, agt., Angels, Calaveras Co., Cal. Under option to the Dutch-Sweeney Mining Co.

Property: 40 acres, including 2 mill sites, located 2 miles south of Jamestown, Tuolumne Co., on the northwest slope of Quartz Mt.

Ore: gold, in a 30' vein of dolomite and mariposite, containing stringers of quartz. Hanging-wall is a hard diorite; foot wall is Calaveras slate. Vein strikes N. 30° W., dips 65° N. E. Two orebodies were worked when the mine was formerly operated.

Development: 1,340' incline shaft, with levels at 100' intervals. **Equipment:** 250-h. p. double-drum hoist, Ingersoll-Rand compressor, electric power. **Mill:** 60-stamp, 1,000-lb. stamps, 2 Blake crushers, 24 Frue vanners. Mine was being reopened at last accounts by the Dutch-Sweeney Mining Co., which was planning on development from the 1,600' level of the adjoining Dutch mine. See M. and M. Res. of Tuolumne Co., pp. 136, State Mineralogist's Rep.

ARADOS COPPER CO.**MEXICO**

Address: 25 Broad St., New York. Clarence W. Hoyt, pres., 41 Donovan Bldg., Lowell.

Lands: about 2,000 acres were taken over 1910 from Chihuahua Copper Co., Quo Vadis Copper Co., and include a number of adjoining claims privately owned.

The Chihuahua group has several shallow shafts, and 9 tunnels with about 1,500' of workings, estimated by management to show several thousand tons of ore. **Equipment:** includes a 25-h. p. hoist, good for 500', and small Gardner air compressor and necessary mine buildings.

The Quo Vadis and other groups show numerous contact veins between limestone and porphyry, ranging from 2 to 40' in width, development work said to have yielded enough ore shipped to pay for machinery in use on these properties, ore averaging better than 5% copper.

Idle several years owing to political disturbances, but president writes that property will be vigorously and systematically developed as soon as conditions in Mexico warrant. Company is controlled by strong interests who are successful copper producers, and stock is privately held by a few people.

ARAPAHOE MINING & MILLING CO.**COLORADO**

Address: 218 Colorado Bldg., Denver, Colo. **Officers:** Thos. B. Everett, pres., treas. and gen'l mgr.; Chas. J. Jordan, v. p.; Harry A. Stewart, sec.; Will McLeod, mgr.

Inc. in Colorado. Cap., \$1,000,000, shares \$1 par; nonassessable. Treasury stock offered to the public at 3c a share in blocks of 300 shares with a bonus of 20% and guarantee of refund out of initial earnings.

Property: 4 mining claims near Idaho Springs, 2 mill sites and water rights in Wisconsin mining district, Gilpin Co., a contract with miners of Wisconsin district for daily supply of 50 tons of ore at \$3 per ton and a long lease on Rocky Mt. concentrating mill at Blackhawk, Gilpin Co. Rocky Mt. mill has daily capacity of 75 tons, fully equipped and reported in

operation June 15, 1914. Management will "take no chances in the mining business," but intends sub-leasing mining claims and doing only a custom-milling business with expected net earnings of \$150 per day, to be divided among the stockholders in return for their confidence in the management.

ARCANE MINING CO. NEVADA

Address: 1605 Walker Bank Bldg., Salt Lake City, Utah. Mine office: Pioche, Nev.

Officers: H. W. Rand, pres.; A. M. Cheney, v. p.; S. P. Kinney, sec-treas.; preceding officers, Frank Holman, Frank Manning, directors. H. E. Freudenthal, supt. **Cap.**, \$100,000, shares 10c par.

Property: five claims, adjoining the properties of the Ohio-Kentucky and Amal. Pioche at Pioche, through which the Susan Duster lode of the Ohio-Kentucky extends, with 45° dip to the south. The ore from the lode on the O. K. property is said to have had an average assay value per ton of 7% lead, 20% zinc, 20 oz. silver and \$2.50 in gold.

Development: 1,200' of underground work has been done. Company at present is sinking a vertical double-compartment shaft to the 650' level, at which depth it expects to cut the Susan Duster lode, 200' distant from the Arcane-O. K. line. The O. K. company is said to have followed the lode to the property line.

Equipment: power house, blacksmith shop, 40-h. p. gasoline engine and air compressor.

ARGENTA-DILLON MINING CO.

MONTANA

Idle. Property operated under lease by newly organized Beaverhead Copper Mining Co., which see.

ARGENTINE MINING CO.

NEVADA

Company inactive. Mines and mill optioned to Geo. Threlfall in 1914, together with the Diablo mine.

Property: Northern Belle and Holmes Mines, with mill and water rights and the Lucky Hill Mine (owned outright by Threlfall) in camp of Candelaria, Mineral Co., Nev., 9 miles from Redlich, on Tonopah & Goldfield R. R.

Ore: gold-silver. Country rock is lime with rhyolite intrusions; ore occurs as oxides in lenses as an alteration of lime and rhyolite, carrying chlorides and from 60c to \$1 in gold values. Vein system said to be 4,000' long and proven to cover entire ground.

Development: 60 miles of old workings, consisting of shafts, tunnels and crosscuts. **Ore reserves:** estimated after a resurvey and sampling, 400,000 tons in mines and ore dumps, besides 2,000' of unprospected mineralized ground on the Lucky Hill.

Equipment: 40-stamp mill and cyanide plant. Company plans erection of new 60-ton mill and aerial tramway for ore haulage.

ARGO MINES CO.

ARIZONA

Address: Oatman, Mohave Co., Ariz. **Officers:** S. S. Jones, pres. and gen. mgr.; J. M. Francis, v. p.; J. E. Shank, treas.; J. S. Withers, sec. Inc. in Ariz. **Cap.**, \$1,000,000, shares \$1 par; 600,000 shares held in treasury.

Property: 7 claims, 110 acres, in the Oatman district, show a vein 40' to 130' wide on surface, supposed to be a continuation of the Tom Reed vein. **Development:** a two-compartment shaft is being sunk to the 500' level.

Equipment: 25-h. p. gasoline hoist, and a 360 cu. ft. air compressor.

ARGO MG. DRAINAGE, TRANSP. & TUNNEL CO. COLORADO

Office: 79 Milk St., Boston, Mass. Mine office: Idaho Springs, Clear Creek Co., Colo. Chas. C. Parsons, pres.; H. W. Robinson, sec.; R. E. Schirmer, treas. and gen. mgr.; L. S. Stewart, supt. Inc. 1893 in Colorado

Cap., \$100,000. Is controlled, through ownership of entire stock issue, by Argo Mining & Tunnel Co., Ltd. **Property:** the Newhouse or Argo tunnel, described under title of Argo Mining & Tunnel Co. Balance sheet for fiscal year ending Aug. 31, 1915, shows net profit of \$1,112.92 over incurred expenses of \$40,545.71 as compared with a net profit of \$3,500 in 1914, the decrease being due to inactivity of several properties and subsequent slackening of transportation business.

ARGO MINING & TUNNEL CO.

COLORADO

Office: 79 Milk St., Boston, Mass. Mine office: Idaho Springs, Clear Creek Co., Colo. **Officers:** F. A. Schirmer, pres.; Chas. C. Parsons, v. p.; Chas. G. Schirmer, sec.-treas; with F. Hargreaves, H. W. Anderson, J. A. Caldwell and H. W. Davis, directors; R. E. Schirmer, mgr. **Inc.** 1909 in Delaware. **Cap.**, \$1,250,000, shares \$5 par; issued, \$952,335. Debentures, \$150,000 authorized; \$135,000 issued. Company succeeded Argo Transportation & Tunnel Co., Ltd., which succeeded Argo Tunnel & Mining Co., Ltd., which succeeded Newhouse Tunnel Co., Ltd. Owns the entire stock issue of Argo Mining, Drainage, Transportation & Tunnel Co., which holds direct title to the tunnel.

The Argo or Newhouse tunnel, 21,968' long, with nearly 20 miles of workings, is perhaps the most celebrated mining tunnel in existence. It starts at Idaho Springs and passes under Russell gulch and Quartz hill, with terminus in the Gunnell vein. The tunnel has double tracks, of 18" gauge, laid with 30-lb. rails. For the first 12,000' the tunnel is 9' high and 10' wide, balance being 8' high and 6' wide. Grade is 5" per 100'. The tunnel was begun Jan., 1894, and completed Nov. 18, 1910, and provides drainage, transportation, ventilation and air service for drilling operations.

The mines under which this tunnel passes are estimated to have produced about \$75,000,000 in metallic values, and the tunnel cuts sundry veins of ore carrying gold, silver, lead and copper, and several laterals have opened various orebodies of greater or less promise. The tunnel connects with the Concrete, Tremont, Prize, Burroughs, Kansas Golden Edge, Gem, Sun & Moon, Old Town, Poso, Saratoga and Gunnell shafts at depth of 1,600'. During 1915, 6,000' of rails were replaced and tunnel cars thoroughly overhauled. Equipment includes 5 locomotives, handling 53-ton cars each. Transportation charge for waste work through the tunnel is 17c per ton and on ores from 40c to \$1.25, according to values. Ore is turned over to the Argo Mill, whose charges are from \$3.50 up, including sampling and treatment.

ARGO MINING & TUNNEL CO., LTD.

BRITISH COLUMBIA

Office and mine: Greenwood, Yale district, B. C. Ole Lofstad, pres. and gen. mgr.; A. S. Black, sec.-treas.; preceding officers, John Williamson, Jerome McConnell and Oscar Hartman, directors. **Inc.** June 10, 1909, in British Columbia. **Cap.**, \$125,000, shares 25c par.

Lands: the Argo Mine, near the British Columbia smelter, developed by 1,150' tunnel, at a vertical depth of 500', with portal about 500' from track of the Canadian P. R. R. A vein of milling quartz, 10' wide, shows in face of tunnel, a 4' body of concentrating ore, on the foot-wall, talc. Property under development in 1915. Expect to make shipments to smelter in 1916. Four men employed.

ARGO REDUCTION & ORE PURCHASING CO.

COLORADO

Office: Idaho Springs, Clear Creek Co., Colo. J. Meyer, Jr., pres.; R. E. Schirmer, sec.-treas. and purch. agt.; preceding officers, F. A. Schirmer, C. G. Schirmer, directors. Otto Heizer, gen. mgr.; J. A. Pearce, mill supt. **Inc.** July, 1912, in Colorado. **Cap.**, \$150,000, shares \$10 par, fully paid and nonassessable; issued \$112,000.

Property: 2 acres mill site at the portal of the Newhouse, or Argo tunnel, on which a 500-ton mill has been erected to treat custom ores. Process consists of amalgamation, concentration and cyanidation of ores, all of which are purchased on their assay values from samples taken by the manager. Operations under former management from April to Nov., 1913, were unsuccessful, attaining extraction of only 59.8%. Radical alterations have increased extraction to over 90%, and installation of flotation process in Jan., 1916, insures further saving of values.

ARGONAUT CONS. MINING CO.

CALIFORNIA

Office: 43 Cedar St., New York City. Controls Argonaut Mining Co., and is itself controlled by the White Knob Copper & Development Co., owning a majority of its capital stock. **Officers:** John T. Smith, pres.; H. H. Carlisle, v. p.; M. M. Salomon, treas.; Arthur Kennedy, sec., New York. **Inc.** Jan. 5, 1907, in Maine. **Cap.**, \$2,000,000, par \$5; \$1,855,000 issued; \$1,200,000 owned by White Knob Copper Development Co. **Dividends** 30c, 1914; 10c Mch. 20 and June 20, 1915. Annual meeting, first Tuesday after June 1. Security Registrar & Transfer Co., tran. agt. and registrar.

ARGONAUT MINING CO.

CALIFORNIA

Address: 404 Humboldt Bank Bldg., San Francisco. Mine office: Jackson, Amador Co., Cal.

Officers: Jesse W. Lilienthal, S. F., pres.; R. S. Rainsford, mgr.; W. J. Nettle, mine supt.; Geo. W. Green, mill supt.

Inc. in 1893. **Cap.**, \$1,000,000, shares \$5 par; all issued. Is the operating company of the Argonaut Cons. Mng. Co., control of which is held by the White Knob Copper & Dev. Co., Ltd.

Dividends: to July, 1915, totaled \$1,740,000, yearly dividend \$1.20 per share. In May, 1915, had cash on hand \$220,615, and a surplus of \$254,000 in bonds, yielding 6% annually. Listed in San Francisco.

Property: one mile north of Jackson, on the Mother Lode; adjoins that of the Kennedy Extension Mng. Co. on the south.

Ore: soft shattered white gold quartz in a very regular and continuous vein 8 to 12' wide, with strike N. 10° W. Vein outcrops in a metabasite; above the 290' level it passes into the Mariposa slates, where, apparently, the fissure was originally opened by a thrust fault with a throw of 120'. One wall is a soft black slate, the other is slate or a greenstone schist. Two ore shoots have been developed; the north shoot 325' long, with average width of 10'; the south shoot 600' long, with average width of 10'. On the 1,240' level there is a split in the vein, a branch running off into the schist hanging wall. Ore yields in the mill about \$5.50 in free gold and \$1.50 in concentrates.

Development: shaft 4,650' deep, sunk at an angle of 60°, with levels at 150' intervals. At 290' level shaft cuts the vein in diabase, from the 1,460' level to present depth it is in the slate hanging wall. Present work is being done on the four lower levels. Ground is very heavy and the square-set mining method is used. Nearly half the force employed underground are timbermen. Ore is hoisted, in 4-ton skips, by a 500-h. p. double-drum electric hoist, automatically dumped into storage bins, then fed to a 10 by 16" Knight crusher and trammed in 2½-ton cars to the mill.

Mill: forty 1,000-lb. stamps, dropping 98 times per minute, with 7" drop, and crushing 5 tons per stamp through 20-mesh wire screen, with capacity of 200 tons daily. From the amalgamating plates pulp flows to 16 Frue vanners, tailing goes to hydraulic classifiers, overflow being concentrated on 20' Darrow rotary concentrator. An 83% extraction is made by amalgamation and concentration. Company employs 145 men.

Costs per ton are: total mining, \$2.80; total milling, \$0.55; office and general, \$0.09; making total operating cost of \$3.45. Net earnings: said to be over \$33,000 per month.

In June, 1909, the Kennedy Ext. Mng. Co. brought suit against the Argonaut Co., claiming the Argonaut ledge apexed on their land; decision was rendered in favor of the Argonaut Co. on June 29, 1914. This litigation cost the company \$113,000.

Management, in 1916, has started to sink the shaft to the 6,000' level, using an electric hoist on the 3,900' level for the work and to enlarge the mill, and will erect an Eastwood multiple arch dam for tailings storage.

ARICHISE COPPER CO.

ARIZONA

Address: C. M. Skinner, pres., 18 Broadway, New York City. Property in Arizona transferred to San Chez Copper Corporation 1916. Company will be wound up. See Vols. X and XI.

ARIO COPPER CO.

MEXICO

Idle owing to political disturbances in Mexico. Mine office: Ario de Rosales, Ario, Michoacan, Mex. Frederick Moser, pres.; Geo. H. Walsh, Jr., treas.; A. P. Stramler, supt. **Cap.**, \$2,000,000, shares \$10 par. Holds lands through Ario Copper Co., S. A. Inc. April 13, 1907, in Mexico. **Cap.**, 500,000 pesos.

Lands: 126 hectares, including the Flora, Roma, Bohemia, San Antonio and San Valentin mines, old properties showing silver and copper ores, about 5 miles from the Inguaran mines, on the projected line of the Morelia y Tacambaro railway, partly constructed. Principal development is on the Flora and Bohemia mines, with 7 shafts aggregating 500' depth, and 12 tunnels aggregating 2,600' length. La Roma has ore assaying up to 25% copper. Equipment includes steam and gasoline power.

Patzcuaro, 70 miles distant, is the nearest railway point.

ARIZONA BELMONT MINING CO.

ARIZONA

Office: Bullitt Bldg., Philadelphia, Pa. **Mine:** Silver Bell, Pima Co., Ariz. Meyer Schamberg, pres.; John Rice, treas.; with J. S. Harwood, N. S. Keith, W. P. O'Meara, G. D. Woodside and E. E. Young, directors. **Inc.** 1911 in Arizona. **Cap.**, \$1,000,000, shares \$1 par; issued 870,000. Treasurer reported \$192 on hand Dec. 31, 1913. Lands, 16 claims, adjoin the Imperial Copper Co. on the east and northeast and are developed by 392' shaft. Operations suspended in 1913 and company now reported considering acquisition of more promising property.

ARIZONA CALIFORNIA MNG. CO.

ARIZONA

Address: Prescott, Ariz. W. S. Wilhelm, pres.; G. W. Lavender, v. p.; H. G. Wilhelm, sec.-treas. **Inc.** April, 1915, in Ariz. **Cap.**, \$250,000, shares \$1 par; outstanding, \$100,000.

Property: 6 claims, 122 acres, patented, in the Hassayampa mining district, 6 miles south of Prescott, show a quartz vein containing gold, silver, zinc and lead ore.

Developed by the Shamrock and Ruth mines, latter having a 250' vertical shaft. **Equipment:** includes a 10-h. p. hoist and a 40-ton mill, with Huntington mill and Wilfley tables. Mill concentrates said to assay 36% zinc, 55% lead and 30 oz. silver.

ARIZONA-CELTIC COPPER CO.

ARIZONA

Office: 504 I. W. Hellman Bldg., Los Angeles, Cal. Mine office: Clifton, Greenlee Co., Ariz. B. F. Taylor, pres.; D. M. Lynch, v. p.; A. G. Shaw, sec.-treas.; preceding officers, R. T. O'Donnell, Archibald Morrison and G. M. Chartier, directors. **Inc.** Feb. 20, 1912, in Ariz. **Cap.**, \$3,000,000, shares \$5 par; issued 400,000.

Lands: 37 claims, area 768 acres, and a 1,040-acre mill and smelter site, in the Greenlee Gold Mountain district, showing 3 orebodies, 1 vein of 80' width, said to average 3% copper. Property, which was formerly owned by the Arizona Morenci Copper Co., is only slightly developed.

ARIZONA COMMERCIAL MINING CO.

ARIZONA

Offices: 50 Congress St., Boston, Mass., and 188 Middle St., Portland, Me. Mine at Globe, Gila Co., Ariz. **Officers:** Chas. S. Smith, pres.; Harry M. Stonemetz, v. p.; C. H. Altmiller, treas.; preceding officers, E. S. Goulston, G. T. Rice, Wm. M. Bradley, clerk, and Wm. E. Chandler, directors. Robert R. Boyd, supt. Inc. April 4, 1912, in Maine. **Cap.**, \$1,500,000, shares \$5 par, fully paid, nonassessable; issued 265,000. Annual meeting 2nd Wed. in April. Company is successor of the Arizona Commercial C. Co., bondholders of the old company receiving 70 shares of new stock for each \$500 bond held and the stockholders being privileged to subscribe, share for share, for fully-paid stock in the new company upon payment of \$3 per share. Accounts for year ending Dec. 31, 1915, showed cash and loans on hand \$127,235, securities and supplies \$66,414, accounts receivable \$97,131, drafts outstanding \$9,030, and accounts payable \$19,351. Net earnings were \$211,775 in 1915. Balance surplus, Dec., 1915, \$473,714.

Property: 11 claims, 3 fractional, in 2 groups, known as the Black Hawk and Copper Hill groups, separated by the Iron Cap mine of the Iron Cap Copper Co. Lands are at Copper Hill, 3 to 4 miles northeast of Globe, lying just north of the Old Dominion, and adjoining the United Globe and Superior & Boston mines. The property has fine outcrops, and workings have disclosed both oxidized and sulphide ore.

The Copper Hill group, 56 acres, carries the Old Dominion and Copper Hill veins for about 1,500'. **Development:** the 1,320' Copper Hill shaft. The lowest level, 14th, corresponds with the 14th level of the Old Dominion. The 12th level is connected with the O. D. 12th level by an 1,800' drift to the Grey mine. This drift is used for ventilation and drainage, water being pumped from the 14th to the 12th level of the Copper Hill shaft, where it runs to the Old Dominion and is there pumped to surface. About 720,000 gals. are handled daily. The Copper Hill vein has been developed to the 8th level and proved productive to the 7th.

Recent development has been on the Old Dominion vein on an ore shoot which has its apex near the 8th level. It has been drifted on for 614' on the 12th, 852' on the 13th and 384' on the 14th levels. Ore has been found east of the Budget fault, its effect being a vertical displacement of 150' and a lateral displacement of 20'. Where opened up the vein has an average width of 15'. **Ore:** a mixture of pyrite and chalcopyrite and contains 5% copper, 20% sulphur, 30% iron. Concentrating ore containing 4% copper is shipped to the Old Dominion. Smelting ore above 4% is shipped to the Copper Queen at Douglas, Ariz. In 1915 underground work amounted to 3,620'.

Equipment: at Copper Hill shaft includes a 72' steel headgear; a Wellman-Seaver-Morgan hoist, good for 1,500', driven by 175-h. p. Westinghouse motor; one 500-gal. Aldrich electric pump; one 20,000 cu. ft. Sturtevant fan; and 300-ton ore bins. Two 500-gal. pumps will be added to pump from 14th level to surface. Power is obtained at present from Old Dominion.

The Black Hawk group, area 97 acres, which carries the Black Hawk and Old Dominion ledges for about 3,000', has a surface capping of low-grade iron ore, above a 25 to 50' vein, leached to considerable depth, followed by silicious ore, estimated to average about 4% copper, with excess of

iron. There also is a hematite vein of 3 to 4' width giving assays of 4.5% copper, with small silver values.

Development: the 1,200' three-compartment Eureka shaft.

The Eureka mine was abandoned in 1911, but was reopened in July, 1915, and prospecting is being done on the 6th and 7th levels. This work produces a small tonnage of silicious ore averaging 8% copper. The lowest work is on the 10th level, which is now under water. No pumping is being done, as water is 160' below 7th level.

Equipment: at the shaft includes a 56' headframe and a Hendrie & Bolthoff single drum hoist, using steam power.

Buildings include a machine shop, warehouse, office, hospital and a number of miscellaneous buildings. A 20,000-gal. water tank affords high pressure for fire protection.

The 72x80' power house has two 700-h. p. Babcock & Wilcox boilers, a No. 10 Connorsville blower, Nordberg air compressor, 2 Nordberg engines and a 100-k. w. General Electric generator. Plant is now being remodeled; new equipment includes two 600-k. w. turbo generators. All power used will be generated at this plant, which will be connected with the Copper Hill mine by a 6" pipe line for compressed air and an electric transmission line.

Ore shipments from the Copper Hill shaft started in Feb., 1915. Monthly output, June, 1916, amounts to 1,500 tons concentrating ore and 3,000 tons smelting ore, yielding 500,000 lbs. copper. **Production:** in 1915 was 44,353 tons of ore, containing 3,592,274 lbs. copper, 16,511 oz. silver and 282 oz. gold. Company is earning \$70,000 monthly and has no debts; in short, it has "come back" and is making good.

ARIZONA CONSOLIDATED COPPER MINES, LTD. ARIZONA

Letters unclaimed by H. S. Blake, Throgmorton House, Copthall Ave., London, E. C., Eng. Mine office: Clifton, Graham Co., Ariz. Hon. H. A. Stanhope and Jas. H. Hosking, directors. Inc. June 17, 1899, in Great Britain. Cap., £150,000, shares £1 par; issued, £135,007 paid for property and £10,000 cash working capital. Last balance sheet Dec. 31, 1912, showed cash £7,023.

Property: in the Copper Mountain district, bought, 1909, from Continental Finance Syndicate, Ltd., for £135,000 in full-paid stock, is said by company to be the Scioto, Lowland and Chillicothe mines. The claims are said to show a vein that is 2½ to 8' and in places 30' wide, proven for 3,500'. Development by 3 adits; No. 1 in ore for 55'; No. 2, 110'; No. 3, 100'. Property includes a mill site, on the San Francisco river. Claims to own six copper mines, 120 acres adjacent to properties of the Arizona Copper Co. and of the Detroit Copper Co., near Morenci, Ariz.

ARIZONA COPPER CO., LTD. (THE) ARIZONA

Head office: 29 St. Andrew Square, Edinburgh, Scotland. **Board of Directors:** John Wilson (chairman), P. Dickson, G. Readman, W. A. Carter, Young J. Pentland, Alex. McNab, F. L. MacLeod and Lord Salvesen; Sec., William Exley Miller. Mine and works office: Clifton, Greenlee Co., Ariz. Norman Carmichael, gen. mgr.; P. B. Scotland, supt. of mines; J. G. Cooper, cashier and purch. agent.

Inc. August 5, 1884, in Great Britain. (For early financial details see Copper Handbook, Vol. XI, 1914, p. 72.)

Cap., authorized, £755,000; issued £703,984 10s as follows: 160,000 "A" preference shares of 5s each, all uncalled but £7,480 10s paid in advance of calls; £316,530 preference stock; £379,974 ordinary shares (1,519,896 shares of 5s each fully paid). Profits are divided thus: 10% cumulative dividends

on "A" preference shares less 5% interest on amount uncalled and unpaid; 7% cumulative dividends on preference stock; balance to ordinary shares.

Funded Debt: 5% terminable debentures. Amount authorized and fully subscribed £500,000, repayable at 103 May 15, 1922, or at any time after May 15, 1915. On September 30, 1914, £400,000 of these debentures had been issued. Fiscal year ends on September 30. Dividends on ordinary shares for recent years have been as follows: 2s 6d in 1908, 1909, 1910 and 1911; 3s 3d in 1912; 2s 9d in 1913; 1s 9d in 1914. Free profits were £231,411 in 1914. Balance carried forward September 30, 1914, £27,284.

Property: about 220 claims, 4,000 acres, including eight producing mines, each of which is a unit by itself. These are located at Morenci, Metcalf, Longfellow and Coronado, in Greenlee Co., Ariz. Ores as produced give average returns of about 2.2% copper, production being about 4% smelting ore and 96% concentrating ore. Mines with the exception of Coronado are, generally speaking, shallow, being developed to a depth of about 500 feet only, and are served by numerous shafts. Notwithstanding the comparatively shallow zone of ore occurrence, a large amount of ore is in sight.

During the year ending September 30, 1915, the company mined 968,566 tons of ore, yielding approximately 40 pounds of copper per ton of ore smelted.

The Humboldt mine, which is the principal producer, shows a large body of low grade disseminated chalcocite. Contiguous are the Yavapai, Clay and Petaluma mines, all connected, and with a main hoisting shaft at No. 6 concentrator at Morenci, where the ore is concentrated. The Longfellow mine of this group delivers its ore through chutes to a tunnel on the level of the Coronado Railroad, over which the ore is transported to the concentrator at Clifton.

The Coronado mine, two miles west of Metcalf, and at an elevation of 1,500' above it, is developed by a main shaft and adit tunnel 1,100' below the collar of the shaft. There are six main working levels. Both the Coronado and Humboldt group of mines are thoroughly equipped with underground electric transportation. On the short hauls, Jeffrey 6-ton electric locomotives and 5-ton cars are used, while on the long hauls 12-ton locomotives and 10-ton cars are used. In 1915 a new electric haulage road was completed connecting the 1,100' adit of the Coronado mine with the main electric haulage system in the Humboldt group, and the ore of the Coronado mine, which formerly was hoisted to the collar of the shaft and thence transported by incline and steam railroads to Clifton, now drops by gravity into ore pockets on the 1,100' level, from which it is conveyed by electric trains of 200-ton capacity over 4 miles of 20" gauge track, laid with 50-lb. steel, 3 miles of which is underground, to the concentrator at Morenci, a very large saving in transportation cost over the former method of handling.

The Metcalf group is situated seven miles from Clifton, with which it is connected by the Coronado Railroad, a 3' gauge line, owned and operated by the company, which follows the course of Chase Creek on heavy grade. These mines supply the bulk of the oxide ores, and are worked principally by open cut methods, the ore being leached with sulphuric acid, manufactured in the company's plant at Clifton.

The reduction works now consist of a concentrator of 3,000 tons daily capacity (now being increased to 4,000), situated at Morenci. This is a fine steel and concrete plant. The Callow system of oil flotation is being installed. The old concentrators at Clifton are being altered and will treat 500 tons per day of sulphide ore from the King mine at Metcalf. The new smelting plant, which was started up in the beginning of 1914, is situated

two miles below Clifton, on the east bank of the San Francisco River. This plant is entirely of steel and concrete and consists of a bedding plant for receiving and mixing of the ores, supplementary bins also being provided for fettling and for converter ores and fluxes, a roasting plant, consisting of 8 Herreshoff air-cooled roasters; a large test chamber, fitted with No. 10 wires, hanging 4" apart; 3 oil-fired reverberatory furnaces 22' in width by 100' long; 7 waste-heat boilers and 3 auxiliary boilers, all of the Stirling pattern, and with a combined capacity of 5,000-h. p.; 3 converter stands, with 4 converter shells of the Great Falls type, 12' in diameter. The power plant consists of two 10,000 units of 2,500-k. w. capacity each, General Electric turbo-generators which supply electric current for the plant and power for the mines; a transmission line 10 miles in length, carrying the current at 13,200 volts; the usual air compressors and auxiliary engines, making up a very efficient power plant. Well equipped machine shops, boiler shops and supply warehouse are provided.

Miscellaneous enterprises operated by the company include foundry, machine shop, saw-mill, a 30-ton ice plant and town lighting plant. The company also has general merchandise stores at Clifton, Morenci and Metcalf. Recent productions for fiscal years ending September 30 have been as follows: 1907, 27,404,349 lbs.; 1908, 33,980,291 lbs.; 1909, 32,017,487 lbs.; 1910, 32,161,205 lbs.; 1911, 34,569,019 lbs.; 1912, 38,150,000 lbs.; 1913, 34,230,000 lbs.; 1914, 38,942,455 lbs.; 1915, 37,416,010 lbs.

ARIZONA COPPER BELT MINING CO.

ARIZONA

Office: 25 Broad St., New York, N. Y. Mine office: Constellation, Yavapai Co., Ariz. **Officers:** Wm. J. Dilthey, pres.; H. F. E. Gamm, v. p.; J. C. Maugans, treas.; R. A. Camp, sec.; Samuel Bloom, directors; Charles F. Dilthey, supt. at the mines. Inc. Feb., 1906, in Arizona. **Cap.**, \$1,000,000, shares \$1 par; non-assessable; issued, \$680,508. No bonds.

Property: 17 claims, exclusive of water right and millsite, in two groups, known as the Texas Group and the Wren Group. The Wren Group consists of 4 claims and U. S. Government patent issued during the last year. The property is in Central Arizona, in the Black Rock District of Yavapai County, about 15 miles N. E. of Wickenburg, the nearest railroad station on the Santa Fé Railroad.

The two groups are 2 miles apart and work is mainly on the Texas Group, adjoining the Monte Cristo silver mines, some 2 miles nearer the railroad. The working shaft is about 300' deep, with cross-cutting and drifting at that depth. The ore carries copper, with gold and silver. It was deemed advisable by the management to continue sinking the working shaft during the past year. The Company has a well-established camp on the grounds, 15-h. p. gasoline engine, machine shop and camp buildings.

ARIZONA COPPERFIELDS, INC.

ARIZONA

Officers: Wm. B. Ridgely, pres., 40 Exchange Place, New York; Geo. Z. Medalie, v. p.; R. W. Gnekow, sec. Inc. 1916 in Delaware. **Cap.**, \$5,000,000, shares \$1 par. Company took over more than 89% of the capital stock of the Copperfield Porphyry Copper Mining Co., Inc., which see. Also reported to have acquired 13 adjoining claims in the Wallapai mining district, Mohave Co., Ariz. Is a George Graham Rice promotion; 300,000 shares of stock were offered, at 25c per share, July, 1916.

ARIZONA COPPER-GOLD MINES CO.

ARIZONA

Office: 1011 Pabst Bldg., Milwaukee, Wis. Mine office: Cherry, Yavapai Co., Ariz. R. H. Burmister, pres. and gen. mgr. Inc. Oct. 12, 1903, in Arizona. **Cap.**, \$1,000,000, as Arizona Gold Lode Mines Co., and reorganized, April 10, 1906, under present title. **Cap.**, \$1,500,000, shares \$1 par. Company thrown into receivership and property acquired February, 1914,

by bondholders, who plan reorganization and continuation of development work.

Lands: 17 claims, 340 acres, in the Cherry Creek district, 15 miles north-east of Humboldt, including the Bugler group of 4 claims. Development includes several short tunnels, and the Leghorn shaft of 600' depth, with about 3,500' of workings, on a 2' fissure vein. The ore apparently averages about 2% copper, with gold values.

Equipment: includes a 40-h. p. hoist, good for 1,000' depth, and a 3-drill air compressor. A 40-ton mill, at the Leghorn shaft, has a 10' Lane slow-speed Chilean mill. For early history see Vol. XI, Copper Handbook.

ARIZONA COPPER MINING CO. ARIZONA

Office: Tucson, Ariz. John N. Mettler, pres.; Jos. Brunner, v. p.; V. Brunner, sec.-treas.; with Leo J. Wachs, directors. Inc. Aug. 1, 1901, in Arizona. Cap., \$1,000,000, shares \$1 par; 171,000 shares outstanding, Jan., 1916.

Property: 25 claims, about 500 acres, 16 miles W. of Tucson, in Amole mining district, Pima Co., Arizona. Developed by 100' tunnel and 300' shaft, said to show a vein carrying 2% copper. Ore occurs in porphyry and limestone and carries much iron. **Equipment:** includes hoist, engine and several buildings. Company doing development work 1916 and plans installing air compressor with proceeds from stock sales.

ARIZONA COPPER SHIPPING MINES CO. ARIZONA

P. O. Box 592, El Paso, Tex. Mine office: Dragoon, Cochise Co., Ariz. E. E. Wiseman, pres.; C. E. Cummings, v. p.; C. F. Elliott, sec.-treas. Inc. 1910. Cap., \$1,000,000, shares \$10 par; issued \$620,000.

Property: 8 patented claims, 160 acres, 2 miles N. E. of Dragoon. The property shows limestone crossed by numerous veins, averaging 2 to 12' width, said to carry 4 to 7% copper, 1 to 6 oz. silver and a trace of gold. **Development:** by several pits and shallow shafts, deepest 130', with about 600' of workings. Property considered promising. Idle.

ARIZONA-EASTERN MINING CO. ARIZONA

Address: 220 Fifth Ave., New York. Mine office, Kingman, Ariz. **Officers:** Wm. Schuette, pres.; A. V. Brodrick, v. p.; Lewis Lusk, sec.-treas.; preceding officers and S. W. Odell, directors.

Inc. July 9, 1915, in Ariz. Cap., \$1,500,000, shares \$1 par; issued \$600,000. Bonds authorized \$100,000, none issued.

Property: 23 claims, 1 patented, 375 acres, 2 miles east of Hancock siding, on main line of Santa Fé R. R. and 10 miles south of Kingman, Ariz., includes the Red Hill and Fay mines, showing gold quartz fissure veins in granite porphyry. The mine was worked years ago by Mexicans. Mill tests on sorted ore said to show average value of \$11.78 gold per ton, with a 93% recovery in cyanide plant.

Development: 200' incline shaft with 400' of underground workings. **Equipment:** Includes gasoline hoist and a 5-ton stamp mill for testing purposes. Company plans developing the mine and building a 25-ton mill and cyanide plant in 1916.

ARIZONA EMPIRE COPPER MINES CO. ARIZONA

Mine office: Parker, Yuma Co., Ariz. W. A. Moses, pres.; Gen. E. Bouton, v. p.; L. H. Knowlter, sec.; Newton Evans, treas.; preceding officers and F. X. Pfaffinger, directors; Jas. H. Watson, gen. mgr. Inc. Aug., 1909. Cap., \$5,000,000, shares \$5 par.

Property: bought of Carnation Mining Co. 41 contiguous claims, 820 acres, about 10 miles north of Parker and 3 miles from Eagle Landing, on the Colorado river, include the Eagle, Carnation, Belcher and Cyclone groups. Company also has 160 acres of ranch lands on the Colorado river,

including Eagle landing, held for a smelter site. Geological conditions are markedly similar to those at the Planet and Clara mines. The property, as a whole, has about 6,000' of workings, deepest 300', showing a large amount of copper carbonate, with sulphide zone not yet reached. On the 200' level of the Carnation shaft is an orebody said to assay 5% copper and \$5 gold per ton, carrying a 10' paystreak estimated to average 10% copper and \$6 gold per ton.

Surface showing is interesting, but development work is disappointing. Shallow excavations show irregular areas, often 50' wide, well stained with copper carbonate; much of it could be shipped. This green carbonate ore has been carefully piled and makes beautiful patches of color on the desert scenery. Development usually reveals a sheared zone, copper-stained, but only a few feet wide. Throughout this region there are occasionally encountered pockets of rich gold ore with the copper. These seem to be lenses interbedded in the schist, and while one or two important orebodies have been found in the region, no mines of importance have been developed. Company inactive and mines reported taken over by a Los Angeles syndicate in 1914.

ARIZONA GOLD & COPPER MINING CO.

ARIZONA

Clerk's office: Burlington, Vt. Mine office: Gleeson, Cochise Co., Ariz. L. V. Hastings, v. p.; Hamilton S. Peck, sec. Inc., July 28, 1911, in Vermont. Cap., \$100,000, shares \$5 par, as successor of the Vermont & Arizona Copper Co.

Property: 11 claims,, 220 acres, 4 miles from Gleeson, in the Turquoise district, on the western slope of the Dragoon mountains, show 2 gold and silver veins and several copper veins, giving average assays of \$6 gold and 3% copper per ton. Development: a 230' main shaft and 2 tunnels, longest 125'. Company claims to have developed a large body of low-grade milling ore. Equipment: includes steam power and 12-h. p. hoist. Property idle owing to lack of funds.

ARIZONA GOLD STAR MINING CO.

ARIZONA

Office: 347 Title Insurance Bldg., Los Angeles, Cal. R. Mansard, pres.; R. H. Sayers, v. p.; M. M. Mill, sec.-treas. Cap., \$100,000, shares 10c par; issued \$50,000.

Property: owns the Valkyrie and La Paz claims, 40 acres, 2 miles west of the Gold Road mine, in the Tom Reed-Gold Road mining district, Mohave Co., Ariz. Developed by 100' shaft, to be sunk to 400' depth. Equipped with hoist and compressor.

ARIZONA-HANCOCK COPPER CO.

ARIZONA

Idle several years. Office: Hancock, Mich. Mine office: Florence, Pinal Co., Ariz. Officers: John D. Cuddihy, pres.; Alfred C. Sieboth, v. p.; Henry L. Baer, sec.-treas.; preceding officers, C. D. Hanchette, F. C. Mayworm and Philip Carroll, directors. Inc. in Arizona, as successor to Arizona-Hancock Consolidated Mining Co. Property: 4 claims, patented, 2 miles south of Superior, showing a vein traversing 2 claims, parallel to the vein of the Lake Superior & Arizona, with diabase footwall and limestone hanging, opened by a short tunnel and a winze of 55', with drifts on 2 levels, showing lead above and copper below.

ARIZONA HERCULES COPPER CO.

ARIZONA

Stock control passed to Ray Hercules Mining Co., which see.

ARIZONA-IDAHO COPPER EXTRACTION CO. PENNSYLVANIA

Office: 915 Union Bank Bldg., Pittsburg, Penn. Wm. C. Hagan, pres.; Jas. E. Barnes, v. p.; John Bright, sec.; Ernest H. Browne, treas.; Wm. C. Greenwalt, mgr. Inc. about 1908. Cap., \$500,000; shares \$1 par; non-assessable; 429,000 shares outstanding.

Owens no mines; property is a copper extraction process which the company claimed would produce copper at from 4 to 6 cts. per pound. Company was offering 50,000 shares at 50 cts. per share, to raise cash required to enlarge the demonstrating plant at Denver, at last accounts.

ARIZONA MERGER GOLD & COPPER CO. ARIZONA

Idle. Mine near Mayer, Yavapai Co., Ariz. H. C. Hillwell, S. L. Heron, Henry Reefson, Alonzo Hall, Robert M. Bazel and Geo. D. Birch, directors, at last accounts. Inc. 1909, in Arizona, as a reorganization of the Lyon Copper Co. Cap., \$5,000,000; shares \$1 par. Property: 64 claims near Mayer, Yavapai Co., Ariz., show fissure veins developed by a number of tunnels and crosscuts with 250' shaft. Property considered worthy of development.

ARIZONA & MICHIGAN DEVELOPMENT CO. ARIZONA

Office: Benson, Ariz. Mine office: Johnson, Cochise Co., Ariz. A. J. Pidgeon, of San Diego, Cal., pres. and gen. mgr.; P. N. Lindley, sec.; J. T. Tong, mgr. Inc. 1904, in Arizona. Cap., \$2,500,000; shares \$5 par.

Property: 7 claims, patented, 140 acres, showing porphyry and limestone. Claims said to carry 4 orebodies, 1 opened by vertical and incline shafts and tunnels, showing a 5' vein with poorly defined walls and impregnations in the limestone hanging and porphyry footwall. Has a 450' two-compartment main shaft with 24 openings showing cuprite, malachite and copper sulphides said to give average assays up to 12% copper, 18 oz. silver and \$1 gold per ton. Has a 60-h. p. gasoline engine with double-drum hoist, and has shipped a little good ore to El Paso smelter. Company owns a short railroad connecting with the Southern Pacific railway at Dragoon. Reported, July, 1916, to be shipping one car 4½% ore daily.

ARIZONA MINING & TRADING CO. MEXICO

Idle. Office: Douglas, Ariz. Mine near Nacozari, Sonora, Mex. E. O. Wolf, gen. mgr.; H. C. Holbrook, mine supt. Inc. 1906. Property: in 2 groups, 8 miles and 16 miles S. E. of Nacozari, former known as Los Angeles mine, having a 75' shaft showing chalcopyrite of good grade. A carload of ore shipped to the Copper Queen smelter gave returns of 12.5% copper and 46 oz. silver per ton. Has a concentrator.

ARIZONA NATIONAL COPPER CO. ARIZONA

Idle. 327 Pine St., Williamsport, Pa. Thos. M. B. Hicks, pres. and treas.; C. S. Messerly, sec.; LeRoy Scholl, gen. supt. Inc. Feb. 1, 1906, in Arizona. Cap., \$3,000,000; shares \$10 par. Bonds \$300,000, at 5%.

Property: 14 claims, also a 15-acre mill site and 100 acres timber lands, formerly known as the McNelly-Crowley property, on Pinto creek, carrying contact veins between schist and granite, said to average 14' in width and traced 785', showing considerable high-grade oxidized ores, including chrysocolla and native copper, with some chalcopyrite and occasional bornite. The 80' ledge of decomposed schist is slightly impregnated with copper sulphides. Development: by shafts and tunnels, with a total of 2,000' of workings. Has steam power. No recent returns secured.

ARIZONA SMELTING CO. ARIZONA

Office: 15 Broad St., New York. Works office: Humboldt, Yavapai Co., Ariz. Inc. Feb., 1905, in New Jersey. Cap., \$150,000, presumably increased later. Is controlled, through ownership of entire stock issue, by Consolidated Arizona Smelting Co. Bonds, \$180,000, at 5%. Annual meeting, first Monday in December. Property is described under title of Consolidated Arizona Smelting Co.

ARIZONA-SOUTHWESTERN COPPER CO. ARIZONA

Mine office: Yucca, Mohave Co., Ariz. Officers: R. H. Weber, pres.;

sec.; C. Hoffman, treas.; preceding officers, W. G. Laidley, T. A. McNeal, C. L. Davidson, E. B. Schermerhorn and John T. Switzer, directors; John Lefler, mine supt. **Inc.** 1907, in Arizona. **Cap.**, \$4,000,000; shares \$1 par, non-assessable; issued 3,300,000. Authorized bond issue \$150,000; \$107,000 outstanding. Annual meeting held in Kingman, Ariz., in April.

Property: 14 claims, 9 patented, 276 acres, including the Pittsburgh mine, in Crow canyon, Cedar Valley district, Hualapai mountains, 25 miles from Yucca, the nearest rail point. Mine has 2 orebodies under development, estimated by company to average 30' in width and to be traceable 2 miles, opened by tunnels of 500' and 682', and shafts 400' and 300' connected on the 200' level, with about 5,000' of workings. Mine, which is quite wet, shows chalcopyrite, galena and sphalerite, estimated by company to average 0.25% copper, 3% lead, 4% zinc, 10 oz. silver and \$1 gold per ton, which seems too high for a large orebody of this type. Company claims 100,000 tons of \$12 ore blocked out for stoping on the 200' level.

Equipment: includes an 85-h. p. electric hoist, steel headframe, a 12-drill Ingersoll-Rand air compressor, smithy and 300-ton concentrator, with 14 Overstrom tables. Company has been idle for some time, but started operating late in 1915. Plans to continue shaft sinking and do development work on the 400' level.

ARIZONA SUCCESS MINING CO.

ARIZONA & NEVADA

Idle and probably dead. See Volume XI. Not favorably regarded.

ARIZONA TELLURIUM MINES CO.

ARIZONA

Kingman, Ariz. **Officers:** Thos. H. Condon, Parker, Ind., pres.; W. L. McKay, Kingman, v. p. and gen. mgr.; Geo. A. Shea, sec.-treas.; preceding officers, Carl Bertschinger, W. C. Pedlar, directors. **Property:** claims in the Maynard district, 15 miles east of Kingman. **Development:** 200' tunnel and a shaft which is being sunk to the 300' level.

ARIZONA TOM REED GOLD MINES CO.

ARIZONA

Oatman, Mohave Co., Ariz. **Officers:** Geo. F. Moser, pres.; Chas. S. Seelye, v. p.; C. L. Moser, sec.-treas.; Geo. F. Moser, gen. mgr. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; issued \$500,000.

Property: owns the Trio and Lilah claims, 29 acres, patented and has a 2-years lease and bond on the Snowball group, 90 acres, all adjoining the property of Oatman Pioneer Gold Mines, Inc., on the north. Main ledge of the Pioneer supposed to continue into company's claims.

Development: by several shafts 10' to 100' in depth and on the 400' level by a crosscut from the Oatman Pioneer. Company plans sinking a shaft on the Snowball group. Corporation reported to be backed by W. P. O'Meara, of the Arizona Belmont.

ARIZONA UNITED MINING CO.

ARIZONA

Office: Pennsylvania Bldg., Philadelphia, Pa. Mine office: Johnson, Cochise Co., Ariz. **Officers:** Alfred S. Miller, pres.; Alfred C. Harmer, v. p. and sec.; David H. Ross, treas.; preceding officers, Stanley L. Conklin, John K. Kane, Wm. M. Houston, Alfred H. Miller, J. Wesley Allison, Chas. B. Cox, John Gleeson and Robt. Mackay, directors; J. M. Libbey, mgr.; F. H. Minard, cons. engr. **Inc.** Aug. 12, 1910, in Arizona, as successor to Arizona United Mining Co. of Delaware. **Cap.**, \$5,000,000; shares \$1 par; nonassessable. Company is a close corporation.

Property: 45 claims, 30 patented, about 1,000 acres, 7 miles N. E. of Dragoon, in the Johnson mining camp. Land includes the Mammoth, Republic, Copper King and Southern group of claims. Principal development is on the Republic claim, opened by an 820' shaft, with about 6,000' of workings, in ore averaging about 5% copper.

The Mammoth mine has a 350' shaft, with about 3,000' of workings, in argentiferous and auriferous copper ore, giving average values of about 8% copper, selected ores shipped to the smelter running as high as 40% copper.

Equipment: includes power plant, with hoists at the Republic and Mammoth mines, an electric plant, 4 Ingersoll-Temple electric drills and Ingersoll air compressor. Transportation is by a standard-gauge railway from Johnson to Dragoon, connecting with the Southern Pacific railway.

Property under lease to the Cobriza Mines Development Corporation since Jan., 1915. Idle for several months in 1915 due to low price of copper, resumed operations and was producing 4,500 tons per month until May, 1916, when production was increased to 6,500 tons. Ore runs about 4½% copper with minor values in silver and zinc.

ARIZONA VENTURE CORPORATION

ARIZONA

W. D. Grannis, mgr., Kingman, Mohave Co., Ariz. Cap., \$500,000, increased to \$1,000,000 in 1915; shares \$1 par. **Property:** 5 groups of 12 claims, about 240 acres, includes the Great Republic mine, near Kingman, formerly a silver producer and on which recent development work has shown copper ore. Mine is near the old Diamond Joe mine and is being developed. Company plans erecting a mill. **Equipment:** includes hoist, air compressor, drills and electric power plant.

Company also owns the Waldron group at Deluge, Wash., and reports cutting a lead-bearing vein on the 100' level while sinking a new shaft to 400' level. According to the mining press, this company has been sending out a report by their expert who describes the mine as opened by a tunnel 150' long with a maximum depth of 120' showing 5' of \$38.48 ore. The expert says, "Cut this to one-half and there is a handsome average value left to pay handsome profits," and remarks that "by extending the tunnel about 80' further there should be encountered . . . a tremendous body, or chamber, of ore, of unusual thickness, fully 20' wide." As our contemporary remarks, an expert who is able to see into the ground to this extent possesses a valuable gift, even if he assists himself with a Spanish needle, a goldometer or just a plain dowsing rod. In 1915 management announced production of "lenzite" in commercial quantity, used for wireless telegraphy, in crystals valued at from \$4 to \$65 each.

ARIZOTA MINING CO.

ARIZONA

Mine office: Wenden, Yuma Co., Ariz. Seth Bullock, pres., Deadwood, S. D. Inc. May, 1912. **Property:** 59 claims, 1,180 acres, in the Harcuvar mountains, 11 miles north of Wenden, is developed by a 125' shaft, showing gold-copper ore.

ARK GROUP MINING & MILLING CO., LTD.

WASHINGTON

Presumably idle. **Office:** 616½ Market St., Hillyard, Spokane Co., Wash. J. J. Budd, pres. and gen. mgr.; D. E. Grobe, v. p.; O. L. Budd, sec.-treas.; preceding officers, H. Karlsten and Mary Kneeland, directors. Cap., \$250,000; shares 25 cts. par, 20 cts. paid, 5 cts. assessable; issued 437,595; assessments to date \$3,000. Annual meeting Oct. 1.

Property: 12 claims, partly patented, in the Kootenai district, British Columbia, and Kettle Falls district, Stevens Co., Wash. Ore occurs in contact between granite and lime with S. W. strike and dip of 45°. Vein reported to be from 2 to 60' wide, traceable for three-fourths of a mile and proven to depth of 150' and carries 10 to 20% copper with good silver values.

Developed by 3 shafts and 3 tunnels, longest being 500'. Equipped with steam power, 1 air compressor and 2 air drills. No recent returns secured.

ARKANSAS & ARIZONA COPPER CO.**ARIZONA**

Office and mine: Jerome, Yavapai Co., Ariz. Wm: R. Tucker, pres.; C. W. Clark, v. p.; J. E. Leeper, mgr., Jerome, Ariz.; Col. H. S. Spivey, sec.-treas., Little Rock, Ark.; preceding officers, Judge J. B. Jones, P. H. Reubel and Hon. J. T. Robertson, directors; James Rice, supt. **Inc.** Jan. 25, 1906, in Arizona. **Cap.**, \$1,500,000; increased Jan., 1912, to \$3,000,000; shares \$1 par. Company refinanced in 1915 and bond issue of \$150,000 authorized for further development work.

Property: the Royal Irish group, 14 claims, 280 acres in the Verde district. Claims show feldspar porphyry and diorite cut by olivine basalt dikes running north and south and dipping 60° to the east. Orebodies lie on each side of the basalt in the porphyry and quartz schist. Orebody said to be 85' wide where encountered on 1,400' level and shows chalcocopyrite and some bornite. Extent of shoot not yet determined.

Development: by 1,648' shaft with 5,750' total workings of mine. Management plans development of orebody on 1,400' level and sinking shaft to 2,000' depth. **Equipment:** includes three 150-h. p. boilers, 1 hoist good for 2,000', air compressors, machine shop, power house, etc. Company is preparing to build a mile of road to connect with United Verde Copper Co. railroad. Employs 50 men.

ARKANSAS COPPER CO.**MONTANA**

Mine, on Ten Mile creek, near Helena, Mont., and about 2 miles west of the summit of Mount Helena, is developed by a 200' shaft. Property shows a 30' vein in diorite, traceable 800', assaying well in copper, with small gold and silver values. Was in hands of lessees early 1915, but now inactive.

ARLINGTON MINING CO.**MONTANA**

Idle. **Office:** Wallace, Idaho. Mine near Thompson, Sanders Co., Mont. Cyrus W. Gossert, pres.; Chas. T. Fisher, sec. **Cap.**, \$1,500,000; shares \$1 par.

Land: 20 claims, well timbered, in the Mountain House (unorganized) mining district, near the Idaho-Montana divide. Property shows a ledge said to be traced 6,000' by surface cuts, 30 to 100' in claimed width, carrying, at shallow depth, galena of concentrating grade, with some ore assaying up to 78% lead. The 175' upper tunnel is said to show 3' of good concentrating galena, and the 900' lower crosscut tunnel shows a 10" stringer assaying 8% copper, 15% lead and 15 oz. silver per ton. No recent returns secured.

ARMENDAIZ-SUCESORES; FRANCISCO**MEXICO**

Office: Apartado 37, Monterey, N. L., Mex. Mine office: Cerralvo, Nuevo Leon, Mex. Francisco Armendaiz, mgr. **Property:** includes the Refugio, Barredon and Purisima mines, carrying slightly argentiferous lead ores, which are properties of merit, and the Colorado mine, carrying up to 3% in copper tenor. Mines, which have been small but fairly steady producers of silver lead ores, with a little copper, are under lease to other interests.

ARMINIUS CHEMICAL CO., INC.**VIRGINIA**

Office: 44 Pine St., New York. **Cap.**, \$10,000. Frederic Kernochan, pres.; A. Neustaedter, mgr., Mineral, Louisa Co., Va. **Property:** shows a large lens of pyrite in ancient schistose rocks, worked for iron pyrite. Mine worked by shafts. Equipped with steam hoists, Ingersoll compressors and output is concentrated in a 350-ton mill.

ARNOLD MINING CO.**MEXICO**

Office: Nogales, Ariz. Mine office: Santa Cruz, Sonora, Mex. E. D. Arnold, pres.; A. O. Koppes, mgr. **Property:** the Del Pilar mine, about 35

miles N. W. of Cananea, developed by a 400' shaft, showing ore said to carry 10% copper. Employs about 25 men. Property was reported sold to the Manhattan Development Co., for \$88,000, May, 1913. No recent information obtainable.

ARNOLD MINING CO.**MICHIGAN**

Idle. Office: 62 Devonshire St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. John C. Watson, pres.; John Brooks, sec.-treas.; Capt. Wesley Clark, supt.; preceding officers, Chas. H. Weston and W. H. Currier, directors. Annual meeting, second Tuesday in May. Inc. 1864, in Michigan. Cap., \$2,500,000; shares \$25 par; issued, \$1,550,000.

Lands: 3,323 acres, in T. 58 N., R. 31 W., in 2 tracts, including the Old Copper Falls mine and the Arnold mine proper, with frontage of about 3 miles on Lake Superior. The Copper Falls mine, worked 1850, until Aug., 1893, made 25,686,429 lbs. fine copper, mainly from the Owl Creek fissure, and paid dividends of \$100,000. The Arnold mine proper, developed on the Arnold ashbed, was opened 1863, reopened 1897, closed 1901, rock stamped averaging under 0.8% copper. Has a stamp mill and 2½-mile narrow-gauge railroad, known as Arnold & Eagle Harbor, rolling stock of which has been sold. No. 1 shaft of the Arnold is about 1,000' deep, sunk at an angle of 26° with the horizon. Total production, 1899 to 1911, inclusive, was 2,065,817 lbs. fine copper.

ARPS GROUP**CALIFORNIA**

Owned by C. L. Wilson of San Francisco. Property: 15 claims, unpatented, in T. 34 N., R. 4, W., Shasta Co., Cal., developed by 5 tunnels, of about 1,600' aggregate length, showing sulphide ore. A deposit of manganese ore, 1,200' long and about 125' wide, was discovered in 1914; samples said to assay 40% metal. Shipments to Heroult smelter were made in Spring of 1916.

ASCOT MINING CO.**QUEBEC**

Property: in Ascot township, Sherbrooke Co., shows an ore formation similar to that in the Eustis mine nearby, but not quite so high in sulphur and iron, carrying 2 to 6% copper, with small gold and silver values. Mine, first opened in 1859, is developed by shafts. Equipment: includes a Rand 7-drill compressor, steam hoist and necessary mine buildings. Was controlled by a Montreal syndicate, at last reports.

ASHBED MINING CO.**MICHIGAN**

Office: 62 Devonshire St., Boston, Mass. Mine office: Copper Falls, Keweenaw Co., Mich. Francis L. Maguire, pres.; John Brooks, sec.-treas.; Cap. Wesley Clark, supt.; preceding officers, John C. Watson and Charles G. Lund, directors. Inc. 1880, in Michigan. Cap., \$1,000,000, shares \$25 par. Annual meeting, second Tuesday in March. Land: 1,143 acres, Peterick mine, in vicinity of Copper Falls, adjoining the Arnold mine. The last mining work was done 1905-1906. Described Vol. II.

ASHBORO COPPER MINING CO.**NORTH CAROLINA**

Mine office: Ashboro, Randolph Co., N. C. H. D. Landers, pres.; D. M. Holliday, v. p.; W. C. Hammond, treas.; M. W. Parrish, sec. Inc. in North Dakota. Cap., \$100,000; shares \$1 par. Lands: 93 acres, just north of Ashboro. A carload of ore gave returns of \$16.85 per ton, with 8.6% copper and small gold values. Idle from 1907 to 1913, when work was resumed and shipments made. Presumably again idle in 1915-16.

ASIENTOS MINING CO.**MEXICO**

Mine office: Asientos, Ocampo, Aguascalientes, Mex. Chas. Adler, v. p.; Abram Rapp, gen. mgr. Inc. 1898, in Delaware. Cap., \$1,000,000; shares \$10 par; nonassessable; fully issued.

Lands: 190 acres, including the Nopensada and Alta Palmira mines, which are antiquas, and the Veta Grande and Refugio mines. The Nopensada, said to have been a considerable producer in early days, carries mainly slightly argentiferous copper ore, of about \$40 per ton average value. **Equipment:** includes steam and electric power. The Alta Palmira mine, having a 450' shaft, produces auriferous and argentiferous copper ore. **Equipment:** includes a 150-h. p. steam plant and hoist. The Refugio mine shows ore carrying up to 10% copper and 1,100 grains silver per metric ton, with small gold values. Idle owing to revolutionary disturbances.

ASPEN MINE CO.**COLORADO**

Property: the old Aspen mine at Silverton, Colo., supposedly controlled by American Smelters Securities Co. Ike Camp, operating a lease on the upper workings, is reported to be making daily shipments to Silver Lake mill.

ASSETS REALIZING MINES CORP'N**CALIFORNIA**

Address: 210 Citizens' Nat'l Bank Bldg., Los Angeles, Calif. **Officers:** J. V. Priest, pres. and gen. mgr., with F. R. Kellogg, Chas. P. Grogan and E. S. Parker, directors.

Property: 300 acres, including the Arica, Big Butte, Crescent, Eldorado and January 1-11 claims, in the Ironwood Mng. district, Riverside Co., Calif. **Ore:** gold-silver, in six veins between dolomite hanging and schistose foot-walls.

Development: 2 shafts, one 508' deep, with 4 levels from the 80' to 330' levels. The 138' level said to be opened for 270' in ore averaging \$10 to \$30 per ton in gold. The second shaft, 330 deep, has levels at 165', 230', and 330' depths, and ore is said to average \$20 per ton. **Equipment:** 100-ton plant, equipped with crusher and rolls. Hardinge mill is being built.

Ore reserves: reported, 18,000 tons ready for stoping.

ASSOCIATED MINES DEVELOPMENT CO.**NEVADA**

Office: 617 Pacific Bldg., San Francisco, Cal. C. N. Miller, pres.; E. N. Bannon, sec. Inc. in Nev. **Cap.**, \$500,000; shares \$500 par. **Lands:** at Rochester, Humboldt Co., Nev. Owns the Wild-Cat and Tiger patented claims, the Taylor Hill, Colorado and the Plainview group, also the stock of the Tohoqua mine, Gerlach, Nev. Claims to have \$200,000 worth of silver and gold ore in sight and no debts.

ATHABASCA MINING CO.**CANADA**

Inc. in Alberta, Can., April, 1914. **Cap.**, \$1,000,000. Hon. G. H. V. Bulyea, Gov. of Alberta, Hon. Chas. R. Mitchell, E. J. Taylor and C. L. Freemann, directors, all of Edmonton.

Property: assets and properties of the Athabasca Mng. Syn. consisting of 800 acres of nickel claims, 160 acres iron claims, on and near Lake Athabasca, near Edmonton, Alberta, Canada.

Ore: nickel-iron-copper. Assays of surface samples showed 1½ to 5% nickel, iron samples ran 66.70% iron, 2.12% silica, .014% phosphorous and .013% sulphur. Copper occurs as bornite. Property still undeveloped.

ATHLETIC MINING CO.**MISSOURI**

Address: Duenweg, Jasper Co., Mo. Property bought by Chas. T. Orr and associates of Webb City, Mo., in 1915, purchase price said to be \$150,000. Formerly operated under name of Gopher M. & M. Co.

Property: 40 acres of the Jasper Co. Royalty Co.'s land at Duenweg and a lease on adjoining 140 acres. Lead-zinc ore occurs at depth of 250'.

Development: on the 40-acre tract consists of two 250' shafts. On the 140-acre tract 5 shafts are down to the ore level. **Equipment:** on the 40-acre tract includes a 700-ton concentrating mill. Company plans to build a second mill.

ATKINS KROLL CO.**NEVADA**

Address: 311 California St., San Francisco, Calif. Company owns directly and leases and controls through subsidiary companies a number of operating tungsten mines in Nevada and elsewhere. **Properties:** include the Silver Comet mine near Pioche, Nev., a scheelite mine, 12 miles south of the Bonita mine near Garrison, Utah, W. L. Chapman, supt.

Atkins Kroll also control the Doyle Mining Co., mining tungsten ore, 6 miles north of Osceola, Nev.

ATLANTA-HOME GOLD MNG. CO.**NEVADA**

Suite 3249 No. 120 Broadway, New York City. Mine office: Atlanta, Lincoln Co., Nev. **Officers:** F. R. McNamee, pres.; E. B. Bronson, v. p.; M. Justice, sec.; E. M. Bray, treas.; preceding officers, R. W. H. Smith, and H. A. Geisendorfer, directors. J. J. Stubenbord, supt.

Inc. 1915, in Delaware. **Cap.**, \$2,500,000; shares \$5 par; nonassessable; outstanding 500,000 shares. Security Transfer & Register Co., 66 Broadway, New York City, transfer office. Company was organized to take over the holdings of the Atlanta Cons. Gold Mng. Co.

Property: 11 claims, patented, 180 acres, at Atlanta, Lincoln Co., 47 miles northeast of Pioche, show a contact deposit between porphyry and limestone, that is said to average from \$2 to \$4.50 per ton in gold, and is 50' to 80' wide, proven for a length of 300' and depth of 200'. Ore reserves claimed to be 320,000 tons.

Development: two shafts sunk 300' apart, No. 1 is 200' and No. 2 is 82' deep, with drifts and crosscuts totaling 1,600'. **Equipment:** includes a steam hoist and compressor. Company plans continuing shaft sinking and development and building a cyanide plant. Reports on property have been made by Paul W. Meyers, Geo. Kislingbury and Kirby Thomas.

ATLANTA MINES CO.**NEVADA**

Office: 406 Columbia St., Goldfield, Nev. **Officers:** Geo. Wingfield, pres. and mgr.; A. H. Howe, sec.-treas.; Chas. E. Knox, v. p.; preceding officers, C. B. Zabriskie, Frank C. Favier and Clyde A. Heller, directors; A. I. D'Arcy, mgr. **Inc.** March 3, 1905, in Arizona. **Cap.**, \$5,000,000; shares \$1 par; nonassessable. In treasury, 1,750,000. Annual meeting April 6th. Receipts for 1914, \$30,718. Disbursements for 1914, \$56,445.65.

In 1912 the company was reorganized and refinanced for deep mine development, \$100,000 cash being raised by Geo. Wingfield and associates. The capitalization was increased from two to five million shares. Work was begun Dec., 1913.

Threatened apex litigation with the Florence was settled 1914, by a sideline agreement, the Florence to be opened from Atlanta workings. In 1915 the company secured a lease on the southern half of the Grizzly Bear claim of the Goldfield Cons. Co., to all ground below the 1,400' level.

Property: 74 acres, patented, at Goldfield, Nev., includes the Atlanta, Black Bear and Union Jack mines, adjoining the Florence on the east and the Goldfield Cons. on the north. Contains the extension of the Goldfield Cons. orebodies on the shale-lattice contact. Exploratory work carried on through the St. Ives shaft of the Goldfield Cons. cut the Atlanta vein on the 1,750' level. This vein is 40' to 100' wide, runs N. S. and dips at 45°. The ore is pyritic with tetrahedrite, and varies from gold ore, free from copper, to ore carrying 9% to 14% copper. The great ore shoot thus far shows bands of medium grade shipping ore, but is, as a whole, a low grade concentrating ore that may average \$8 per ton, besides a shoot of shipping ore .6'-15' thick that averaged \$25 per ton in monthly smelter returns. The orebody is proven for 110' upward and for 380' on the strike having been opened on the 1,660' level, and by a winze below the 1,750' level.

Production: began April, 1915, and has averaged about 20 tons a day, mainly from the 1,580' and 1,620' levels.

The geology of the district is described in Prof. Paper No. 66 of the U. S. Geological Survey, 1909, by Ransome, and by J. E. Spurr, in Econ. Geology, Feb., 1916. Property promises to be an important producer of low-grade concentrating ore from which it should be able to pay dividends in 1916.

ATLANTA MINING CO.

IDAHO

Inc. Sept., 1915, in Idaho, by Henry L. Lillienthal, of Spokane, Jas. A. Baxter and M. B. Inghram, of Wallace, Idaho. **Cap.**, \$1,250,000, shares \$1. **Property:** The Bald Knob group on which work was said to be started at once.

ATLANTIC MINES CO.

MONTANA

Address: care Anaconda Copper Mng. Co., 42 Broadway, New York. Ross W. Lynn, pres.; Jas. Dickson, sec. Inc. Jan. 20, 1913, in Delaware. **Cap.**, \$1,000,000, shares \$10 par; \$250,000 paid. **Property:** the holdings of the old La France Copper Co., including the Lexington mine and concentrating plant at Walkerville, Butte, Mont. Company is controlled by Anaconda Copper Mng. Co. interests and was incorporated for the purpose of purchasing the Lexington group of mines at foreclosure sale. One share of new stock was issued for each \$100 bond of the La France Co. and 10% of face value of unpaid coupons, amounting to \$50,000, was paid in stock. Underwriters had option on 10,000 shares at \$14 a share for 12 months, 10,000 more for 18 months at \$18 and 10,000 for 24 months at \$22.

In May, 1916, the Anaconda Company offered to buy the property at public sale at a price to net stockholders \$12.50 per share, or equivalent to par, plus 8%, plus \$250,000 originally in the treasury.

Lands: 8 fractional claims, 32 acres, known as the Lexington mine, held from the French owners under a \$250,000 bond and lease, running in the name of Louis Girard, assigned to La France Copper Co. Property is at Walkerville, in the northern part of the Butte camp.

The Lexington mine has a 1,450' three-compartment main shaft, connected on the 600' level with the Alice mine, with several miles of workings. The mine was worked many years ago for gold and silver, but ore became zinciferous with depth. The lower workings carry chalcopryrite, galena and sphalerite ore, of which about 30,000 tons milled gave an average assay of 1.2% copper, 3.5% lead, 18% zinc, 5.5 oz. silver and \$1.60 gold per ton, which may be taken as a fair average assay of about 400,000 tons of ore blocked out in the lower levels. In addition there are several small bodies of chalcopryrite ore up to 3% in copper tenor, with proportionately higher gold and silver values, and having smaller quantities of zinc. There are electric pumps on the 650' and 1,450' levels capable of handling 500 gals. of water per minute.

Property is one of the zinc producers of the Anaconda company, the ore going to the experimental zinc plant of the Washoe reduction works at Anaconda.

ATLANTIC MINING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Painesdale, Houghton Co., Mich. **Officers:** Wm. A. Paine, pres.; Frederic Stanwood, sec.-treas.; preceding officers, John R. Stanton, S. L. Smith, Frank P. Son and J. H. Blodgett, directors.

Inc. Dec., 1872, in Michigan; reincorporated, 1901, for 30 years. **Cap.**, increased, 1902, to \$2,500,000, shares \$25 par; fully issued; paid in, \$11.80. Last assessment was \$2, Oct. 11, 1909, the first in 30 years. Has paid dividends of \$90,000, last in 1905. Owns \$40,000 stock in Michigan Smelting

Co. Boston Safe Deposit & Trust Co., registrar; American Loan & Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in March. The Atlantic Co. is controlled by Copper Range Consolidated Co., through ownership of 93,470 shares of the capital stock. Balance sheet of Dec. 31, 1915, shows surplus of \$246,329.

Lands: 8,217 acres, including 1,351 acres of mineral lands, 4,760 acres of timber lands, and 2,106 acres miscellaneous lands, latter including the mill site, and a valuable frontage on Portage lake. Mineral lands are S. $\frac{1}{2}$ of Sec. 4, except S. E. $\frac{1}{4}$ of S. E. $\frac{1}{4}$; N. $\frac{1}{2}$ of Sec. 9; N. W. $\frac{1}{4}$ of Sec. 10 and Sec. 16, all in T. 54 N. R. 34 W. Principal holdings are the old Atlantic mine, 640 acres, including the mines known before 1872 as the South Pewabic and Adams, located about 2 miles south of Portage lake and 4 miles southwest of Houghton, and the Sec. 16 tract of 640 acres. The mines, idle since 1911, are very fully described, Vol. X.

ATLAS MINING CO.

YUKON

Mine office: White Horse, Yukon, Canada. R. K. Neill, pres.; Wilbur D. Greenough, gen. mgr. Inc. Dec., 1909, in Washington. Cap., \$600,000; shares \$100 par.

In Feb., 1916, company holdings were taken over by the Yukon Copper Co., Ltd., a Canadian company, which see.

ATLAS MINING & MILLING CO.

COLORADO

Office: Ouray, Colo. C. H. Wagner, pres.; C. H. Austin, v. p.; C. C. Carson, sec.; A. B. Shipman, treas.; with Wm. Story, Jr., Fred Carroll and Chas. D. Lofler, directors. W. P. Casey, supt., Sneffels, Colo.

Inc. Feb., 1904, in Colo. Cap., \$2,000,000; shares \$1 par; 1,921,000 shares outstanding. Authorized bond issue \$50,000; all outstanding. Annual meeting in August.

Property: 28 claims, patented, 204 acres in Mt. Sneffels district, Ouray Co., Colo., includes the Atlas & Crown Point mines. Ore, which occurs in 3' fissure vein in andesite, is a complex sulphide, carrying grey copper, gold, silver and lead. Average assays are reported to run 17 oz. silver and 0.05 oz. gold per ton. The vein is developed by 100' incline shaft and a 2-mile tunnel to depth of 1,500', with a total of 20,000' of underground workings.

Equipment: includes electric power, air compressor, tramway and 150-ton 20-tamp mill with table and flotation (Min. Separation Co., Ltd.) concentration, giving a 90% recovery of ore values. Management expects to further solve treatment of complex ores and increase recovery to 95%. Employs 75 men.

Production: 30,000 tons in 1913, 35,000 tons in 1914 and 40,000 tons in 1915. Management estimates 50,000 tons of ore blocked out.

ATOLIA MINING CO.

CALIFORNIA

Address: 311 California St., San Francisco. Mine office, at Atolia, San Bernardino Co., Cal. Controlled by Atkins, Kroll & Co., San Francisco. Chas. Taylor, supt.

Property: a number of claims at Atolia on the Randsburg branch of the A. T. & Santa Fé R. R. are being worked for tungsten ores. The ore occurs as scheelite in both placer deposits and fissure veins.

Development: a 1,000' shaft with electric hoist and full equipment. The loss of the concentrating mill, destroyed by fire on Jan. 25, 1916, caused suspension of all operations for several months, but a new mill with a daily capacity of 200 tons has been built.

The ore is hauled from mine to mill on 4-ton trucks which deliver 100 tons a day. From a large bin the ore is fed to a 10x18 Joshua-Hendy jaw crusher; then passes by bucket conveyor to the hopper feeding the rolls

for finer crushing. Half of the product is fed into a single mill unit, composed of two 5' Huntingtons. The discharge passes over two large Deister roughing tables, where the most of the tungsten is extracted; the residue passes on to the Frue vanners. The other half of the rolls product goes to the 8' Marcy ball mill whose capacity is 30 to 40 tons in 24 hr. The 30-mesh pulp is discharged onto a Deister roughing table and then passes to a Dorr classifier. The slime from both units is thickened for concentration by use of three 8' Callow cones and then passes over three double-decked sliming tables; thence to three double-decked Deister tables, whence the tailings are carried to the pond. The plant is operated by about 25 electric motors, each unit of machinery being driven by a separate motor. The mill will use 30,000 gal. of water when running full capacity and will produce 5 to 7 tons of concentrates every 24 hr. The new electric hoist will be installed on the 900' level of No. 1 mine, to be used in sinking a winze on the ledge for prospecting the vein at greater depth.

Over 300 men are reported to be employed. Is one of the largest tungsten producers of the country.

A. T. S. MINING CO. (Not Incorp't)

MISSOURI

Formerly known as the A. B. C. mine. Owned by A. T. Swan, Joplin, Mo. Property is the A. B. C. zinc-lead mine at Joplin, Mo. Equipped with 90-h. p. gasoline engine, hoist, Ingersoll-Rand compressor and 175-ton mill.

ATWOOD COPPER CO.

NEW MEXICO

Property the Atwood mine, near Lordsburg, Grant Co., N. M., sold to 85 Mng. Co. in 1915 for \$100,000.

AUFEAS MINES, LTD.

BRITISH COLUMBIA

Address: Hope, B. C. **Property:** the Jumbo group on Silver creek, 4 miles west of Hope in the Yale district, 3 claims, in steep gorge, 1,100' above sea level, containing fissure veins in granodiorite. Veins average 8" in width but carry arsenopyrite and chalcopyrite in quartz. Gold is the principal value and the ore varies from \$10 to \$60 per ton.

Development: by 3 tunnels and several open cuts. A new tunnel driven in 1913, cut a vein 3' wide 385' from portal at depth of 450'. Ore in this face carried more copper than found in the older workings. An aerial tram is to be installed and shipments made to the Tacoma smelter. 40 tons of ore sacked and 100 tons on dump, when work was suspended, in July, 1914.

AUGUSTA METAL MINING CO.

COLORADO

Address: C. L. Arzeno, 9 E. 5th St., Covington, Ky. **Officers:** C. L. Arzeno, pres.; E. A. Darling, v. p.; F. A. Abbot, sec.-treas.; preceding officers, R. V. Lewis, Sydney Maddock, G. T. McDuffie, F. E. Laimbeer, directors. Inc. in Colo. **Cap.**, \$2,000,000; shares \$1 par; issued 1,953,000 shares.

Property: about 300 acres, patented, on Augusta Mt., 10 miles north of Crested Butte, Gunnison Co., Colo., at an elevation of 12,625', shows a fissure vein containing gold, silver, lead and zinc, with general average said to be \$10 per ton. Vein is in diorite. Has been worked spasmodically since 1880.

Development: 320' vertical shaft and several tunnels, longest over 3,000'. The property has been idle for several years and surface equipment, including a 60-ton mill, has been destroyed by snowslides. Management expects to resume operations in 1916.

AURELIA CROWN CO.

WASHINGTON

Office: P. O. Box 187, Seattle, Wash. O. Robert Dahl, pres., treas. and gen. mgr.; A. E. Coxhead, v. p.; H. M. Dahl, sec.; preceding officers,

Geo. C. Whipple and L. A. Sherman, trustees. Inc. in Washington. Cap. \$10,000,000; shares \$10 par; nonassessable; issued \$8,137,600.

Lands: 36 claims, 730 acres and 2 mill sites of about 10 acres, 16 miles west of Lucerne, Chelan Co., Wash. Property includes gold, copper, silver-lead and molybdenite mines, having 8 tunnels, of about 1,300' aggregate length, and several open cuts. The Crown Point molybdenum mine has 3 tunnels, said to develop 2,000 tons ore. The Silver Trail silver-lead mine has a 6' fissure vein. Tunnel No. 3, on the copper vein, shows 4 ore shoots, of 4 to 8' width, carrying ore said to give average assays of 15.5% copper and \$8.65 gold and silver per ton. Mine has an aerial tram.

Equipment: includes a hydraulic plant, with 2 Pelton wheels and 832' of 10" and 11" and 472' of 6" double-riveted steel hydraulic pipe. There is an air compressor. Buildings include a machine shop, engine house, sawmill, warehouse and 3 cabins. The mill has 2 crushers, rolls and a Schull concentrator.

Company makes claims of large annual profits to be earned from the operation of its mines, sawmill, water power plant and in water and rail transportation, but the railroad is yet to be built, the mines are only slightly developed and the tonnages which would make annual earnings of \$2,800,000 possible, are neither blocked out nor reasonably assured. The total expenditure on the property to Jan. 1, 1913, is \$86,552, a small sum compared with the amount of stock issued. The company's circulars considered misleading and not liked. Company fails to answer letters, possibly because of the comments given above.

AURORA CONSOLIDATED MINES CO.

NEVADA

Office: Goldfield, Nev. Mine office: Aurora, Mineral Co., Nev. **Officers:** Geo. Wingfield, pres.; J. H. Miller, v. p.; A. H. Howe, sec.-treas.; J. W. Hutchinson, mgr.; R. A. Hardy, supt.

Inc. in 1913, in Utah. Cap., \$100,000; shares 10c par; all outstanding. June 30, 1914, 87% of the issued stock of the Aurora Cons. Mines Co. was sold to the Goldfield Cons. Mines Co. for \$763,000, by Jesse Knight and associates.

Property: at Aurora, Nev., shows gold-silver ore in fissures in andesite. **Development:** 400' vertical shaft, connecting with main working tunnel, 4,500' long. **Mill and cyanide plant:** 40-stamp with daily capacity of 500 tons, weight of stamps 1,580 lbs.

Operations for 1915 show a loss of \$22,377 for the treatment of 138,399 tons of \$4 ore; this loss, however, is computed by charging \$55,361 equipment and construction expense to operation, the real operating profit being \$32,984. Ore in sight Jan. 1, 1915, is stated to be 414,000 tons; the profit per ton is not given by the company. Neither tonnage nor value checks the original estimates made of the mine, but there is much promising ground yet unexplored.

AURORA COPPER MINING CO.

WASHINGTON

Mine: Chewelah, Stevens Co., Wash. Conrad Wolfe, pres., 417 Hutton Bldg., Spokane, Wash. Property is the Copper Queen mine adjoining the United Copper Co.'s property, 6 miles N. E. of Chewelah. Is developed by tunnels, and 2 deep diamond-drill holes. Ore contains chalcocopyrite with streaks of tetrahedrite in a vein of 25' average width. No recent returns secured.

AURORA MINES CO.

NEVADA

Address: 300 Severance Bldg., Los Angeles, Cal. Mine office: Aurora, Mineral Co., Nev.

Officers: Wm. R. H. Weldon, pres.; C. H. Chrisman, v. p.; F. C. Langdon, sec.; John H. F. Peck, treas.; preceding officers and J. Frank

Mercereau, directors. Wm. B. Davis, supt. Reorganized Mar., 1913, in Nevada. Cap., \$1,000,000; shares \$1 par; issued \$900,000. Annual meeting March 19th.

Property: 13 claims, patented, 150 acres, located in the Esmeralda mining district, Mineral County, comprise some of the mines worked in early days for high grade gold-silver ore in fissure veins.

Development: several tunnels. The Monarch tunnel cut the veins at 300' depth, and 260' of drifting was done. Work was then started on a tunnel 350' lower, already 900' long. At present the tunnel has a length of 1,570' with 400' farther to go to cut the veins. There has been no production to date.

AURORA-SAMPSON MINING CO.

IDAHO

Consolidated Jan. 14, 1916, with H. E. M. Mng. Co. to form the Western Union Mining Co., which see.

AURORA Y ANEXAS; CIA. MINERA LA, S. A.

MEXICO

The Cia. Minera Aurora y Anexas, owned by the late Ernesto Madero and brother, has worked for several years past, the Aurora mine, with 160 hectares in the Cuchillo district, near Coyame, Chihuahua and the Justicia copper mine, 4 miles east of Marquez station on the Kansas City, Mexico & Orient railroad. These properties were purchased from Don Francisco Diaz in 1908.

Owing to the revolution, followed by a revolt and establishment of local revolutionary government in Chihuahua, it is impossible to get recent information.

AUSTIN DAKOTA DEVELOPMENT CO.

NEVADA

Address: Valley City, North Dakota. Mine office: Bank Bldg., Main St., Austin, Nev. J. F. Puttrew and C. C. Newman, directors, Valley City. No. Dakota; C. F. Littrell, mgr.

Property: X-Ray group, 24 claims, in Marshall Canyon near Austin, Lander Co., Nev. **Ore:** gold-silver in chloride zone, in 2 parallel ledges, each 20' thick and cut by several mineralized dikes in granite. Vein system exposed in workings for about 400'. Average assays said to show up to \$2.60 gold and \$300 silver per ton.

Development: the O. K. and X-Ray incline shafts and tunnels. **Ore reserves:** Estimated 11,000 tons of \$26 ore blocked out. **Equipment:** pump, 80-h. p. hoist, ore bins, compressor, storehouse and stable. Company plans sinking the X-Ray shaft to the 250' level.

AUSTIN GOLDFIELD MINING CO.

NEVADA

Owens the Watt mine, in New York Canyon, Lander Co., which see.

AUSTIN MANHATTAN CONS. MNG. CO.

NEVADA

Idle. Wm. A. Marshall, res. agt., Austin, Nev. The company purchased the principal mining properties, first operated in the early 60's and credited with a production of \$19,000,000, in and adjacent to Austin, Nev., in 1908, and started development work, but on too large a scale commensurate with the limited money on hand. See Copper Handbook, Vol. XI, and Bull. 208 and 408, U. S. Geol. Survey. Result was a receivership begun in 1911, culminating in a public sale of the property 3 years later. It was purchased by one of the largest creditors, the present owner, H. C. Fownes, German Nat'l Bank Bldg., Pittsburgh, Pa., who placed it on the market after expiration of the redemption period.

Property. 115 claims, 1,200 acres, 73 claims patented, in the Reese River mining district, at Austin, Lander county, shows in the Lander Hill section, a vein system of 5 fissure veins in granite, N. W.-S. E. strike, dip 25° to 60° N. E. Maximum width of veins is 6'. Ore, sulphide of silver, occurs in lenticular shoots. **Development:** 6,000' tunnel and shafts. The

western portion of the property contains north-south veins yielding gold and silver, developed by the Jack Pot mine to the 400' level.

Mine shows but little ore in sight. Old workings largely caved and inaccessible. Report on the property made by A. W. Daw, of the firm A. & T. Daw, London, Eng., states there is a possibility of ore reserves in the principal veins below the main tunnel level; that suspension of operations in 1887 was due to failure to carry development ahead of stoping, to poor ventilation in the deeper workings and to falling price of silver, and that failure of subsequent operations has been due to lack of development work below the old work and to bad management. There is a 20-stamp mill on the property.

AVINO MINES, LTD.

MEXICO

Idle. Office: 638 Salisbury House, London, E. C., Eng. Mine office: Minas, Durango, Mex. Lionel W. Harris, chairman; Edw. Hooper and A. Glenecross, directors; F. F. Fuller, sec.; Hooper, Speak & Co., cons. engrs.; R. H. Jeffrey, gen. mgr. Inc. March 6, 1909, in Great Britain. Cap., £100,000, in 1,000,000 priority shares and 1,000,000 deferred shares of 1s par; issued, 500,000 priority shares and 978,429 ordinary shares. Was a reconstruction of Avino Mines of Mexico, Ltd., which was reorganized Feb. 24, 1903, as successor of company of same name, organized Feb. 13, 1899, which was the successor of Avino Syndicate, Ltd. Present company took possession of property Aug. 1, 1909. Stockholders of old company were given 1 ordinary share, par 1s, full paid, for each fully paid £1 share of the old company, with the right to buy priority stock at par, share for share. After payment of 200% on priority shares, they became ordinary shares. Shares are listed on the London Stock Exchange.

Accounts for year ending June 30, 1915, show a loss of £1,356, leaving a credit balance of £665, brought forward into debit balance of £6,914; cash, £5,555; ore in transit £5,350; ore on dump £2,123, calls in arrears £230; creditors, £1,275.

Lands: 166 acres, and a 350-acre dam site, 10 miles from Gabriel, on the Mexican International railway, the nearest rail point. Property includes El Sangre de Cristo mine, which has a 500' shaft and 1,050' tunnel, with several large tajos or pits, 1 being nearly 400' in width and of considerably greater length.

Ore is a complex mixture of auriferous and argentiferous lead and copper sulphides.

Production: for 14 months to June 30, 1910, was 43,350 long tons of ore, of which 17,937 tons was rejected and 18,094 tons shipped, yielding 910,499 lbs. fine copper, 261,000 oz. silver and 993 oz. gold, giving a profit of £4,338. Operations during 1912 were seriously interrupted by revolutionary disturbances. As the present mill is not successful the company has been shipping ore to smelters, at such times as the revolutionary troubles in Mexico permitted. All work was stopped in April, 1913. During 1912-13, 6,199 tons were sorted out for shipments, of an estimated value of £21,840.

Ore reserves: are reported June, 1913, as 113,167 tons, averaging 1.8% copper, 9.7 oz. silver and \$6 gold per ton.

Equipment: includes a steam and a 300-h. p. electric plant, operated by a Crocker-Wheeler gas engine.

The former management spent too much money on surface, and not enough underground, besides making a mistake in the plan of ore treatment. The mine now has competent consulting engineers and managers, and ought to make money, when peaceful conditions once more prevail in Mexico.

A. W. C. MINING CO.**MISSOURI**

Address: Joplin, Mo. **Owners and operators:** W. O. Cragg and A. W. Canada. **Inc. in Maine. Cap., \$40,000. Property:** 120 acres in center of West Joplin sheet ground district. **Ore:** lead-zinc, occurs at a depth of 190'. **Development:** 3 vertical shafts. Three mills are operated on the property, 2 on Luke land and one on Expansion Co.'s land, adjoining on the south.

Production: in Feb., 1916, company is reported to have sold 1,000 tons zinc concentrates, assaying 60% zinc for \$130,000. This represented an output of 7 weeks.

A. Y. & MINNIE M. & M. CO.**COLORADO**

Leadville, Colo. Is a subsidiary of the A. S. & R. Co., S. D. Nichol森, gen. mgr. Produces lead-zinc sulphide ore, which is shipped to Sand Springs, Oklahoma, and to Pueblo, Colo. Developed by shaft and employs about 50 men.

AYUTLA SMELTER**MEXICO**

Owned by Carrizo Copper Co., at Ayutla, Autlan, Jalisco, Mex.

AZALIA MINING CO.**NEVADA**

Address: F. M. Berry, sec.-treas., Union Oil Bldg., Los Angeles, Calif. **Officers:** F. W. Cole, pres.; S. E. Vermilyea, v. p.; preceding officers, John Woodson, F. O. Wilkinson, directors; W. L. Kemp, supt. **Cap., \$1,000,000; shares issued 458,000.**

Property: 4 claims, 8 miles N. W. of Platina on a spur of the Spring Mt. range, cover a vein in limestone, containing zinc-silver ore, for 3,000'. At last accounts an 80' incline shaft passed over the ore, which is said to be 6' thick and faulted at a depth of 30'.

AZTEC COPPER CO.**NEW MEXICO**

Office: 707 Colorado Bldg., Washington, D. C. **Mine office:** Organ, Dona Ana Co., N. M. **Gen. H. H. C. Dunwoody, pres. and mgr.; Geo. B. K. Roberts, sec.-treas.; preceding officers, Col. M. C. Wyeth, C. F. Humphrey and C. C. Clements, directors. Inc. in Arizona. Cap., \$1,000,000; shares \$1 par; nonassessable.**

Lands: 7 claims, 140 acres, in the Organ Mountain mining district, about 12 miles by good road southeast from Las Cruces. Claims cover the mineralized limestone porphyry contact worked by the Modoc mine. Developments are on the Orejon claim opened by a 140' 45° inclined shaft, sunk on a 12 to 18" vein. Three claims, known as the Orejon group, have been leased for the year 1916. Company reports that "we owe nothing and do not pay salaries."

AZTEC GOLD MINE**NEW MEXICO**

Operated by the Maxwell Land Grant Co. Described in U. S. G. S. Bull. No. 620-N.

AZTEC MINES CO.**ARIZONA**

Letter returned unclaimed from Chicago office and mine office, Prescott Yavapai Co., Ariz. L. H. Beyerle, pres. **Inc. 1908, in Arizona, practically as successor of Gold Copper Mining Co. Cap., \$3,500,000, shares \$1 par.**

Lands: 7 claims, 100 acres, well timbered and watered, 5 miles west of Poland and 13 miles south of Prescott, in middle of the Senator district, near the Hassayampa river. Property includes the Aztec, Peacock, Fairview, Mountain View and Iron Duke claims, said to show fissure veins of 2 to 15' width. Main development on the 15' vein, by a shaft cutting auriferous and argentiferous copper ore. A tunnel 900' long, is intended to open up the main vein through the 3 claims, and will have a back of about 500'. The ore from the main shaft on the Peacock claim is reported

to average \$13 in copper and \$9.92 in gold. Besides 2 main veins of the group there are 8 other cross and parallel veins on the claims.

In 1915 the Savage mine of the Aztec group was leased to L. E. Paquin and J. R. M. Gordon, who report having found a vein carrying high values in lead, zinc and silver.

Past history of company, with Mr. Stevens' unfavorable comments, given Vol. X.

AZTEC MINES CO.

COLORADO

Property is the O. K. mine at Central City, Colo. A. H. Frost, pres., and J. R. Hastings, sec., Winona, Ont., Canada. Operated in a small way, 1915, by Henry R. Eilmann, lessee. Mine shows narrow fissure vein, carrying gold and copper values.

AZURE MINING CO.

NEW MEXICO

Mine office: Tyrone, Grant Co., N. M. Employs 30 men, when in full operation. Louis Kahn, pres.; M. D. Rothschild, sec.-treas., 14 Church St., New York. Wm. Rogers Wade, supt. Inc. 1890, in New York. Is operated as a close corporation.

Lands: 110 claims, 1,800 acres, near the Burro Chief group of the Chemung Copper Co. Company sold 73½ acres, 1909, to Mangas Development Co.

Geology: property shows monzonite, quartz-porphry and granite, with fissure veins in granite and disseminated ore in porphyry, there being 7 orebodies with 2 under development. The Santa Fé vein is from 15 to 75' wide, averaging 40' and is traceable for 6,000'. This vein is developed by a 417' shaft, having 5 levels with 15,500' of workings showing gem turquoise as well as copper ore. The old turquoise mine has 2 tunnels and large open-cast workings.

Besides the Santa Fé vein, the property has disseminated ores, one orebody on the contact between granite-porphry and monzonite-porphry being 152' thick, developed for 500' in length and carrying 2½% copper present as disseminated particles of chalcocite. Property has been explored by churn drills and diamond drilling.

The mine was at one time the largest turquoise property in the world, systematic mining having begun in 1891. Gem production has practically ceased and the property is considered valuable for its copper ore alone.

Company is also developing the Tres Hermanos zinc mine in the Tres Hermanos district, 23 miles S. of Deming, Luna Co., N. Mex., said to show oxidized ores carrying zinc-lead-silver values. **Ore:** occurs as blanket and chamber deposits in limestone, 2-5' wide, reported to assay from 30-35% zinc, 30-40% lead and 6-8 oz. silver. Developed by several vertical shafts, from 30-100' deep.

Equipment: includes compressor and 20-h. p. gasoline hoist. **Production:** in 1915, mainly from development work, was 720,000 lbs. zinc, 300,000 lbs. lead and 2,000 oz. silver. Further development planned.

AZURITE MINING CO.

NEVADA

J. W. McFatridge, mgr.-sec.-treas., 941 W. 35th St., Los Angeles, Cal. **Mine address:** Goodsprings, Clark Co., Nev. A. C. Black, pres. and purch. agt.; T. D. Knights, v. p.; preceding officers, M. P. Erwin, M. M. McFatridge and Samuel Yount, directors. Inc. Feb. 7, 1911, in Nevada. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; issued 440,879 shares.

Property: 9 claims, 174 acres and a 3-acre smelter site, in the Yellow Pine district, sections 26, 27, 34 in T. 24 S.; R. 57 E., 12 miles from Goodsprings and 20 from Jean on the Salt Lake railroad. The mines adjoin the Boss mine on the east.

Ore: carries plumbojarisite, a very rare mineral, carrying gold and platinum (see U. S. Geol. Survey Bull. 620). The Shenandoah, Jolly Boy and Copper Chief mines, all producers, adjoin the Azurite. A 150' tunnel, 80' below the incline shaft, at the Azurite mine, will give working ground for stopes. Claims show ores carrying gold, silver, copper, lead, zinc and platinum, lowest assay at the copper mine said to be \$3.60 gold, \$4.50 silver, 27% copper, .03 oz. platinum. Ore occurs in replacement orebodies of irregular size and shape, the largest 35x40' and 8 to 10' thick. These replacements occur in thick bedded limestones cut by porphyry dikes.

Development: the Azurite copper mine has a 78' and a 20' shaft. Property has 1,626' of workings, including several tunnels, the longest being 450', estimated to block out 8,800 tons of 20% copper ore and 30% lead ore.

Company plans installation of cable tram and concentrator for 1916. Company bought the Nevada Copper Realty property, Feb. 7, 1911. The proposed Parump Valley branch of the Salt Lake railroad from Jean to Good Springs will open up this district and enable many of the mining companies to ship ore. The mine shipped four carloads of high-grade copper and lead ore in 1914, but no mining was done in 1915.

AZURITE MINING CO.

NEVADA

Bankrupt. Properties in Hawthorne and Mina districts, Mineral Co., Nev., sold in 1915 to H. Geile of Grand Rapids, Mich., for \$30,000, under judgment for \$65,000. Mines, reported to carry sulphide ore, are to be reopened.

AZURITE MINING CO.

WYOMING

Idle. **Office:** 55 High St., Oshkosh, Wis. Henry L. Larsen, pres., Green Bay, Wis.; Arthur Bishop, v. p.; H. O. Granberg, sec.-treas. and gen. mgr. **Inc. Dec. 17, 1904, in Wyoming. Cap., \$1,000,000, shares \$1 par; issued, \$624,650. Lands:** 5 claims, 63 acres, in the Battle Lake district, near Dillon, in Carbon Co., Wyo., showing 3 fissure veins, in gabbro, of 15 to 20' estimated width, opened by 305' of work, including a 65' shaft and 70' tunnel, showing ore giving assays of 18% copper. Company paying taxes yearly.

BABINE BONANZA M. & M. CO.

BRITISH COLUMBIA

Jas. Cronin, mgr. Owns a group of claims at the head of the Tuchi river in the Babine range, Skeena district, 22 miles by trail from Smithers, on the Grand Trunk Pac. R. R. Orebodies occur on contact of granite porphyry and altered sediments, and in fissure veins, 1' to 3' wide, in the porphyry. Values are in the silver-lead-zinc contents. Average assays show 20 to 60 oz. silver, 11 to 56% lead, 10 to 34% zinc.

Development: Several tunnels, longest 400', and shafts, deepest 105'. Property has had only a little development work done during the last few years. It is a promising prospect, but handicapped by its inaccessibility. See Ann. Report, Min. of Mines for B. C., pp. 174, 279.

BACA MINING CO.

COLORADO

Property known as the Baca Land grant originally belonged to Senor Don Luis Mana Baca as a gift from a King of Spain. The present owners opened the land to prospectors in July, 1914. B. T. Tipton, mgr., Crestone, Saguache Co., Colo.

Property: 35,000 acres of mineral land, including 23 partially prospected mines near Crestone, Saguache Co., Colo., on the D. & R. G. R. R. The largest mines of the group are the Eastern Star, Sunset, Julia D., Queen Esther, Von Moltke, Great Western and Independent, the latter being the only one developed by the company.

Geology: Ore occurs in 8 well-defined contact veins, along dikes and in true type fissure veins, in pockets and shoots; country rock is altered granite and schistose gneiss, cut by intrusive dikes of porphyry, phonolite and iron stained quartz, containing gold, silver, lead, copper and zinc. Mother Lode said to be traceable for 12 miles on surface. Smelter assays ran \$18 gold, 500 oz. silver and 8% zinc.

Development: considerable amount of old workings, shafts and cross-cuts. There is an unlimited water supply. Ore is shipped to the Pueblo smelter. Property worked by prospectors and lessees under 2-5-year leases. Miners receive free timber, water and assay services and pay 10-15% royalty on ore extracted. At last accounts were planning new Edison type mill.

BACA ORTIZ; COMPANIA RESTAURADORA DE MEXICO

Mine office: Tepehuanes, Santiago Papasquiaro, Durango, Mex. Property is the Candelaria mine, carrying auriferous and argentiferous copper ore. Idle on account of revolution, 1912-16.

BACHELOR KHEDIVE MINES CO. COLORADO

P. O. Box 1,139, Denver, Colo. **Officers:** Henry A. Dubbs, pres.; Henry Lyne, v. p.; J. S. Williams, sec.; W. A. Johnston, asst. sec.; with W. J. Kerscher, T. J. Hyland and W. B. McDonald, directors. L. G. Eakins, gen. mgr., Denver. **Inc. in Colo. Cap.,** \$1,000,000, shares \$1 par, all outstanding. Ann. meeting 1st Monday in October. Company is a subsidiary of the A. S. & R. Co.

Property: 11 claims, patented, 83 acres, at Ouray, is a silver producer. Was leased in 1915. Ore sales 1915 said to have been \$7,630, with net receipts of \$5,920.

BADGER-HALL MINING CO. ARIZONA

Office: 1125 G Ave., Douglas, Ariz. Mine at Paradise, Cochise Co., Ariz. H. C. Beumler, pres.; C. P. Harvey, v. p.; S. S. Badger, sec., all of Douglas, Ariz. **Inc. 1907 in Arizona. Cap.** \$1,000,000, shares \$2 par; fully paid. Is controlled, through ownership of 60% of stock issue, by Bisbee-Sonora Development Co., which see.

BAGDAD COPPER CO. ARIZONA

Office: Suite 3249, No. 120 Broadway, New York. Mine at Bagdad, via Hillside, Yavapai Co., Ariz. **Officers:** E. B. Brown, pres.; F. C. Hart, v. p.; B. E. Page, sec.-treas.; Herman Cook, asst. treas.; preceding officers, H. Richardson, Gideon Giroux and G. D. Hopkins, directors. **Inc. in 1911 in Delaware. Cap.,** \$6,500,000, shares \$5 par; outstanding 1,097,428 shares.

In May, 1911, an unsuccessful attempt was made to finance the company by the offer of 100,000 shares to the public at \$4 a share. In Oct., 1912, a 2-year bond on the property was given to the General Development Co. of New York (Lewisohn), and this company at once began drilling operations to develop more ore. Work with 3 churn drills was carried on up to April, 1913, when the bond was relinquished, but a new option on control of the company was taken in Oct., 1913, and was still in force Dec., 1915.

Property: 53 patented claims and 9 unpatented, over 1,000 acres, in the Copper Creek region, Eureka district, Yavapai Co., 26 miles by wagon road from Hillside, on the Sante Fé line to Phoenix. Company has spent over \$600,000 on the property in purchase and in development.

Development: by tunnels and churn drilling. There were about 8,000' of underground workings and 33,255' of drilling Oct., 1915. In 1911 Allen H. Rogers estimated 4,324,500 tons of ore, averaging 1.93% copper. In 1912 F. H. Clark estimated 4,883,600 tons, averaging 1.934% copper. In 1914 H. A. Geisendorfer made detailed estimates of 6,031,000 tons of blocked ore, averaging 1.77% copper and 7,246,200 tons probable ore, averaging 1.60%

copper, a total of 13,277,200 tons of ore, averaging 1.68% copper, underlying 67.88 acres. Average thickness of ore is estimated at 58.4'.

In 1915 a reconnaissance survey for a branch railroad was made. Work planned includes a branch railroad, water-power installation, mining equipment and a 3,000-ton concentrator.

BAILEY COBALT MINES, LTD.

ONTARIO

John L. Woods, pres.; Floyd Weed, supt. Inc. Aug. 15, 1906, in Ontario. Cap., \$5,000,000, shares \$1 par. Trusts & Guarantee Co., Ltd., Toronto, Can., transfer agt. and registrar. In 1914 company, being deeply in debt, including about \$90,000 owing to E. A. Benson, former president, a permanent liquidator was appointed. A Protective Committee was formed by Buffalo stockholders to guard their interests. It is said that E. A. Benson, former president, and other promoters issued 4,250,000 shares of stock to themselves, retaining 750,000 in the treasury for financing the property. This promotion stock, it is claimed, was disposed of, and the treasury stock remained unsold, with the foregone result of such practice. Company now in hands of liquidators.

Reorganization Committee: Because of the financial condition of the company and appointment of liquidators by Supreme Court of Ontario, the following consented to act as a committee and prepare the plan for reorganization: Albert G. Wheeler, Jr., chairman, Wm. E. Stevenson and H. S. Langdon, with Walter Laier, sec., 22 William St., New York. Lawyers' Title Insurance & Trust Co., New York, is depository.

Reorganization Plan: The plan issued by the above committee is dated Oct. 13, 1914, and provides for the formation under the laws of the Province of Ontario of a new company with \$600,000 capital stock, of a par value of \$1 a share. Holders of existing stock consenting to plan shall receive one share of new stock for each ten shares of old. The remaining new stock shall be offered for subscription to stockholders at par, in proportion to their present holdings. New company shall have the power to issue 6% First Mortgage bonds covering its property to Edwin A. Benson, of Chicago, in payment of judgment of \$90,789 held by said Benson against the company.

The suit brought against the former directors by the Protective Committee is still pending, and the Reorganization Committee can do nothing until it is settled.

Property: 38 acres, adjoining the Penn Canadian mine in Coleman Twp., Nipissing district. Several veins have been opened up, from which shipments have been made at different times. Developed by shaft. Lowest workings on the fifth, or 280' level. In 1913 underground work totaled 1,370'.

During first five months in 1914 mine was worked with force of 16 men, doing 600' of development work. Property in charge of caretaker since 1914.

BAKER MILLING, SMELTING & REFINING CO. OKLAHOMA

John Baker, pres., writes that he has never deceived anybody, and simply holds the charter, keeping it in force for the present, with no stock for sale. Unfavorably regarded. See Vol. XI, Copper Handbook.

BAKER MINES CO.

OREGON

John M. Baker, supt. Inc. 1913 as a leasing company to work the Last Chance mine, formerly worked by the Cornucopia Mines Co. The mine is at Cable Cove, near Sumpter, Baker Co., Ore., about 18 miles W. of Copperfield, on the Oregon R. R. & Navig. Co. line.

Ore: massive white quartz containing pyrite, chalcopyrite, zincblende and gold in the Last Chance vein, strike N. 20° E., dip 45° west. **Develop-**

ment: 700' tunnel cutting the vein at 500' depth on the dip, and a 265' winze sunk in the vein with several hundred feet of drifting on the 100' and 200' levels, also crosscuts to surface for drainage.

Equipment: 20-stamp amalgamation mill, cyanide plant, aerial tramway, laboratory, offices and dwelling houses. Employs about 25 men. Company was operating in 1915.

BALAKLALA CENTRAL MG. & SMELTING CO. CALIFORNIA

Address: Coram, Shasta Co., Cal. Inc. in Wyoming. **Cap.**, \$5,000,000, shares \$5 par; one-third of issue owned by Balaklala Consolidated Copper Co., the remainder by another large mining company. Owns 3 claims surrounded on all sides by Balaklala Consolidated Copper Co.'s holdings. Inactive.

BALAKLALA CONSOLIDATED COPPER CO. CALIFORNIA

Office: 111 Broadway, New York. Mine office: Kimberly, Cal. Works office: Coran, Shasta Co., Cal. **Officers:** Thos. W. Lawson, pres.; W. A. Kerr, v. p. and treas.; Frank M. Leland, gen. mgr.; preceding officers and H. W. Hoops, directors. A. R. Buchanan, sec. Inc. Feb. 24, 1906, in Nevada. **Cap.**, \$10,000,000, shares \$25 par. Bonds, \$1,500,000 have been retired.

Company was a reorganization of the Balaklala Mining Co., control of which was sold simultaneously to two parties, making a snarl requiring reconstruction to untangle. Is controlled, through ownership of entire stock issue, by the First National Copper Co. Windsor Trust Co., New York, and Federal Trust Co., Boston, transfer agents; Trust Company of America, New York, and First National Bank, Boston, registrars. Company report for fiscal year ending June 30, 1914, gives cash \$260,762, and since operations were resumed in Aug., 1915, this has been increased to \$308,000.

Management declared a dividend on First National Copper, the holding company, of 25 cts. a share, payable Aug. 25, 1916.

Property: 65 claims, patented, 1,169 acres, also 800 acres of miscellaneous lands, including a smelter site, the town site of Coram and right-of-way for tram line. Mineral holdings are at Kimberly, in the Flat Creek district, 4 miles northeast of the Iron Mountain mine, and adjoin the Trinity mine. Property reported to carry 5 orebodies, with 2 developed. Apparently 4 orebodies are portions of the same ore zone, separated by faulting. Lands carry 3,040' of the strike of the main ore zone, developed for about 1,100'. Country rock is rhyolite, ore occurring in lenticular masses as replacement of country rock. in flat bodies, with slight dip to north, and greatest extension east and west, with a series of north and south step faults, causing displacement from a few feet to more than 100'. The two main orebodies are developed for lengths of 900' and 1,100'. Ore is cupriferous pyrite, copper values being mainly in chalcopyrite, with a little chalcocite and covellite, all carrying gold and silver values, estimated by management to average about 2.65% copper, 0.9 oz. silver and 50 to 60 cts. gold per ton. The larger orebody developing about 1,000,000 tons, gives a typical analysis of 2.7% copper, 0.95 oz. silver, 0.03 oz. gold, 21.4% silica, 31.5% iron, 0.3% lime, 3.4% alumina, 2.2% zinc and 35.2% sulphur.

Principal workings are known as the Windy Camp and Weil. The mine has large reserves of low-grade ore. Development is by a large glory hole, and by tunnels, with upraises, providing for open-cast mining, giving cheap extraction, there being about 20 tunnels, including the Weil tunnel of nearly 6,000' length. Mining operations were resumed Aug., 1913, and were of a desultory nature for 2 years. The property has been working steadily since Aug. 13, 1915, shipping 250 tons of ore daily, increased May 13, 1916, to 300 tons, to the Kennett smelter of the U. S. Smelting Co. under a 10-year contract. Ore shipped assays about 2.85% copper per ton.

Ore reserves: said to be about 3,000,000 tons of 2.83% copper ore with 1.32 oz. silver and 60 cts. gold per ton.

Power equipment includes a steam plant installation of about 1,000 h. p. and electric power. Machinery includes a number of hoists, 5 compound air compressors and about 40 rock drills. Buildings include an office, store, school, hospital, sawmill and about 75 dwellings, all but the necessary mine buildings being located in the town site at the smelter.

The mine and smelter are connected by a Bleichert aerial tram of 16,130' length, of 75-tons hourly capacity, operated by gravity, having 62 wooden towers, highest 85'. The 1,700-ton smelter is thoroughly modern and well equipped. Ore passes through 4x10' revolving sizing drums, coarse material going to the blast furnaces and fines to the calciners. The 500' bin house has bins for ore, fluxes and fuel. The roast building has four 50-ton McDougal calciners.

The furnace building, of steel frame, no wood being used, has three 600-ton water-jacket blast furnaces, each 56x240", first blown in Oct., 1908, and a 17x96' reverberatory furnace, of 150 tons daily capacity, for fines, burning petroleum, the waste heat generating power in 2 Stirling boilers, the power house having 3 additional Stirling boilers, burning petroleum. The converter plant has 96x150" shells of horizontal type, and an electric traveling crane. The product when operating is 99% blister copper carrying 75 oz. silver and 1.5 oz. gold per ton, sent to Perth Amboy works for electrolytic refining. Power plant includes 3 Connersville blowers, each driven by a 450-h. p. tandem compound steam engine, direct-connected. The slag line has electric locomotives.

Although the smelter is about 14 miles from the nearest cultivated lands, the "smoke farmers" of northern California were busy and controversy with the Shasta County Farmers' Protective Association led to the installation of the Cottrell electrolytic flue dust precipitator, which took out the dust, but not the acid fumes, and hence was not successful. The Young process used at Campo Seco (Penn Mining Co.) and the Hall process were also unsuccessful. The Heslewood method in 1915 was the last one to be tried out, but was not satisfactory.

The smelting record is given in Vol. XI, the Copper Handbook.

Production: 1915-16, to June 30, 76,000 tons, netting \$175,000. Management spent \$25,000 on development 1915, and will diamond drill lower workings in 1916, spending 50c on development work for each ton of ore mined.

Property considered good and capable of making money with copper at 14 cts., provided some settlement could be made with the farmers, or a process found for elimination of the sulphurous fumes. Like Trinity Copper, it is a member of the Thos. W. Lawson family. Stock was raised from around \$1 $\frac{3}{8}$ to over \$10 per share in 1915 by a market campaign. Company had \$450,000 in First National Copper Co. treasury and can, in normal times, produce 10,000,000 lbs. per year at a fair profit.

BALAKLALA COPPER CO.

CALIFORNIA

Reorganized as First National Copper Co.

BALBACH SMELTING & REFINING CO.

NEW JERSEY

Office: 580 Market St. **Works:** 111 Passaic Ave., Newark, and on Newark Bay, N. J. **Officers:** Edward Randolph, pres.; C. M. Loeb, v. p.; F. Schmutzer, sec.-treas.; E. E. Dieffenbach, supt.; preceding officers and Jas. F. Bless, directors. **Inc.** 1891 in New Jersey. **Cap.**, \$1,000,000, shares \$100 par, nonassessable, in \$500,000 preferred and \$500,000 common stock; 3,900 preferred and 3,900 common shares issued and outstanding. **American**

Metal Co. is the purchasing and selling agent, but does not control the company.

Plant at Newark comprises an electrolytic refinery, a lead desilverizing plant, and a small copper smelting plant. The refinery has 444 tanks, in parallel, with two 360-k. w. generators. Plant has a capacity of 1,800 to 2,000 tons electrolytic copper per month, employing 150 men. The metallurgical practice of the works ranks deservedly high. The lead refinery, with a capacity of 4,000 tons per month, erected at Newark Bay, went into operation July, 1913. Company does a custom business in ores, bullion, residues, blister copper, etc., containing gold, silver, platinum, copper and lead.

BALKAN BUTTE COPPER MINING CO.

MONTANA

Office: 13 N. Wyoming St., Butte, Mont. Officers: Chas. Steele, pres.; Paul Germolgez, v. p.; Thos. Tomich, sec.-treas. Inc. Jan. 26, 1907, in Montana. Cap., \$450,000, shares \$1 par. Property: 4 patented claims, 80 acres, in Elk Park, Jefferson Co., Montana, shows gold, silver, copper, lead ore. Idle.

BALL COPPER CO.

ARIZONA

Office: 723 Title Ins. Bldg., Los Angeles, Cal. Mine office: Winkelman, Pinal Co., Ariz. Chas. E. Finney, pres.; Edward W. Brooks, v. p.; Robt. J. Simpson, sec.-treas.; preceding officers, C. T. Joslin, Jos. Ball, H. L. McNair and C. E. Finney, Jr., directors. Inc. Feb. 1, 1908, in Arizona. Cap., \$3,000,000, shares \$10 par; \$1,250,000 issued. Bonds, \$50,000 outstanding, at 6%. Annual meeting, third Tuesday in January. Company owns 40,000 shares of the London Arizona Consolidated Copper Co., and has transferred its mineral claims, to that company; they are described under that title.

BALLARD GROUP.

ARIZONA

Formerly under option to the United Verde, Jr., Co. Located at Jerome, midway between United Verde Copper Co. and United Verde Extension on the north and the Copper Chief, Equator and Green Monster on the south. Claims cover an area of 110 acres, 86 patented. Development work amounts to 1,100'. Ore contains copper, gold and silver.

BALTIC MINING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Baltic, Houghton Co., Mich. Works office: Redridge, Houghton Co., Mich. Officers: Wm. A. Paine, pres.; Frederic C. Stanwood, sec.-treas.; preceding officers, Samuel L. Smith, F. W. Paine and Thos. S. Dee, directors; Fred W. Denton, gen. mgr.; John Wagner, purch. agt.

Inc. Dec., 1897, in Michigan. Cap., \$2,500,000, shares \$25 par; fully issued, \$18 paid in. Is controlled, through practically entire stock ownership, by Copper Range Consolidated Co. Owns \$80,000 stock in the Michigan Smelting Co. Annual meeting, first Monday in March. Paid dividends of \$7,950,000 to end of 1913, dividends being \$12.50 in 1905; \$14 in 1906; \$10 in 1907; \$9 in 1908; \$10 in 1909; \$10 in 1910; \$5 in 1911; \$7 in 1912; \$2 in 1913. Net earnings, 1915, were \$949,965, and company ended the year with a surplus of \$1,440,516.

Lands: 800 acres, near the eastern limit of the Michigan copper belt, about 75 acres being on the eastern sandstone and non-mineralized. Holdings comprise all of Sec. 21 except the S. E. $\frac{1}{4}$, and W. $\frac{1}{2}$ of Sec. 20, T. 54 N., R. 34 W. Lands are bounded on the north by the Wheal Kate and Sec. 16 of the Atlantic; on the east by St. Mary's Mineral Land Co.; on the south by St. Mary's lands, lands of Hussey, Howe & Co., and the Trimountain mine; on the west by the Trimountain. Exchanged 39 acres, 1905, with the Atlantic mine, which will enable the Baltic to sink No. 5 shaft to much greater depth than otherwise possible. To the southward

the Trimountain and Champion mines are opened on the same bed, which has a strike of N. 63° E., from Baltic shafts 2 to 5, and to the northward is the Superior mine, on the same bed. The dip of the bed averages about 73°, being the sharpest of any developed cupriferous bed in the Lake district.

The Baltic amygdaloidal bed is exceptionally strong, ranging 15 to 60' in width, and so well mineralized that at most points it can be more or less thoroughly stoped from wall to wall. The great width of the stopes has brought about the use of a walling system, by which waste rock is built into dry walls along the drifts, thus saving timbering, while giving stronger walls than any timber could supply, and saving the cost of hoisting lean rock. The walling system of the Baltic has proven a success under actual test, and is now in general use in the Lake district, the credit being due Mr. Denton. A little melaconite is found in narrow fissures crossing the lode, these being too small to follow, but the black oxide ore mined in the stopes is saved in the milling, carrying 35 to 40% copper as dressed, and smelts readily with the native copper mineral. The native copper of the Baltic is arsenical, and it is probable that some copper arsenides are mined and milled, as narrow arsenical fissure veins occur occasionally in the district south of Portage lake. While the finished copper is arsenical, it makes wire of great tensile strength.

Development: Shafts are numbered from south to north. Mine makes about 2 miles of new openings yearly.

No. 1, the discovery shaft, located between Nos. 2 and 3, was sunk at a wrong angle, and was abandoned at depth of 219'.

No. 2, the southernmost shaft, is 2,566' deep, began production 1906 and furnished about half of the 1915 production. The surface plant at No. 2 includes a boiler house with two 250-h. p. Stirling boilers, and an engine house with a Nordberg air compressor reducing 4,000' of free air per minute to a pressure of 70 lbs. per square inch, and a Nordberg hoist with double-conical drum. The shaft rock house has a crusher operated electrically, and the shaft has concrete stringers.

No. 3 shaft, 1,170' northeast of No. 2 and 2,926' deep, has a steel shaft rock house of the circular type, with 1,200-ton bins, equipment including a 16x18" engine, two 18x24" Blake crushers and a large crusher operated electrically.

No. 4 shaft, 900' northeast of No. 3 and 2,667' deep, has a frame shaft rock house sheathed with steel, 36x71', with 17x31' wing, 88' high, with 1,400-ton rock bins and two 18x24" Blake crushers.

No. 5 shaft, the northernmost, 885' N. E. of No. 4 and 1,624' deep, has a shaft rock house duplicating that at No. 4. Stoping was done on the 9th and 14th levels, inclusive, and drifts run to the Atlantic boundary. The ground was considerably disturbed in the upper levels, but is growing more settled at the bottom, and good showings are reported on the West lode. Hoist is a duplex Nordberg, good for 1,500' depth. Shaft has been abandoned and ground tributary thereto is mined and ore hoisted through the No. 4 shaft.

Hand power cranes for handling mass copper have been installed at all shafts, and the mine has electric pumps. In 1915 installation of additional dynamo for underground haulage and construction of transformer house for new transmission line from stamp mills was completed.

The compressor house, between shafts Nos. 3 and 4, is 36x58' in size, with concrete foundations, stone walls and steel roof, housing a compressor with capacity to reduce 4,000 cu. ft. of free air per minute to a pressure of 70 lbs. per inch. Adjoining is a boiler house of similar material, 49x76', with wing 12x62', having four 250-h. p. Stirling boilers and a 140' self-supported

steel smokestack. This boiler plant supplies steam for shafts 3 and 4. A new boiler plant was constructed in 1916. Adjoining the boiler house is a 360' coal trestle, of 5,000 tons capacity, underneath being a 5x8' concrete tunnel, through which coal is hauled in tram cars, on a down grade, by endless cable. The mine has a complete electric light plant. A considerable town has grown up about the mine with well-built dwellings for employes, on lands owned by the company. The property is served by the Painesdale branch of the Copper Range railroad, under the same control as the mine.

The mill, on Lake Superior, one-half mile west of the Atlantic mill, went into commission Dec., 1901, and was enlarged, 1907. The building is of structural steel, on stone foundation, equipped with 4 Allis simple heads of 500 to 625 tons daily capacity each, and 2 Nordberg compound heads of about 800 tons daily capacity each, giving the mill a capacity of about 4,000 tons daily. Equipped with Wilfley tables, Woodbury jigs and Deister concentrating tables for treating the finer slimes. The mill has crushing rolls and a Huntington mill for regrinding, and a settling tank for slimes. Mineral carries about 60% fine copper. Power is furnished by a 500-h. p. 14x32" Nordberg cross-compound engine, and a 180-h. p. auxiliary engine.

Adjoining the mill is a boiler house with five 250-h. p. Stirling boilers and a Green fuel economizer. Draft is secured by a set of duplex fans, driven by the mill engine, with a concrete smokestack 226' high and 8' in diameter. Behind the boiler house is a 25,000-ton coal storage yard, for the joint use of the Baltic and Atlantic mills, coal being brought to the boilers, through tunnels, by gravity. A 1,250-k. w. electrical plant, installed 1912, at the Baltic mill, supplied power for a number of regrinding mills at this and other stamp mills of the parent company.

Water for the Baltic and Atlantic mills is furnished by a \$150,000 gravity dam across the mouth of Salmon Trout river. The entire steel structure is anchored to a 2" steel base plate, at the bottom of the concrete, by a large number of 1½", 2" and 2½" steel rods, of 15 to 30' length. Water is taken from the dam about 20' below the crest by three 38" riveted steel pipes, one on the Atlantic and two on the Baltic side. Surmounting this structure is a trestle of the Copper Range railroad.

Production:

	Rock Stamped.	Copper Produced.	Yield Per	Cost	Price
	Tons	Pounds	Ton. Lbs.	Per Pound	Received
1906.....	649,932	14,397,557	22.15	09.53c	19.05c
1907.....	761,288	16,704,868	21.94	10.34c	17.28c
1908.....	764,117	17,724,854	23.19	08.28c	13.39c
1909.....	814,260	17,817,836	21.88	07.98c	13.00c
1910.....	781,419	17,549,762	22.46	08.32c	12.74c
1911.....	696,795	15,370,449	22.06	09.09c	12.54c
1912.....	652,433	13,373,961	20.50	10.94c	16.16c
1913.....	333,289	7,736,126	23.21	11.91c	14.89c
1914.....	324,433	7,001,945	21.58	11.17c	13.38c
1915.....	378,443	12,028,947	31.79	09.50c	17.40c
	6,156,409	139,706,305	22.69	09.42c	14.90c

The ultimate productive capacity of the mine cannot be predicted with safety, but the present milling capacity is equal to making nearly 25,000,000 lbs. fine copper yearly, and ultimately this output, or even a greater production, should be reached. The management is of the best.

BALTIMORE COPPER MINING CO.

MONTANA

R. L. Clinton, pres.; T. J. Fenlon, sec.; Jacob Matson, lessee. Property: The Baltimore mine, Boomerang gulch, 4 miles from Boulder, Jef-

erson Co., shows pyritic ore with sphalerite, silver-bearing galena and a little chalcopyrite. Developed by tunnels and stopes. See Bull. 527, U. S. Geol. Survey, p. 121, for description of mine. Shipments in 1914 said to have returned 25 oz. silver, \$2 gold, 9% lead, 2½% sulphur and 4½% iron.

BALTIMORE COPPER SM. & ROLLING CO. MARYLAND

(Baltimore Copper Works), Fourth Ave. and Fifth St., Canton, Baltimore, Md. Jos. Clendenin, pres.; Wm. H. Peirce, v. p.; Edw. Brush, v. p.; H. A. Thoman, sec.; Chas. N. Sappington, treas. Company succeeded the Baltimore & Cuba Smelting & Refining Co., which built the first American copper smelter, 1845, and is controlled, through stock ownership, by American Smelting & Refining Co. (American Smelters Securities Co.).

Lands: 40 acres, located on one of the best harbors of the Atlantic seaboard, with direct rail connections, being very advantageously located for both domestic and foreign business. The plant is large and modern, including a smelter, nickel refinery, electrolytic plant, and sheet copper rolling mill. The electrolytic refinery, of 600 tons daily capacity, has anodes arranged on both series and multiple plan. Material treated is entirely auriferous and argentiferous, being received in the form of blister copper from various western states, and from several foreign countries. Works employ about 1,500 men.

BAMAR COPPER CO. MONTANA

Mine office: 410 Daly Bank Bldg., Butte, Mont. M. J. Scott, pres.; F. H. Butler, v. p.; J. B. Frisbee, sec.; M. A. R. Scott, treas. Inc. Sept. 24, 1910, in Montana. Cap., \$1,500,000, shares \$1 par, nonassessable. Annual meeting, first Tuesday in June.

Lands: 12 claims, 230 acres, in the Summit Mountain district, near Buxton Switch, in the foothills of Fleecer mountain, 13 miles southwest of Butte. Claims were bought of Butte & Buxton Copper Mining Co. for 150,000 shares of Bamar stock. Lands carry several veins, of which 1, of 50' estimated average width, opened on surface for 6,000', was mined 1890, by several shallow shafts, for silver-lead ores. Country rock is granite, markedly similar to that at Butte, covered by 1 to 8' of wash, with a mineralized zone of about one-half mile width carrying 4 veins, with a diorite dike to the northward. Shallow pits and trenches show continuity of the veins, which are leached at surface, carrying a little carbonate ore below commercial tenor.

Development: Includes several shallow old shafts, and the 180' two-compartment Linda shaft, also the 700' Linda tunnel, with a total of about 1,000' of workings. The tunnel shows a ledge, carrying a mineralized 10' streak along the footwall showing mainly pyrite, with some argentiferous chalcopyrite and occasional carbonate stains, and a highly silicious gangue. Property has yielded ore carrying 1 to 36% copper and 43 oz. silver per ton, with up to \$2.50 gold, also galena assaying 11% lead, 24 oz. silver and \$1 gold per ton.

Equipment: Includes a 40-h. p. boiler, 20-h. p. hoist good for 500', 2-drill air compressor and several mine buildings. Company plans deepening shaft, drifting and crosscutting. Property considered promising.

BANKER MINE. COLORADO

Dr. G. Johnson Rittenhouse, owner, Los Angeles, Calif. Ray J. Barber, mgr. and engr. **Property:** On Breece Hill, near Leadville, Lake Co., Colo. \$200,000 claimed to have been expended on development work and equipment under former management. Mine closed down 12 years ago without showing returns for money invested and sold for taxes to present owner. Planning to unwater shaft and develop orebody in 1916.

BANNACK CONSOLIDATED MINING CO.**MONTANA**

Property reported sold, 1915, for \$75,000 to Bannack Gold Mining Co., which see.

BANNACK GOLD MINING CO.**MONTANA**

Office: 331 D. F. Walker Bldg., Salt Lake City, Utah. Mine address: Bannack, Beaverhead Co., Mont. Officers: John F. Cowan, pres., Ogden, Utah; W. C. Ebaugh, sec.-treas., Salt Lake City; G. T. Hansen, managing director; above, with W. J. McCornick and B. Binnard, both of Salt Lake City, directors. C. W. Stallings, supt.

Inc. April, 1915, in Mont. Cap., \$1,000,000, shares \$1 par. Title Guarantee & Trust Co., New York City, transfer agt. and registrar. Stock listed on N. Y. Curb and Butte Exchange.

The first discovery of gold in Montana was made in the Bannack district in 1862, and in that year the placers are reported to have produced \$600,000 in gold. "Quartz" mining began very shortly after. In 1863 a 6-stamp mill was in operation. A reasonable estimate from available data puts the total production of the district to 1905 at not less than \$4,600,000. From 1905 to 1913 the production reported is approximately \$2,000,000. The ores have been of value almost wholly on account of their gold, but they contain also some silver, lead and copper. The district has been comparatively inactive during the last twelve years. The Bannack property has been operated in the past in a desultory manner by owners and lessees.

Property: adjacent to the town of Bannack, at an altitude of 5,935', consists of the Golden Leaf group of 8 patented claims, part interest in 2 claims, the Junction mill-site, with underground rights, also an additional area of 200 acres, besides the underground rights in Excelsior and Horace Placer mill-sites. Nearest shipping point is at Grant, 12 miles from Bannack, on the Pittsburgh-Gilmore Railroad, which connects with the Oregon Short Line at Armstead.

Geology: the rocks of the Bannack district consist of Paleozoic limestone intruded by a nearly circular shaped boss of syenite about $1\frac{1}{4}$ miles in diameter. Around the edges of this intrusive is formed the irregular contact deposit on which the company's claims are located. The orebodies are along the contact or in irregular masses in the limestone and vary in width from 1' to 30' and even 40', averaging about 10'. The high grade bodies vary in length from 50' to 100'; the milling orebodies are of much greater extent. The best ore is usually in the widest parts of the vein, and is for the most part very soft, requiring little blasting, though the ground stands well without timbering. A large tonnage of shipping ore, estimated at over \$1,300,000, has been removed from the property, leaving in the mine large reserves of milling grades of ore. See U. S. G. S., Bull. 574, pp. 72-75.

Development: approximately 13,000' of underground workings to a depth of 600'. The Priscilla tunnel, the main working adit, was driven 800' to the contact at an elevation of 90' above creek level, and cuts the contact 250' below surface, though the highest point of contact on the surface will be 800' above the Priscilla tunnel.

Ore reserves: estimated June 1, 1915, as 100,000 tons of \$8 to \$10 gold per ton, ready for milling; this tonnage has been increased by later work and latest estimate is: 118,000 tons of old ore, varying from \$6 to \$12 per ton; 79,500 tons of new ore, varying from \$5.50 per ton for 50,000 tons to \$11 per ton for 8,500 tons; and about 6,000 tons higher grade ore, varying from \$15 to \$650 per ton. In addition to the above, work is being done on 10 new ore faces. There are also 10,000 tons of dump ore, said to average \$10 per ton. Values are principally all gold, silver contributing \$0.50 to \$1 per ton. No account has been taken in above estimate of ore below the

Equipment: a well-equipped surface plant, also a reduction plant; the first unit of the cyanide plant, now being built, will have a daily capacity of 150 tons. It is expected to start operating in Sept. The plant will use the continuous counter-current decantation process. Power for mine and mill will be furnished by a hydro-electric plant at the mill; water being obtained from Grasshopper Creek, $2\frac{1}{2}$ miles above the mill, furnishing a net working head of 39'. During the winter when water is not available a Diesel oil engine will furnish the power.

Milling costs estimated not to exceed \$2 per ton; mine and overhead costs not to exceed \$1 per ton. Average mill-heads are estimated at \$10 per ton, with an extraction of over 90%.

Mine is well developed and ore reserves, as estimated, are sufficient for 4 years' operation. The possibility of developing new orebodies seems good and operating costs should be low. Using modern methods and under an efficient management, the Bannack mine has great possibilities and is very favorably regarded.

BANNER & BANGLE MNG. CO.

MONTANA

Address: Leo Greenough, mgr., Old Nat'l Bank Bldg., Spokane, Wash. Mine 5 miles from Troy, Lincoln Co., Montana, said to have an ore shoot 1,000' long, developed by 5 tunnels over a vertical height of 2,500', with commercial ore on each level. Ore contains lead and zinc.

Company owns a water right which will be utilized for developing electric power; dam now under construction. A railroad will be built from Troy to the mine and a 250-ton mill erected 2 miles from Troy. Employs 400 men at present. Improvements estimated to cost \$500,000.

Reported in April, 1916, that property had been acquired under lease and bond by Snowstorm Mines Cons., which see.

BANNER GOLD MNG. CO.

COLORADO

Address: 516 Exchange National Bank Bldg., Colorado Springs, Colo. **Officers:** J. T. Hawkins, pres.; J. R. McKinnie, v. p.; E. C. Sharer, sec-treas.; A. D. Aitken, asst. sec. and treas. **Cap.,** \$2,000,000, shares \$1 par. Treasurer's statement Jan. 1, 1916, shows 11,000 shares in treas., and cash on hand \$185. At last accounts taxes paid to 1915; liabilities, \$490. Last stockholders' meeting June, 1903. Listed on Denver and Colorado Springs Exchanges.

Property: 7 claims, patented, 68 acres, on Beacon Hill, Cripple Creek, show 3' fissure vein, containing gold and silver, and the C. K. & N. vein, 3' wide where cut. **Development:** 90', 110' and 400' shafts, with prospecting on 3 levels. Worked in 1915 by lessees through the 700' level of the Henry Adney shaft on adjoining property, and produced \$1,800. Gross production to Jan. 1, 1916, \$8,149.

BANNER M. & M. CO.

IDAHO

Peter Steele, pres. and gen. mgr.; John C. Abels, v. p., St. Paul, Minn. **Property:** at Silver City, Owyhee Co., Idaho, an old-time producer, idle for some time owing to lack of funds. Authorized bond issue in 1915 has provided sufficient capital for immediate resumption of development work.

Ore: quartz. **Development:** by tunnel. **Equipment:** 4 (Nissen)-stamp mill, compressor and electric power.

BARABA MINING CO.

WISCONSIN

Idle. **Office and mine:** Mellen, Ashland Co., Wis. Nelson Baraba, Sr., pres.; Nelson Baraba, Jr., sec. **Inc.** 1906. **Cap.,** \$1,000,000, shares \$1 par. Has a shallow shaft showing ore assaying 2.8% copper, with traces of gold and silver.

BARBAROSSA MINE.

CALIFORNIA

Address: M. B. Kerr, gen. mgr., 626 Mills Bldg., San Francisco, Calif.; B. G. Parlow, owner, Loraine, Kern Co., Calif.; F. W. Snyder, supt.

Property: 140 acres, near Loraine, 15 miles N. E. of Caliente, Kern Co., Calif., shows 7 veins, of which the Barbarossa alone has been worked. It has a N. W.-S. E. strike, with dip 40° E., average width 4', granite foot-wall, and quartz-porphry hanging-wall.

Ore: free milling gold. **Development:** tunnels. **Equipment:** 5-stamp mill, 1½ miles from the mine, gasoline power. Said to have total production of \$60,000 up to 1915.

BARE HILL MINE.

MARYLAND

Office: Care of F. R. Van Antwerp, owner, Hornell, N. Y. Mine near Mt. Washington, Baltimore Co., Md. Is an old and slightly developed mine, showing auriferous and argentiferous chalcopryrite and bornite. Idle many years.

BARNES-KING DEVELOPMENT CO.

MONTANA

Address: Butte, Mont. Mine offices: Kendall, Fergus Co., and Marysville, Lewis & Clark Co., Mont. **Officers:** C. W. Goodale, pres.; A. J. Davis, v. p.; J. E. Corette, sec.; C. C. Swinborne, treas.; preceding officers, C. R. Leonard, F. L. Melcher, I. A. Heilbronner, T. A. Marlow, directors. Geo. P. McGee, mgr.; Jerome Place, Helena, Mont.; I. H. McCormick, supt. Piegan-Gloster; W. R. Price, supt. Shannon mine.

Inc. 1907 in Montana. **Cap.**, 400,000 shares, \$5 par; all issued. Security Transfer & Registrar Co., New York City, transfer agt. Annual meeting, first Wednesday in March. Stock listed on Butte Exchange.

Balance sheet as of Dec. 31, 1915, shows assets of \$2,428,737, which includes properties and options, \$1,903,092; buildings and supplies, \$277,059; N. Y. City bonds, \$54,764; bullion in transit, \$54,801; accounts receivable, \$7,995; cash, \$117,046; liabilities include a surplus of \$288,486.

Net profits have been as follows: in 1913, \$24,700; in 1914, \$150,419; in 1915, \$147,968, and \$26,011 for quarter ending March 31, 1916. Operating profits of the North Moccasin property in 1915 were \$201,568, while the Piegan-Gloster operated at a loss of \$15,993; \$20,276 was expended on Shannon development. First dividend of 7½c a share was paid March 1, 1916; 2nd of 7½c paid June 1, 1916.

Property: originally owned and operated by the company, consisted of the Barnes-King group of claims at Kendall, developed by the Barnes-King mine.

In 1912, after working spasmodically for several years and spending considerable time and money in an unsuccessful search for new orebodies, the mine was closed permanently, with about \$300,000 left in the treasury. The management now determined to acquire a good property for the company. In 1912 the North Moccasin property, covering about 2,000' in length along the ore-bearing formation adjoining the Barnes-King on the north and the Kendall on the south, was purchased for \$150,000; \$5,000 cash, and the remainder to be paid from net working profits in no prescribed time. In addition a working option was obtained on the Piegan-Gloster property, located near Marysville, Lewis & Clark Co., Mont. Title to this property was obtained in 1913; purchase price paid for it was \$100,000, with an additional cost of \$8,200 for 5 adjoining claims. The Gloster mine had been worked from 1880 to 1888, when the pumps were pulled. It is credited with a production of several million dollars of gold and silver bullion.

In 1915 the company bought all the property of the Kendall Gold Mng. Co., adjoining the North Moccasin on the south, for \$100,000, and an option was taken on the Shannon mine, 2½ miles southwest of Marysville; purchase price is approximately \$228,000, payable from mine profits.

At the end of 1915 the company owned, or had under option, the following properties: At Kendall, the Barnes-King group, 23 claims, 286 acres;

North Moccasin group, 6 claims, 67 acres; Kendall group, 21 claims, 266 acres; total, 50 claims, 619 acres; at Marysville, the Piegan-Gloster group, 34 claims, 391 acres, and the Shannon group, 6 claims, 92 acres, exclusive of 2 claims purchased late in 1915. In Jan., 1916, the company took an option and lease on 2 claims, known as the Parker-Brownlow group, in the Rimini district, 22 miles from Helena. The orebodies at Kendall are irregular replacement deposits in limestone, dipping 25°. The ores are mostly soft and well oxidized.

Development: the North Moccasin group was first worked through the Barnes-King shaft; later the Santiago shaft was completed to the 500' level and it is now the main working shaft. Orebodies have been opened up on different levels to a depth of nearly 800'. In 1915 underground work totaled 6,600'. The Kendall mine was closed by former owners in 1913, after having exhausted all known orebodies to a depth of 560'.

The old Gloster mine had been opened by a vertical shaft to a depth of 500', and a winze sunk 300' below the 500' level. The Piegan claim had been developed by tunnels. The B. K. Co. has unwatered the Gloster mine to the 400' level and opened up the Piegan orebody above water level. The Norman tunnel, connecting the No. 4 Piegan tunnel and Gloster workings with the tramway to the mill, was driven 900'. All ore mined in 1915 from the Piegan-Gloster ground averaged \$6.20 gold and \$1.14 silver per ton.

The Shannon mine, previous to the time of its being taken over by the B. K. Co., was opened by a tunnel with 2,000' of underground workings, chiefly on the vein which, in the tunnel, is 300' long, from 4 to 10' wide, and averages \$15 in gold per ton. The B. K. Co. has sunk a 215' winze on the vein, dip 70°, and opened up the 200' level for a distance of 400' to the W. and 122' to the E. The vein is in slate, and where crosscut on the 100' level is said to have a width of 15'. Ore taken out in drifting amounted to 800 tons of ore, assaying \$16 per ton. The Shannon mine is 13,000' from the Gloster mill, to which it is being connected by an aerial tramway.

Equipment: at the North Moccasin there is a double drum electric hoist, compressor, and a 1,400' electric tramway from mine to mill, which is on the original B. K. group, and has a nominal daily capacity of 200 tons, allowing a 10-days leaching period. There is also a small oil fired roaster for treating the black unoxidized ore found in the eastern ore shoot. There is a 500-ton cyanide plant on the recently acquired Kendall property. The Piegan-Gloster equipment includes a double drum electric hoist, 100-h. p. motor and compressor at the Gloster shaft. The old Gloster 60-stamp mill has been equipped with a No. 5 Symons gyratory crusher, three 10' Chilian mills, 2 Wilfley tables and a cyanide plant. The mill is to be connected to an all-slime treatment plant with a daily capacity of 150 tons. The Shannon mine has a 75-h. p. electric driven compressor.

Power: the purchase of the Kendall property included a 400-h. p. hydro-electric plant on Warm Springs creek, 6 miles from the mine. This plant furnishes power for the Kendall properties, and also supplies the towns of Hilger and Kendall with lighting facilities. The Piegan-Gloster and Shannon properties obtain power from the Montana Power Co.

Production: North Moccasin—

	Tons Milled	Assay per Ton	% Rec.	Lbs.Cons. per Ton			Total Costs per Ton	Net Profits per Ton
				KCN.	Zn.	Lime		
1915	47,038	\$9.80	89.7	0.40	0.43	4.0	\$4.65	\$4.28
1914	51,471	8.92	93.8	0.27	0.46	3.2	4.40	3.84
1913 (a).....	49,726	8.89	90.58	0.32	0.34	2.7	5.05	3.29
Piegan-Gloster—								
1915 (b).....	14,956	7.34	8.52	....	....	....	6.94	1.07 (d)

Shannon mine—
 1915 (c)..... 1,690 27.76

(a) Mining and milling figures cover 12 mos.; costs per ton cover 16 mos. (b) 7 mos. operation. (c) Extracted during development work.
 (d) Loss.

Company is prospecting the Woodrow Wilson claim on Bald Mountain, Rimini district. Two carload shipments made to the East Helena smelter early in 1916 gave returns of 1.14 oz. gold, 1.8 oz. silver.

The present officers, by obtaining good properties, have built up a strong company, which promises to be one of the regular dividend payers. This is the result of several years of untiring effort, often under discouraging conditions and in the face of ridicule. The management deserves great credit.
BARNEY COPPER CO.

ARIZONA

Office and mine: Globe, Gila Co., Ariz. Hon. J. D. Coplen, pres. and gen. mgr.; J. B. Coplen, v. p.; W. J. Miller, sec.; foregoing, with F. F. Green and J. N. Porter, directors; 1st Nat'l Bank, Globe, treas. Inc. Aug. 27, 1910, in Arizona. Cap., \$5,000,000, shares \$5 par; nonassessable; fully paid and fully issued, 999,995 shares being given for property. Annual meeting, first Tuesday in October.

Lands: 34 claims, partly fractional, patented, about 560 acres, adjoining the land of the Inspiration Cons. Copper Co. on the west, show Pinal schist and quartzite, partially covered by conglomerate. Property has a number of old pits and shafts, deepest 400', in Gila conglomerate. **Equipment:** includes 15-h. p. gasoline hoist, and there are 7 camp buildings.

In April, 1911, Barney stock was offered for sale in Kansas City at 50 cts. per share. In Jan., 1912, an option on property was given to the General Development Co. for \$600,000. This company put down 2 holes, one at the bottom of the 400' shaft passed out of schist and into dacite and at 1,030' into granite porphyry. This drill hole encountered an artesian flow at 960', which is a valuable asset of the company. The General Dev. Co. soon after relinquished its option and the property has since been idle. Drill hole No. 2 was discontinued at 600' without disclosing ore. The Barney Co. claims to have put down two holes, one of which passed thru 20' of ore, about 1.2% copper, before being lost. Second hole was also lost. Company is planning to do more development work. The surface conditions on property are unpromising, the rocks gray and unaltered and this area is not favorably regarded.

BARSTOW MINE.

COLORADO

Office: 42 Broadway, New York. Mine office: Ouray, Ouray Co., Colo. Works at Ironton, Ouray Co., Colo. J. H. Fennessy, trustee, New York office; A. R. Wilfley, cons. eng.; C. R. Wilfley, mgr., at Denver; O. W. Knous, supt.; A. C. Haskell, mill supt.; W. C. Fulton, purch. agt.

Property: 27 claims, patented, 199 acres mineral land with 5 acres mill site, in Red Mountain district. Ore found in fissure vein in andesite with N. W. strike and dipping 75°, is reported as 8' wide and carries 0.75% copper, 2.5% lead, 4% zinc. Developed by 2 shafts, 425' and 145' deep, and 2 tunnels, 3,200' and 3,300' long. Total length of underground workings 10,300', reported to have developed 17,000 tons of ore with 8,000 tons in sight.

Equipped with 2 hoists, electric compressor, 6-drill capacity, frame stamp mill and concentrator with 2 Blake crushers, 9x15", 40 stamps, 20 Wilfley tables, 2 slime tables and buddles. Mine has 115 h. p., mill 175 h. p.

Mine is 11 miles from D. & R. G. R. R. and the Silverton R. R., operating in the summer, is 1 mile away.

Company plans extensive development and installation of electric hoist, saw mill, etc. Mill in operation from June 1 to Dec. 1 only. Property developed by lessees in 1914-15, reported to be making regular shipments to the Durango smelter.

BASIN MNG. CO.

IDAHO

Wallace, Idaho. **Incorporators:** John P. Gray, Therrett Towles and F. Pfirman. Control purchased May, 1916, by the Hercules Mining Co., which bought 700,000 shares of issued and 500,000 shares treasury stock.

Inc. July, 1915. **Cap.**, 1,500,000 shares, par value 5c. This company is a reorganization of the old Basin Mng. Co., involved in litigation since 1907. Owns 5 patented claims in the Burke section, south of and adjoining the Hercules mine, between the Laclede on the west and the Stanley group. It is valuable to the Hercules Co. for tunnelling from the Hummingbird and Stanley into the Hercules mine.

BATES LEASING CO.

COLORADO

Inc. by Central City parties in October, 1913. **Property:** Bates mine in Chase Gulch, Gilpin Co., Colo., which had been idle for 28 years. **Ore:** occurs as pyrite and chalcopyrite in shoots about 3' wide, carrying gold, silver and copper. Milling concentrate averages 1.23 oz. gold and 7.80 oz. silver; smelter returns average 2.50 oz. gold, 14 oz. silver and 2.94% copper. The ore is treated at the Polar Star mill, leased by the company at Black Hawk and concentrate shipped to Globe smelter at Denver.

Development: consists of winze sunk from the 400' level and drifting from it.

BATOPILAS MNG. CO.

MEXICO

Address: 50 Broad St., New York City. **Mine office:** Batopilas, Chihuahua, Mex. **Officers:** F. D. Merchant, pres.; Sam'l Elliott, N. F. Palmer, v. ps.; preceding officers, Jas. Marwick, Geo. W. Field, Alton B. Parker, Gates W. McGarrah, Louis H. Scott, Walter M. Brodie, Geo. Rowland, E. L. Stevens, all of New York. F. A. Drury, Worcester, Mass.; Robt. M. Currier, Boston, directors; E. W. A. Jorgensen, sec. and asst. treas.; L. H. Scott, treas.; John R. Harbottle, gen. mgr.

Cap., \$9,000,000; shares \$20 par; outstanding \$8,931,980; nonassessable. **Bonds:** authorized \$1,000,000, 1st mtge. 6's, dated Dec. 1, 1887, for 15 years, outstanding \$367,900. Bonds were extended to Dec. 1, 1917, with provision that 10% of amount outstanding at that time, \$45,900, should be retired each year, beginning in 1908. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting 3d Tuesday in April. Union Trust Co., New York, and State St. Trust Co., Boston, transfer offices. Farmer's Loan & Trust Co., New York and Old Colony Trust Co., Boston, registrars.

A concession from the Mexican government was granted April 12, 1886, to A. R. Shepherd for 20 years, covering 61 sq. miles of the richest mineral district in and around Batopilas, together with water rights of the Batopilas River. This concession was assigned to the Batopilas Mng. Co., which was organized Oct. 13, 1887, in New York, as a consolidation of 6 companies, Cons. Batopilas Silver Mng. Co., New Giral Silver Mng. Co., Descubridora Cons. Silver Mng. Co., Camuchin Cons. Silver Mng. Co., Valenzuela Cons. Silver Mng. Co., Animas Silver Mng. Co.; other mining properties were also purchased. The concession expired in 1906, and was renewed for 10 years, expiring May 31, 1916. It gave the company full mining rights over the area mentioned, the company being required to purchase outright at least 100 hectares, 240 acres, per year.

Balance sheet as of Dec. 31, 1914, shows assets, \$12,794,479, of which amount \$12,485,435 represents mines, real estate, buildings, equipment, etc.,

and \$207,322 current assets; current liabilities \$37,258, accrued liabilities \$24,950. Total surplus Dec. 31, 1914, \$3,365,771. Oct. 15, 1915, the company had cash in New York banks, \$87,247.

Property: located around the town of Batopilas, in the Andres del Rio mining district, in the extreme southwestern part of the State of Chihuahua, Mexico. When 1913 began the company had titles in the silver zone for 865 hectares, and in the auriferous zone, 20 miles up the river, for 64 hectares. On account of the revolution it has been impossible, during the last 3 years, to comply with the provisions of the contract and time allowances have been granted. In addition the company owns 130,000 acres of ranch and timber lands.

Ore: native silver occurring with calcite in veins, which are mainly in diabase. Some of the veins have contained very rich ore. The San Miguel property contains many veins, some of which have been worked for more than 100 years. The main veins are the San Antonio, Cancio, Cinco de Mayo, Diablo, Carmen, and Veta Grande now worked out. During 6 months in 1913 the average assay for low grade ore from the San Miguel mine, which produces $\frac{3}{4}$ of the silver output, was 9.27 oz. per ton, while the ore from the Porfirio Diaz Tunnel group averaged 6.55 oz. per ton. High grade ore produced during .8 mos., 609 tons, averaged 411 oz. per ton.

Development: over 10 miles of adit levels and 77 miles of workings. The principal mines are the Porfirio Diaz Tunnel on the Todos Santos Group, the San Miguel mine, El Escritorio, and El Camuchin. Work at El Escritorio and El Camuchin was unsatisfactory in 1913 and they were closed down.

Equipment: the Hacienda San Antonio contains 100-stamp mill with a daily capacity of 40 tons, electric light plant and air compressor, all run by Pelton wheels capable of furnishing 550-h. p. The San Miguel Hacienda contains a 25-stamp mill for high-grade ores, cyanide plant, amalgamating pans, refining plant, a roasting and lixiviation plant for concentrates, with a daily capacity of 8 tons, machine shop, foundry, office buildings, dormitories, boarding house, etc.

Power obtained from the Batopilas River by means of a dam 764' long and an aqueduct 9,900' long. The water after being used in the San Antonio plant, is siphoned under the river and runs to the San Miguel Hacienda, where 32-h. p. is developed by turbines.

Production and profits: have been as follows:

Year	Tons Ore Treated	Oz. Silver	Operating Profits
1915.....	.....	156,862	.....
1914.....	6,630	188,087	\$ 10,556
1913.....	20,887	374,174	60,068
1912.....	34,032	564,398	80,046
1911.....	33,073	516,688	17,409(a)
1910.....	43,612	730,697	106,258(a)

(a) Deficit.

During the last 3 years the Mexican revolution has interfered with the operations of the company, the mines were worked only about 8 mos. of each year with a consequent reduction of output. The future of the property depends upon new development.

BATTLESHIP MINING & MILLING CO. **NEW MEXICO**
 Idle many years. **Office:** 412 Mack Bldg., Denver, Colo. Mine near Lordsburg, Grant Co., N. M. Dr. O. L. Blachly, pres.; O. B. Crum, sec-treas. **Cap.,** \$100,000, shares \$1 par. **Lands:** 2 groups of 2 claims each, area 79 acres, in the Virginia district, 3 to 4 miles from Lordsburg, con-

nected therewith by a good wagon road. Property has no surface improvement, but is opened by 478' of shafts, crosscuts and open cuts, showing ores that are said to have given average returns, from smelter shipments to El Paso, of 8 to 14% copper, 1 to 20% lead, 22 oz. silver, and \$10 to \$20 gold per ton. Property reported under lease to Andrew Bain of El Paso in 1915.

BAY STATE MNG. & DEV. CO.**UTAH**

Address: American Fork, Utah Co., Utah. Geo. B. Tyler, pres.-mgr.; J. H. Wooten, v. p.; J. W. Storrs, sec.-treas.; with A. Chipman and E. J. Bennett, directors. **Property:** at American Fork canyon, developed by tunnels. A shipment made in Oct., 1915, said to have averaged \$21 per ton.

BEAD LAKE GOLD-COPPER MINING CO.**WASHINGTON**

Office: 600 Columbia Bldg., Spokane, Wash. Geo. C. Geisler, pres.; W. E. Allen, sec.-treas. and gen. mgr.; preceding officers, Geo. Potter, A. B. Babb and Jos. Rosslow, directors. **Inc.** Dec. 15, 1910, in Washington. **Cap.**, \$3,000,000; shares \$1 par; assessable; 1,800,000 shares issued, 100,000 shares were offered at 50 cts. a share in 1916 by a New York brokerage firm. **Annual meeting,** first Tuesday in March.

Property: 17 claims, about 7 miles from Newport, Wash., shows 1 undeveloped vein and 2 veins which have been developed and show silver-lead ore to a depth of 300' and 267' along a vein averaging 8' wide. **Development:** includes 300' of shafts and over 4,500' of tunnels. Company claims about 25,000 tons of good concentrating ore blocked out.

Equipment: includes 60-h. p. boiler, steam power, air compressor, diamond drill, smithy, and buildings sufficient to accommodate 50 men. **Management** planning to build a concentrator and begin shipments in 1916.

Company bought controlling interest in Comstock mine and adjoining claims, 8 miles from Newport, in Feb., 1913, for \$25,000 cash and an interest in the company.

BEAR GULCH MINING CO.**MONTANA**

Office: care of Alex. Johnson, Clark Bros. Bank, Butte, Mont. **Mine** at Twin Bridges, Madison Co., Mont. **Property:** the Mountain View group, carrying auriferous and argentiferous copper ores, opened by tunnel about 3,000' long. Has steam power and air compressor. Property has little ore and is not on the contact zone; its chief value is for a tunnel site for the Moffat claims, which adjoin it, and are being worked, 1916, by George C. Stone, former manager of the Alex Scott Mine at Butte. The Moffat Mine has developed a granite lime contact with basic carrying magnetite that varies from 5' wide for 1,000' along the tunnel, to 100' wide near the face. This ore, averaging 2.1% copper, is shipped (1916) to the East Butte smelter. **Tramming** to R. R. costs \$2.00, railroad freight \$1.75 and smelting charge \$3.75 per ton.

BEAR TOP MINE**IDAHO**

Formerly owned by Bear-Top Orofino Cons. Mng. Co., which owed \$162,000 and went into hands of receiver, in 1913. **Property:** in Murray district, Coeur d'Alenes, near Wallace, Shoshone Co., Idaho, shows ore in pockets and irregular shoots, with silver-lead values. Leased to E. Z. Christian, May, 1914.

BEARUP GROUP**NEW MEXICO**

Owned by D. E. Bearup, Cooney, N. M. Located in the Mogollon-Cooney district, Socorro Co., N. M. **Claims:** 4 on Gold Hill and 9 in western part of district. The Gold Hill claims show the Maud S. lode. Vein where opened has width of 2' to 13', and is said to assay \$12 per ton. There is also a narrow high-grade streak. **Development:** by tunnels, long-

est 600'. Total amount underground workings 1,500'. Small shipments have been made of ore extracted during development work, 50 tons said to assay \$98 to \$235 per ton and 50 tons shipped to concentrator said to assay \$21 per ton. There is a small 2-stamp mill and gasoline engine on the property. Employs 6 men.

BEATSON COPPER CO.**ALASKA**

Entire property, assets and liabilities acquired by the Kennecott Copper Corporation, and company dissolved Oct. 4, 1915.

BEAVER AUXILIARY MINES CO.**ONTARIO**

Three-quarters of stock is held by Beaver Cons. Mines, Ltd., which see. H. Donaldson, supt. **Property:** 120 acres, at Elk Lake, Ont., carries silver ore, mainly of milling grade. **Development:** 330' main shaft, crosscuts and drifts. **Equipment:** hoist and surface buildings.

BEAVER-BUTTE COPPER CO.**UTAH**

Office and mine: Beaver, Beaver Co., Utah. Sherman McGarry, supt. **Inc.** 1909, in Utah. **Cap.**, \$50,000; shares 10 cts. par; assessable. Property idle from 1912-1914, owing to lack of capital, but development work resumed in summer of 1914, and property reported under lease to Senator A. B. Lewis, representing Eastern capitalists, 1916.

Lands: 15 claims, unpatented, in the Newton district, 8 miles from a railroad, show gold-silver ore and are believed to carry the continuation of the Sheep Rock ledge. **Development:** by a 150' two-compartment shaft, crosscuts and drifts. Company claims to have 2' of \$10 ore on surface and 19' of \$8 ore on the 150' level with 1' of \$18 ore along the foot-wall side. Plans installing an electric hoist and drifting on the 150' level. See Beaver Gold Mines Corp. and remember Majestic Mines.

BEAVER CONS. MINES, LTD.**ONTARIO**

Lumsden Bldg., Toronto, Ont. **Mine office:** Cobalt, Ont. **Officers:** F. L. Culver, pres.; C. C. James, v. p.; H. E. Tremain, sec.-treas.; preceding officers, Wm. T. Mason, F. L. Lovelace, W. E. Stevenson, F. C. Finkenstaedt, directors; J. W. Moffett, supt., c/o Beaver Mine, Cobalt.

Inc. Feb., 1907. **Cap.**, \$2,000,000, shares \$1 par, fully paid, all issued. Union Trust Co., Toronto, and Security & Registrar Co., New York, transfer offices. Annual meeting in April.

Balance sheet of Feb. 28, 1915, showed assets of \$2,589,901, which included accounts receivable \$5,064, due from smelters \$31,282, ore on hand or in transit, \$216,550, Beaver mine \$1,000,000, Beaver Auxiliary Mines stock, \$141,750, Temiskaming Mng. Co.'s stock \$9,928. Liabilities showed accounts payable \$9,009, depreciation account \$93,040, profit and loss balance \$480,981. The company had \$35,128 invested on capital account. One dividend, \$60,000, was paid in 1914, and a 3% dividend on April 27, 1915. At close of 1915 the company had bullion in storage and due from smelters aggregating an estimated value of \$170,278.

Property: 2 claims, patented, 60 acres, in Coleman Twp., Cobalt district, adjoining the Temiskaming mine, and 120 acres, James Twp.; also 12 months option from Nov. 1, 1915, on Kirkland Lake Mining Co., Teck Twp., and a $\frac{1}{4}$ interest in the Beaver Auxiliary Mines Co.

Ore: silver, cobalt, and arsenic in narrow calcite veins, in diabase and the Keewatin formation. Ore occurs as high-grade in pockets and shoots, or as milling ore. The mineralized lode strikes N. E., 10° dip.

Development: by vertical shaft, 1,234' deep at end of 1915; sinking of this shaft will be continued to the diabase-Keewatin contact at a depth of 1,600' to 1,700'. During 1915, underground work totaled 5,211'. Ore extraction was kept at a minimum, due to low price of silver.

Equipment: includes a 150-ton concentrator, giving an extraction of about 80%, blacksmith shop, dwellings, etc.

Production:

Year	Tons Milled	Tons Concts.	Oz. Ag. in Concts.	Total Oz. Ag. Prod.	Earnings
1915	30,093	474	349,900	746,310	.....
1914	26,724	348	415,707	900,000	\$158,465
1913	25,256	324	379,764	762,699	168,630

The company plans to develop its Kirkland Lake property. It has a surface plant of 2 boilers, small compressor, and mine buildings. Vein has been proven for 1,400'. Company's agreement with the K. L. Gold Mines, Ltd., demands a monthly expenditure of \$2,000 for development for a year.

BEAVER COPPER CO.

UTAH

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. Mine at Milford, Beaver Co., Utah. A. D. Moffat, pres.; A. J. McMullen, v. p. and gen. mgr.; F. S. Walden, sec.-treas.; preceding officers, A. D. McMullen, Lewis Merriaru, Chas. A. Weaver and Jas. H. Paterson, directors; D. P. Rohlfing, cons. engr. Inc. 1907, in Utah. **Cap.**, \$1,000,000; shares, 10 cts. par; assessable; all issued. Annual meeting, third Monday in March.

Property: 4 claims, 75 acres, in the Beaver Lake district, carrying an ore zone for about 6,000', with 2 veins, known as North and South, that are fissures in monzonite. Six veins about 4' wide, developed by 4 pits and a 140' shaft, with 308' of workings, show oxidized and sulphide ores, latter chalcopryrite, estimated by management to average 2% copper, 6 oz. silver and 80 cts. gold, per ton. Company has raised sufficient funds to install complete equipment and has begun sinking shaft to 400' level, February, 1916. Shipped 8 tons in 1914 and a total of 80 tons to date.

BEAVER GOLD MINES CORP.

UTAH

Officers: A. B. Lewis, pres.; E. C. McGarry, v. p.; M. P. Braffet, sec.-treas., with B. F. Caffey, W. L. Cook, W. H. Stephens and S. Glazier, directors. A. B. Blainey, mgr. Inc. in 1914. **Cap.**, \$3,500,000, shares \$1 par.

Property: claims covering the Sheep Rock, gold vein in the Newton district in eastern Beaver Co., 12 miles northeast of Beaver City, Utah. **Development:** by a shaft 100' deep, in 1915. Company claims to have cut a vein of milling ore, 15' wide on the 60' level, and 18' wide on the 100' level. At last accounts was planning on sinking an additional 60'. In Jan., 1916, the company is reported to have obtained a bond, \$240,000, on the old Sheep Rock mine, a former high grade producer, developed to the 300' level and equipped with a 5-stamp mill. Promotion methods have caused much comment.

BEAVER HORSESHOE GOLD MNG. CO.

UTAH

Beaver City, Beaver Co., Utah. **Officers:** H. B. Ward, Mina, Nev., pres.; John Waldis, Tonopah, v. p.; C. R. Bunker, Salt Lake City, sec.-treas., with Fred Zimmerman, J. W. Kelley and F. E. Becker, directors. Inc. in May, 1915. **Cap.**, \$250,000. **Property:** 19 claims located on south Fork of Beaver river, 14 miles east of Beaver City. Surface samples are said to assay \$24.60 in gold and 2 to 11% potash.

BEAVER LAKE GOLD MNG. CO.

SASKATCHEWAN

Prince Albert, Saskatchewan, Canada. Fred Cox, sec., at last accounts. **Property:** in April, 1914, the company acquired 32 claims of the Prince Albert Expl'n Co., located on the north shore of Beaver Lake, 118 miles from Le Pas, the nearest R. R. point, is on the Can. Northern Ry., out of Winnipeg.

Development: has been done on the Prince Albert claim where, at the contact of the Huronian schist and Laurentian diorite, a 48" quartz outcrop can be traced for a considerable distance. A 70' incline shaft, sunk on the vein, is said to show a 4 to 5' vein averaging \$16 in gold and 2 oz. silver per ton. Company was planning development work at last accounts.

BEAVER MINES CO. UTAH

Office: 222-23 Continental Bank Bldg., Salt Lake City, Utah. Mine address: Marysvale, Piute Co., Utah. A. H. Cutright, pres. and mgr.; Geo. R. Raymond, v. p.; W. E. Kilburn, treas.; A. Maxwell, sec., and Alex. Beckstead, directors. Inc. Dec. 17, 1910, in Utah. Cap., 1,000,000 shares, 1 ct. each; issued, 850,000 shares. Annual meeting, second Saturday in January.

Property: 11 claims, 220 acres, in the Ohio district, 5 miles from D. & R. G. R. R. Claims carry copper-bearing gold-silver ores in fissure veins in andesitic porphyry, giving average assays of from \$1 to \$60 per ton. There are 7 veins, 2 developed by crosscut tunnels, 725' and 72' long, to reach the main vein. Mine has only a prospecting outfit. Management plans drifting and developing on several veins in 1916.

BEAVER MOUNTAIN MINING CO. ALASKA

Idle. Mine office: Sulzer, Prince of Wales Island, Alaska. Henry Miller, pres.; George Comer, mgr., at last accounts. **Lands:** on the southern side of Beaver mountain, Hetta inlet. **Development:** by tunnels, showing ore carrying copper, nickel and cobalt. Operations confined to annual assessment work.

BEAVERHEAD MONTANA COPPER MNG. CO. MONTANA

Ray A. Cobban, Butte, Mont., sec.-treas. Cap., \$100,000, shares \$1 par. Company obtained a lease and bond on the old Jack Rabbit mine, in Argenta, Beaverhead Co., Mont. **Developed:** by a shaft 100' deep. Ore said to assay 22 oz. silver, and 12% copper.

Equipment: includes a gasoline hoist. Company was planning at last accounts, to sink the shaft an additional 100' and do development work.

BECK TUNNEL CONSOLIDATED MINING CO. UTAH

Office: Knight Investment Co., Provo, Utah. Jesse Knight, gen. mgr.; Wm. Homer, supt. Inc. 1904 in Utah. Cap., \$100,000; shares 10c par; all issued; assessable. Prior to Nov., 1907, paid \$675,000 in dividends, none paid since.

Property: 119 acres, patented, located in the Tintic district, Juab Co., adjoining railroad. **Ore:** gold, silver, lead, zinc. **Development:** by 2 shafts, one double-compartment and 1,100' deep, and by a 1,000' tunnel. For the past year the mine has been worked by lessees; company is now doing prospect work on the 1,100' level.

Production:

	Ore Tons	Gold Oz.	Silver Oz.	Lead Lbs.
1912.....	6,298	1,073	95,031	1,863,559
1913.....	5,371	584	119,120	1,778,317
1914.....	2,934	322	66,605	1,260,713

Shipments of zinc ore, said to contain 36% zinc, started in 1915.

BEE BEE MINING CO. UTAH

Office: Newhouse Bldg., Salt Lake City, Utah. Mine office: Goldstrike, Washington Co., Utah. **Officers:** H. G. Snyder, pres.; John A. Bryson, v. p.; Rolla E. Clapp, sec.-treas.; with E. J. Lund and Thos. Marioncaux, directors; S. F. Snyder, supt.

Inc. April 13, 1915. Cap., \$100,000; shares 10c par, issued \$70,000.

Property: 3 claims, unpatented, in the Goldstrike mining district, Washing-

ton Co. **Development:** in July, 1915, claimed to show 20,000 tons of \$10 to \$35 free milling ore in fissure vein. Employed 3 men at last accounts.

BEECHER GOLD MINING CO. WASHINGTON

Address: Orient, Wash. A. A. MacDowell, pres.; W. J. Gilpin, v. p.; Alex A. Anderson, sec.-treas.; with Ralph Warmelle, Washington, D. C., directors, at last accounts.

Property: near Orient, Perry Co., Wash., has the Beecher mine on it in which gold-quartz ore occurs in stringers.

In June, 1915, C. C. Arrasmith, of Republic, Wash., is reported to have taken a lease and bond on the mine for \$180,000.

BEEMER CONSOLIDATED GOLD & COPPER CO. ARIZONA

Owns the Stormcloud mine at Mt. Union, 12 miles south of Prescott, Yavapai Co., Ariz. Idle, 1915.

BELCHER MINING CO. ARIZONA

Address: Providence, Ariz. Owned by E. S. Pennebaker, W. W. Lewis and Frank S. Kirkland of El Paso, Tex. **Property:** the Red Rock, Belcher, Mammoth and Eugenia claims in Big Bug district, Yavapai Co., Ariz., 13 miles south of Prescott.

Ore: copper, gold and silver, with gold values predominating, occurs as a sulphide in a vein, in Yavapai schist. The vein is from 17' to 27' wide and claimed to be traceable for 6,000' along surface, traversing entire ground from N. E.-S. W. Average assays said to be \$5.90.

Development: in the Red Rock mine is by several shafts, one 300' and adits, underground workings totalling about 500'. **Equipment:** mill, compressor, hoist, operated by electricity. Power is obtained from the Arizona Power Co. Management expects to be able to mine and mill its product at \$1.48 a ton, leaving a net profit of \$2.50.

Ore reserves: estimated by F. W. McConnell at over \$1,000,000 ore in sight.

BELCHER MINING CO. NEVADA

Merged with Jacket Crown Point Belcher Mines Co. (which see), March 10, 1915.

BELCHER MINING CO. WASHINGTON

Mine office: Republic, Ferry Co., Wash. Jos A. Anderson, pres. and mgr. **Property:** the Belcher claim shows irregular replacement deposits of pyrite associated with garnet, epidote, tremolite and magnetite in marble and interbedded shale, etc., intruded and metamorphosed by monzonite porphyry dikes and sheets.

Development: by 3 tunnels showing sulphide orebody 5'-20' thick, on dip plane. (see Bull. 550 U. S. G. S. 1914, pp. 167, 175, 179).

A 1,000' aerial tram connects the tunnels with ore bins on the railroad. Water, brought 2,000' from Lambert creek, through a steel pipe, generates electric power, supplemented by a gasoline auxiliary plant. **Equipment:** includes an air compressor and power drills.

Property was reopened May, 1911, and shipped low-grade gold-bearing pyritic copper ore to Granby smelter. Mine reported, 1914, to have opened up lenses of low-grade ore on the lower level.

BELGIUM-BOHEMIAN MINING CO. CALIFORNIA

A Belgium company, that in 1914, owned the Highland mine, Liberty mining district, 11 miles S. E. of Etna mills in the Klamath Reserve, Siskiyou Co., Calif. **Property:** 100 acres at 6,400' elevation. **Ore:** free-milling gold in shoots 130' long and 2' wide; strike N. 40° E.; dip 30° S. E. Foot-wall is a dioritic schist and hanging-wall is quartz porphyry.

Development: tunnels with several thousand feet underground workings; main tunnel 600' long. All work has been done near apex of moun-

tain so that only a shallow depth has been obtained. Supplies are packed in over a 3-mile trail.

Equipment: includes a 10-stamp mill, run by gasoline. Company employed 26 men in 1914. Mine is credited with a production of \$350,000.

BELMONT-BANNER MINING CO.

IDAHO

Office: Eagle Block, Spokane, Wash. Mine at Delta, Shoshone Co., Idaho. I. Waldo Murphy, pres.; J. H. Masks, sec., and D. W. Jackson, directors. **Cap.**, \$1,000,000, shares \$1 par. **Property:** 3 claims, 1 fractional, near Delta, showing a fissure vein of 3 to 4' surface width, in quartzite, carrying silver, lead and copper values. Mine has about 700' underground workings. Company doing annual assessment work only.

BELMONT-CANADIAN MINES, LTD.

BRITISH COLUMBIA

500 Bullitt Bldg., Phila., Pa. Inc. 1915, by the Tonopah Belmont Development Co. **Officers:** Clyde A. Heller, pres.; K. Kitto, sec.-treas.; C. S. Verrill, resident director in Vancouver; F. W. Holler, supt.

Company exercised an option Jan. 1, 1916, on a gold mine, belonging to Surf Inlet Gold Mining Co., Surf Inlet, B. C. **Ore:** gold-quartz with iron sulphides. Orebody proven to depth of 500'. Average assays run \$12 per ton.

Development: for year ending Mar. 1, 1916, consisted of about 4,000' of tunnel and drifting by machine drills. **Ore reserves:** estimated at 200,000 tons developed. **Equipment:** power plant, boilers, compressor, office buildings and bunk houses. Plan driving tunnel 2,000' to cut orebody.

Company spent \$150,000 during life of option and \$500,000 installing 250-ton mill, hydro electric power, and cyanide plant. A new company will be formed to operate the property, control of which will be held by Tonopah Belmont Development Co., through ownership of 80% of the stock.

BELMONT MILLING CO.

NEVADA

Officers: Clyde A. Heller, pres., 500 Bullitt Bldg., Philadelphia, Pa.; Wm. M. Potts, v. p.; K. Kitto, sec.-treas.; R. G. Wilson, asst. sec.-treas.; preceding officers, Rich. G. Park, M. B. Cutter, S. D. Sinkler, T. W. Synnot, Jos. C. Fraley, C. Berkeley Taylor and H. C. Brougher, directors.

Inc. May 11, 1910, in N. J. **Cap.**, \$250,000, shares \$1 par, non-assessable, all owned by Tonopah Belmont Dev. Co., which see.

BELMONT MINING CO., LTD.

IDAHO

Office: Wallace, Shoshone Co., Idaho. Mine in Two Mile gulch, Evolution district, 3 miles north of Wallace. Inc. 1900. **Cap.**, \$100,000, shares 10 cts. par, with 200,000 shares in treasury. Reorganized 1909, 1,000,000 shares at \$1.00 par, assessable; placing 500,000 shares in treasury. William Sheave, pres.; D. C. Nicholson, v. p.; Frank P. Hess, sec.-treas., with Ida Sheave, Christ Anderson, Dr. J. C. Witherspoon and John Mickels as additional directors (Jan., 1916).

Property: 12 claims showing several contact veins in Burke and Revett quartzite. Ore is said to assay 2.5% lead, 2 oz. silver, 15% manganese with only a trace of copper. **Development:** by tunnels and total work amounts to 1,770'. Continued development work is planned for 1916. **Claims** are in a silver-lead district and copper values incidental. Is a development proposition only.

BELOROPHON MINING CO.

UTAH

Cap., \$100,000, shares 10 cts. par; 850,000 shares issued. **Property:** 250 acres adjoining the Live Yankee group on the north in American Fork Canyon, Utah. The Live Yankee vein is said to cross the claims. **Ore:** occurs in contact between lime and quartzite, showing gold, copper, silver and lead values.

Shipped 1 carload in Sept., 1914, running 1.38 oz. gold, 10 oz. silver, 5.8% lead and 3.45% cu. Planning to resume development work in 1916.

BEN HARRISON MINE

OREGON

Owned by A. L. White, Lima, Ohio. W. C. Fellows, mgr. **Property:** 10 claims, 7,000' above sea level, in Grant Co., Ore., in N. W. corner of Sec. 36, T. 9 S., R. 34 E., 23 miles by road west of Whitney, and 28 miles by road from Sumpter, the nearest railroad stations, was purchased in 1911 for \$45,000. \$200,000 is said to have been spent before production started.

Ore: occurs in the Ben Harrison vein, strike N. 3° E., dip 67° E., which varies in width from 18" to 21", with an average stopping width, where opened, of 77". The vein is a brecciated replacement in granodiorite. **Ore minerals** are pyrite, stibnite, chalcopyrite, sphalerite, pyrrargyrite and stephanite, with gold of about equal value to the silver in the ore.

Development: by adits, the lowest at the 600' level. Several hundred feet of drifting has been done on the various levels and at the beginning of 1915 there was said to be above the 500' level, 87,000 tons of ore blocked out on 3 sides, with an average value of \$10 per ton. The 600' level has had several hundred feet of drifting done; here the ore is said to be 20% higher in value than the ore in the upper levels.

Equipment: includes 20-stamp mill, tube mill, classifiers and vanners. A 75% extraction was obtained in the mill. This low recovery and high cost of transportation of concentrates caused the owner to plan on building a roasting and cyanide plant in 1915. No later returns. See Mineral Res. of Ore., Vol. 1, No. 8, p. 176.

BEN HUR LEASING CO.

WASHINGTON

S. P. Domer, sec., Rookery Bldg., Spokane, Wash. **Mine office:** Republic, Ferry Co., Wash. Alex. McKay, supt. **Property:** held by lease from Ben Hur Mining & Milling Co. (See Vol. X, Copper Handbook), consists of the Little King and Queen claims on Gold hill, developed by 800' shaft, showing gold, silver and copper ore. **Equipped:** with steam power, compressor, etc. New plant installed 1913. Property was intermittently worked, 1911-12, and drifting done on the 200' and 400' levels. Mine was operated under lease by Cons. Mining & Smelting Co. of Canada, Ltd., during 1914-15, but given up early in 1916.

BEN HUR MINING CO., LTD.

MONTANA

Address: Saltese Supply Co., Saltese, Missoula Co., Mont. D. S. Dickson, pres.; Frank H. Bell, v. p. and purch. agt.; Chas. J. Luedke, sec.; C. A. Keating, treas.; preceding officers, Peter Peterson and A. J. Matthiesen, directors. **Cap.,** \$1,500,000 shares, \$1 par. Annual meeting, last Saturday in April.

Lands: 5 claims, adjoining the Last Chance mine, 3 miles from a railroad, showing a fissure vein, in quartzite, of 10 to 60' width at surface. **Development:** by 3 crosscut tunnels, the lower, of 1,100', cutting a vein carrying silver-lead and gray copper ores. Property considered a promising prospect.

BENDIGO MINES CO.

CALIFORNIA

Address: Vidal, Riverside Co., Calif., J. E. Meyer, mgr. Purchased, Jan., 1915, the Morgan and Bradley group of claims, 7 miles from Vidal and did development work during the year. The ore is copper-gold and returns from shipment of several cars are said to be \$50 per ton. **Developed:** by a 150' incline shaft, with a 60' vertical winze from lower level which is claimed to have opened up a 3' vein of ore. \$75,000 said to have been taken from the small block of ground opened by the shaft. There is

also a large deposit of gypsum on the property. Company plans to sink a vertical shaft connecting with the winze.

BENGAL TIGER-GORDON MINE**COLORADO**

Operated by Twin Lake M. & M. Co., which see.

BENNETT-STEPHENSON M. & M. CO.**NEW MEXICO**

Officers: O. Jolliffe, pres.; Jas. C. White, v. p.; C. B. Gill, treas.; J. L. McCullough, sec. Annual meeting April 7th at Las Cruces. Controls through stock ownership the Organ Mountain Mining Co., which see. Fully described Vol. X. Mines under 10-year lease to the American S. & R. Co.

BENTON MNG. CO.**IDAHO**

Address: Burke, Shoshone Co., Idaho. **Officers:** John Callahan, pres. and mgr.; F. P. Candee, sec.-treas.; E. G. Gnaedinger, cons. engr.; with Fred Richardson and L. V. Tyler, directors. **Cap.**, \$1,250,000; shares \$1 par; issued 1,165,000 shares; assessable; 3 assessments totaling 10½ mills have been levied, last one, 3 mills, was 2 years ago. \$1,000 in treasury in Oct., 1915. Annual meeting in April at Wallace.

Property: 6 claims on east side of Gorge Gulch, adjoining the Stanley and Moonlight, near Burke, supposed to have a continuation of the Stanley vein system. **Ore:** silver-lead-copper-antimony, occurring in fissure veins, said to assay 60% lead, up to 12% copper and up to 65% antimony. Lead vein dipped out of winze at 60' depth and at 200' the McNeil fault was passed through. Crosscutting at this level exposed lead vein to the S. E., but main orebody is supposed to be deeper.

Development: adits, 200' winze from main adit level, with over 1,000' of drifting. Employs 7 men.

BERNICE RED ROCK MINING CO.**MONTANA**

Address: P. O. Box 616, Butte, Mont., Sam Jones, pres., Bernice, via Basin, Mont.; H. D. Fagon, v. p.; N. B. Lewis, sec.-treas.; J. B. Anderson, agt., 1924 13th St., Washington, D. C.

Property: 4 claims located in sec. 10, T. 6 N. R. 6 W., 3 miles from Bernice station on Gr. Northern Ry., 26 miles from Butte, shows a large vein with scattered mineralization of lead carbonate and sulphide ore; but low average values, containing gold, \$0.40 to \$1.60, silver 2 to 7 oz., 0.5% copper, lead 2%, and zinc 5%. Course of vein is N. 70° W. with dip 70° S. and where exposed has a width of 8' in the upper tunnel, and 23' in lower tunnel.

Development: 2 tunnels, upper one 150' long, the other 100' vertically below the upper, cut the vein at a distance of 200' from the portal. A 20' winze was sunk on the vein from the lower level. The ore can be cheaply mined and is capable of flotation, but value is low. Company officers and stockholders are all colored men.

BERTHA A. MINING CO.**MISSOURI**

Office: Webb City, Mo. **Inc. in Missouri.** **Cap.**, \$10,000. Operates a lease on 160 acres of mineral land, owned by the Newell-Morse Royalty Co., in S. 12, T. 28, R. 33, Webb City, Jasper Co., Mo. Company is one of the largest producers of zinc lead concentrates in the Prosperity district. **Developed:** by 8 shafts to a depth of 221' and equipped with 1,000-ton concentrator, pumps, steam drills and hoist. Company employs 125 men.

BESSIE-CORA MINING CO.**COLORADO**

Ralph Roseberry, supt. Owns a group of claims, including Silver-Wave, at Montezuma, Summit Co., Colo. **Ore:** silver-lead, in paystreak, 2½' wide and proven for about 100' in Silver Wave ground. **Development:** tunnel, winze and drifts. **Equipment:** aerial tramway, air-compressor and electric power. Employs about 15 men.

BEST CHANCE MINING CO., LTD.**IDAHO**

Main office: 203 Paulsen Bldg., Spokane, Wash. **Mine office:** Wallace, Shoshone Co., Idaho. Chas. H. Bell, pres.; W. A. Cox, v. p.; Chas. A. Gram, sec.-treas.; Robert J. Edgren, mgr. and purch. agt. Other directors, J. A. Scott and Chas. Harr. Inc. March, 1909, in Idaho. **Cap.**, \$1,500,000, shares \$1 par, fully paid and assessable.

Lands: 12 claims, unpatented, in the Yreka mining district of the Coeur D'Alenes, Idaho.

Fissure veins said to be 100' wide in Burke quartzite with 2,800' of underground work. Development work in progress Dec., 1915. Is primarily a silver-lead property.

BETTY ALDEN MINING CO.**MONTANA**

Mine office: Basin, Mont. Thos. C. Kelly, sec.-treas., and Thos. F. Fitzgerald, directors. Inc. about April, 1913, in Arizona. **Cap.**, \$4,500,000, shares \$15 par. Succeeds the Montana Mineral Land Development Co., and apparently has taken over its Montana holdings.

Property: 19 claims, 300 acres, known as the Eva May and Red Bird group, on Cataract creek, showing fissure veins in granite carrying sulphide ores, mainly chalcopyrite. Mine has a 1,200' vertical shaft and tunnels of 525', 1,400' and 800', developing a vein of 100' claimed width, giving assays of 6% copper, 6 to 12% lead, 15 to 30 oz. silver and 20 cts. to \$3 gold per ton. The property shows a considerable body of low to medium grade ore, and the management estimates 50,000 tons blocked out for stoping which probably is an overestimate.

Equipment: includes a 200-h. p. steam hoist, having two 75-h. p. hoists, one being a 14x16" Vulcan hoist raising single-deck cages, and a 4-drill Ingersoll-Sergeant air compressor. Buildings include machine shop, smithy, carpenter shop, and power house. The concentrator is equipped with a 7x10" Blake crusher, 1 set of rolls, 8 three-compartment jigs and 2 Wilfley tables.

The new company planned unwatering the mine, finishing a tunnel now almost completed to cut the orebody and shipping ore from the King's claim. Editor is familiar with the property and considers it can be profitably worked if railroad were built to the mine. The King tunnel, which was driven to hold some unpatented claims, is drifted along a tourmaline vein 2½ to 3' wide, carrying pyrite, arseno-pyrite, sphalerite and galena. The ore of the Eva May mine is a coarse, white quartz carrying pyrite, chalcopyrite, galena, sphalerite and gray copper with much black tourmaline. The latter caused trouble in concentration work. No recent returns secured.

BEZANT GOLD MINING CO.**COLORADO**

Office: 517 Exchange Bldg., Denver, Colo. **Mine office:** Central City, Colo. **Officers:** O. J. Duffield, pres.-mgr.; G. H. Putnam, v. p.; D. D. Chirley, sec.; C. C. Hendrie, treas., directors. Inc. Aug., 1908, in Colorado. **Cap.**, \$500,000; shares \$1 par; 100,000 outstanding. Dividends to date, \$2.20 per share.

Property: 3 claims, one patented, 14 acres, has a quartz fissure vein in granite and porphyry, 1-5' wide, carrying gold ore with copper sulphides said to assay from 0.20 to 30 oz. gold per ton. Developed by a 500' shaft and about 4,000' of drifts and stopes. Equipped with 50-h. p. electric hoist. Operated intermittently and total production to end of 1915 about \$8,000,000.

B. & H. MINES & MILLING CO. (not inc.)**MONTANA**

Owners: N. J. Bielenberg and W. I. Higgins, Deer Lodge, Mont. H. F. Widdicombe, engr. & supt. **Property:** known as the Bielenberg-Higgins, consists of 20 claims, 10 patented, 360 acres, 3 patented millsites

and 1 unpatented tunnel site, in Bear Gulch, 14 miles from Twin Bridges, Madison Co., Mont., on a branch line of the No. P. R. R.

Ore: complex sulphides, occurs in porphyry and altered granite. There are 9 known veins, said to be traceable for 4,000' and to contain gold, silver, lead, iron and copper values. Veins strike E. W. with dip of 38°, becoming flatter as work progresses; 4 veins have been extensively developed and proven to be from 7' to 105' wide and continuous at depth, containing ore of commercial value, said to average \$4 per ton. Ores are treated by wet concentration, making a recovery of 90%. Concentrates run \$54 to \$80 gold, 11 oz. silver, 25% lead, 2% zinc and 0.5% copper. Ore reserves are estimated approximately at 200,000 tons of \$4 to \$10 ore.

Development: a 7x7' crosscut tunnel, 900' long, drifts, raises and winzes, underground workings, totaling 2,000'. **Equipment:** 100-ton mill, 2 air hoists, pumps, wet concentration plant and compressor, 640 cu. ft. capacity.

Property has been in development stage for several years. Management now plans adding electric power, driving the tunnel to 3,000' and increasing daily capacity of the mill to 300 tons.

BIG BLUE MINING CO.

ARIZONA

Inc. in Arizona. Col. E. F. Brown, owner; J. A. Gaskey, supt. **Property:** the Big Blue and Copper Prince mines on the Hassayampa river, 14 miles from Wickenburg, Yavapai Co., Ariz., showing fissure veins in schist, that yield high-grade silver-gold-copper ore.

Development: by 2 shafts, connected on 200' level, drifts, crosscut and tunnels. An ore shoot developed on 100' and 200' level is now being stoped.

Equipment: includes crusher, pump, gasoline engine, hoisting plant and a concentration mill. Shipped regularly to Douglas in 1914. Ten men employed.

BIG BUTTE MINING CO.

MONTANA

Idle. Company owns 20 acres on S. W. flank of Timber Butte, south of the city of Butte, Mont., and has a lease and bond on Carey claim west of Walkerville, Butte. The latter claim is developed by a 287' tunnel.

BIG CASINO GOLD MINING CO.

CALIFORNIA

Office: Call Bldg., San Francisco, Calif. **Property:** the Mack quartz mine, at Big Oak Flat, Tuolumne Co., Calif. **Ore:** free milling gold in lenses in an E. W. vein, dip 30° N.; width 5'. East of New Mack shaft both walls of vein are in quartz diorite; west the vein is in slate. There are two parallel veins on the property, but most of the work has been done on the Mack-Longfellow vein.

Development: the New Mack shaft, sunk 700' on the vein, is 270' east of Old Mack shaft, 450' deep; drifts on the vein at 100' intervals to the 600' level. Below 600' the vein is in slate.

Equipment: includes 50-h. p. hoist; compressor driven by 100-h. p. motor; and a 20-stamp mill. Pulp from batteries is treated on Frue vaners. Mill is driven by 75-h. p. motor. Electric power furnished by Pacific Gas & Electric Co. 7 men employed at last accounts. Output not given.

BIG CLIFF MINING CO.

CALIFORNIA

Address: Seattle, Wash. M. E. Olsen, pres. and mgr. Company reported to have purchased the Big Cliff mine for \$85,000 in Oct., 1915. **Property:** 6 claims (which include Big Cliff mine), in the Salmon River district, 18 miles from Etna Mills, Siskiyou Co., Calif., said to show a main orebody 200' wide and 2 parallel veins, each 30' wide, carrying milling ore. Company plans building a 200-ton mill and a 7,700' tram connecting the mine and mill.

BIG COTTONWOOD CONSOLIDATED MINING CO. UTAH

Office: Dooly Block, Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. **Officers:** J. M. Howell, pres.; Fred E. Rowley, v. p.; Jay Eliot Johnson, sec.-treas., mine supt. and mg. engr.; preceding officers, Wm. Howell and A. M. Cheney, directors. **Inc.** Sept., 1909, in Utah. **Cap.**, \$250,000; shares 25 cts. par, assessable; 900,000 shares issued; listed Salt Lake Exchange. Annual meeting, first Monday in October. **Lands:** 11 claims in South Fork, Big Cottonwood district, Salt Lake Co., carry auriferous and argentiferous lead and copper ore on which work is being done. Driving crosscut tunnel, now 310' to cut fissure veins in lime and quartzite at 700' and 1,000'. No ore reserves developed, as yet. Property is a prospect.

BIG COTTONWOOD COPPER & GOLD MINING CO. UTAH

Office: 521 Atlas Bldg., Salt Lake City, Utah. Mine office: Brighton, Salt Lake Co., Utah. **Officers:** Col. Nicholas Treweek, pres. and gen. mgr.; W. Mont Ferry, v. p.; J. Leonard Burch, sec.-treas.; preceding officers, J. E. Galligher and John S. Bransford, directors, at last accounts. **Inc.** in Utah. **Cap.**, \$1,500,000, increased 1906, to \$3,750,000; shares \$5 par; non-assessable. Is operated as a close corporation.

Property: 140 acres, adjoining the Mountain Lake Consolidated Mining Co., on the southeast, and carrying same ore zone, near the head of Big Cottonwood canyon, and also in the Snake Creek district. **Development:** by a shaft, showing ore assaying up to 8% copper, with small gold and silver values, and a long tunnel with about 2,000' of workings. Mine apparently has considerable bodies of sulphide ore, averaging about 5% copper and \$2 'per ton in combined gold and silver values.

BIG CREEK LEASING CO. IDAHO

Address: Kellogg, Idaho. D. W. Price, pres.; R. R. Price, v. p.; A. O. Larson, sec.-treas.; Wm. Beandry, mgr.; A. E. Miller, supt. **Cap.**, \$50,000; shares \$10 par; all issued.

Company has a 5-year lease, to 1918, on the ground below the 500' level of the Yankee Boy Mng. Co. property (which see). Claims to have spent \$15,000 on development in 1914 and 1915.

BIG ELK MINING CO. MONTANA

Office: Wallace, Idaho. Mine office: Saltese Missoula Co., Mont. **Officers:** E. L. Proebsting, pres.; H. J. Rossi, v. p.; A. H. Featherstone, sec.-treas.; Peter Peterson, gen. mgr.; preceding officers and W. S. Brown, directors. C. F. O. Merriam, mg. eng. **Inc.** April, 1909, in Idaho. **Cap.**, \$2,000,000; shares \$1 par; assessable; fully issued. Last assessment 1 mill per share, July 22, 1914.

Property: 15 claims, 300 acres, unpatented, on Bald mountain, in the St. Joe district, showing 3 fissure veins in St. Regis quartzite, various trenches exposing veins with 4' thickness carrying streaks of chalcopryrite and spathic iron, in spar and quartzite. A carload shipment, to Helena, from an 18' prospect shaft, returned 28.7% copper, 28.9% iron, 15% sulphur and 2 oz. silver per ton. A 125' upper tunnel and a 200' lower diagonal crosscut tunnel show chalcopryrite and bornite, carrying small gold values. The C., M. & St. P. R. R. crosses property. Management considered good and property promising. Four men employed continuously.

BIG FIVE COPPER CO. WYOMING

Main office: Rock River, Wyo. Mine office: Arlington, Wyo. **Officers:** John F. Pierce, pres.; W. A. McIntyre, v. p.-mgr.; R. W. S. Donell, sec.-treas., with Ralph Booth, and S. Morris, directors. **Inc.** in 1908, in Wyoming. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; 520,000 shares outstanding. Annual meeting, July 17.

Property: 2 claims, 40 acres near Arlington, Carbon Co., Wyo., shows small vein of copper ore carrying gold and silver values. Only assessment work done, but management plans sinking to 220' and crosscutting at 175' level in 1916.

BIG FIVE MINING CO.**COLORADO**

Office: Cheyenne, Wyo. Mine office: Idaho Springs, Colo. **Officers:** Wm. P. Daniels, pres.; Geo. A. Benton, v. p.; H. C. Von Reimer, sec-treas. Inc. in Wyo., June 1, 1912, as a reorganization of the old Big Five Tunnel Ore Reduction & Trans. Co. **Cap.**, \$750,000, shares \$1 par; issued 400,579. Bonds outstanding July 1, 1915, \$188,210. Treasurer's report for fiscal year ending June 30, 1915, shows cash on hand July 1, 1914, \$8,154; receipts from operations, \$15,163; from assessments \$36,066; other income \$27,508; disbursements during year \$74,601, which includes \$49,252 operations at Idaho Springs, and \$6,291 operations at Frances; salaries \$5,993. Cash on hand June 30, 1915, \$12,290.

Property: company's principal enterprise is the Central tunnel over 9,000' long, at Idaho Springs, developing several claims. During the year 2,047' of drifting and crosscutting was done. The Edgar vein showed up better than the others under development, receipts from Edgar ore were \$10,096. Also owns several patented claims in San Juan County and the Frances property, now idle, in Boulder Co., Colo.

BIG FIVE TUNNEL, ORE REDUCTION & TRANS. CO. COLORADO

Reorganized, 1912, as Big Five Mining Co., which see.

BIG FOUR EXPLORATION CO.**UTAH**

Office: 804 Newhouse Bldg., Salt Lake City, Utah. Inc. Dec., 1912, in Utah. **Cap.**, \$500,000, shares \$1 par; assessable. **Officers:** Morris P. Kirk, pres.; J. H. Leavell, v. p.; John Pingree, sec-treas.; preceding, with E. B. Critchlow and L. R. Eccles, directors. Company operates a 250-ton wet concentrating mill at Atkinson, 7 miles north of Park City, Utah. Mill was constructed to treat a dump estimated to contain over 1,000,000 tons of tailings, the accumulation from Park City mills.

Production: In 1915, 11,365 tons treated; shipping ore totaled 198 tons, yielding 164,509 lbs. zinc; concentrates, average grade 38.4%, totaled 668 tons, yielding 371,538 lbs. zinc. Extraction 62%. A 500-ton addition to the mill is being built.

BIG INTERIOR GOLD MINES, LTD.**BRITISH COLUMBIA**

Alvo von Alvensleben, pres.; A. J. Engvick, sec. **Property:** the Della group of 5 claims, located 9 miles above Great Central lake, near Big Interior copper mine. Claims show a vein of gold-copper ore in porphyry, from 1½ to 5' wide, running north and south and proven by open cuts for a length of 1,700'. Property reported on by W. K. Edwards, whose 2 sets of samples averaged \$25 and \$15.44 per ton in gold.

BIG JIM GOLD MINING CO.**ARIZONA**

Office: 561 I. W. Hellman Bldg., Los Angeles, Cal. Mine office: Oatman, Mohave Co., Ariz. **Officers:** C. C. Spicer, pres.; E. H. Newland, v. p.; S. M. Warmbath, sec.; N. A. D'Arcy, treas.; with H. E. Wood, directors; A. G. Keating, supt. Inc. March, 1915, in Ariz. **Cap.**, \$100,000, shares 10c par, non-assessable; outstanding, \$63,000. Stock listed in Los Angeles and San Francisco, and on New York Curb.

Property: 9 claims, 112 acres, unpatented, in the Tom Reed Gold Road mining district, located in three different groups, two of which adjoin the Tom Reed and United Eastern properties. The third group, 3 claims, is 3,000' west of the Tom Reed.

Ore: gold occurring in andesite. On the 400' level company claims to have cut a 46' vein that will assay from \$10-\$75 per ton, with N. W. strike and dip of 72°.

Development: 500' vertical shaft, with drifts on the 400' and 485' levels; drifting is in progress on both levels. **Equipment:** includes a 25-h. p. gasoline hoist and Ingersoll-Rand compressor. There has been no production. Property is yet in the development stage. Stock sold at 10c per share a year ago, advanced to \$2.50 and was selling under \$1, June, 1916, evidently the result of stock manipulation.

BIG LEDGE DEVELOPMENT CO.

ARIZONA

Office: 310 Sellwood Bldg., Duluth, Minn. Mines near Humboldt, Ariz. Ernest Le Duc, pres.-gen. mgr.; Chas. Batre, v. p.; D. D. Murray, sec.-treas. **Cap.**, \$1,500,000, shares \$1 par; 900,000 issued; increased in March, 1916, to \$7,500,000, shares \$5 par. Old shares convertible into new stock, share for share, name being changed from B. L. Mining Co. to present title. Registrar & Transfer Co., 32 Nassau St., New York, registrar. Claimed to have \$65,000 in treasury Sept., 1915. Company is a reorganization of the Big Ledge Mining Co. of Ariz. Deed conveying 34 claims to new company filed March 1, 1915, at Humboldt. Purchase price said to be in excess of \$250,000. In Oct. the company obtained the additional neighboring groups, Henrietta and Butternut, 1½ miles apart.

Property: original holdings, about 3½ miles from Humboldt, were claimed to show a disseminated orebody 700' wide and 3,000' long, containing copper ore that would average 2¼% copper with gold and silver values additional. The management also claimed there were fissure veins of "considerable importance" on the property. The large orebody was proven by very shallow workings, deepest a 38' shaft. The company commenced developing and exploration by sinking 3 shafts, one on the Copper Kettle claim, supposed to be sunk 300', a second on the Mountain View claim; to be sunk 250', and a third on the Bee claim, to be sunk 300', and churn drilling on the Pick and Shovel claim.

The Henrietta group, when acquired by the company, was developed by 4 shafts and 2 tunnels, with several thousand feet of underground workings and equipped with a 20-stamp mill. The mine is credited with a past production of several hundred thousand dollars. It was closed in 1904 and later reopened and worked by lessees. The Big Ledge Copper Co. is said to have shipped several cars of ore from the property and claims reserves of 100,000 tons \$20 ore; values are in copper, gold and silver content.

The Butternut mine, idle since 1906, had been credited with a production, under former management, of 6,000 tons ore, averaging 12% copper, 4 oz. silver and \$1.20 in gold. It was developed by a shaft to a depth of 310', with several hundred feet of underground workings. The Big Ledge Copper Co. claims ore reserves of 15,000 tons, gross value \$258,000; values are in the copper, gold and silver content. Shipments are said to have been made recently and company planning to build a mill on the property.

The several properties of the company may have merit, but the methods of promotion, the grossly exaggerated reports sent out by the company cannot be criticized too severely.

BIG PINE CONSOLIDATED MINING CO.

ARIZONA

Prescott, Ariz. **Officers:** A Bjorkman, pres.; J. J. Hawkins, sec.; A. Bergquist, treas.; with Felix Durocher and C. H. Dunning, directors. C. H. Dunning, supt. Inc. April 30, 1915, in Ariz. **Cap.**, \$500,000, shares \$1 par; outstanding \$400,000. Annual meeting 1st Monday in April. Commercial Trust & Savings Bank, Prescott, registrar. Is a consolidation of the Big Pine Mng. Co. and the Lake Superior & Western Mng. Co.

Property: 14 claims in Senator district, 12 miles south of Prescott. **Ore:** gold occurs in 3 parallel veins, which cross the claims. **Development:** by 7 tunnels, principally on a vein claimed to show ore for 1,800' in one pit.

nel, 700' in a second and 1,100' in a third. Company claims ore reserves of 70,000 tons, average grade \$9 per ton.

Mill: the 100-ton cyanide plant of the Mascot mine, Lake Sup. & Western Co. is to be moved to the Big Pine property and erected near portal of tunnel No. 6. Electric power will be obtained from the Ariz. Power Co.
BIG PINE MINING CO. **NEVADA**

Address: Manhattan, Nye Co., Nev. Operated by Mushett and Wittenberg. **Property:** Big Pine claim covering the gold mineralized schist belt for 1,000'. **Development:** the Mushett & Wittenberg 200' vertical shaft, sunk 350' from north end line of claim. Between the shaft and north end lines the ore found is mined by glory-hole methods, dropped to the 200' level and hoisted through the shaft. Dimensions of the glory-hole late in 1915 showed ore equal to 240,000 tons from surface to the 200' level. South of the shaft the known extent of the ore zone to the 200' level is 400' long and 60 to 75' wide, equal to 370,000 tons. Average daily tonnage hoisted is 375/.

Mill: equipped with a 5x20' tube mill, which treats 125 tons daily, plates, classifiers, etc. Heads average \$5.60, tailing 40c per ton; 90 h. p. used in mine and mill. Tube mill consumes 170 lbs. pebbles per day. Operating costs are reported the cheapest in Nevada, totaling 45c.

BIG SEVEN GROUP.**ARIZONA**

Near Harrington, Yavapai Co., Ariz. Mine, developed by 1,200' tunnel, shows a well-defined vein with high values in gold-silver-copper. Ten men employed during 1914.

BIG SEVEN MINING CO.**MONTANA**

Property: the Big Seven mine, an old-time producer, near Neihart, Cascade Co., Mont. Dave Barker, mgr. **Development:** 3,000' tunnel. Rich strike reported in June, 1914, said to have resulted in shipment of 40 tons of ore, which returned \$20,000. Operated as a close corporation.

BIG THOMPSON MINE.**COLORADO**

Worked under lease by L. G. Carlton and I. T. Russell, Elkton, Colo. **Property:** the Big Thompson mine, an old-time producer, near Elkton, Teller Co., Colo. Ore occurs in vein 15' to 25' wide, reported to average \$14 per ton; mined by stoping. Shipping in 1915.

BIG THREE MINES.**NEW MEXICO**

Situated 3 miles north of Organ, Dona Ana Co., N. M. Owned and operated by Capt. C. B. Gill, Geo. Luchen and Dr. J. H. Johnson. **Property:** 7 claims shows copper, silver and lead deposits. Workings 116' deep, and equipped with 14-h. p. gasoline hoist. Plan sinking shaft on Rubyin mine to 200' depth and drifting.

BILL NYE MINE.**OREGON**

J. H. Beeman, mgr., Grant's Pass, Oregon. **Property:** near Grant's Pass, Josephine Co., Ore., shows sulphide ore in veins, said to average \$4 gold. **Development:** by tunnels. **Equipment:** 10-stamp mill and cyanide plant. Operated jointly with Lucky Bart mine in 1915.

BI-METALLIC MINE.**NEVADA**

Owned by M. G. Bradshaw, Crown King, Yavapai Co., Ariz., and P. A. Simon, Mina, Mineral Co., Nev. Mine is located at Candelaria, Columbus district, Mineral Co., Nev. Management claims gross earnings from ore sales in 1914 were \$33,000, with operating expenses of \$17,000.

Property: 3 claims, 47 acres, unpatented, shows a vein in slate; course of vein is N. 5° W., dip 65°. Ore occurs in shoots and lenses, and is said to average 30 oz. silver and \$2 gold per ton. **Development:** 2 incline shafts, 280' and 600' deep, equipped with gasoline hoist. Mine was closed down in 1915 and reopened 1916.

BINGHAM AMALGAMATED COPPER CO.**UTAH**

Office: 61 Commercial Block, Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. B. F. Grant, pres.; L. A. Marks, v. p.; F. R. Snow, sec.-treas.; Jos. E. Edmunds, gen. mgr.; preceding officers, W. P. Davis, R. E. Miller and Dr. A. McCurtain, directors. E. W. Jones, supt. Inc. Jan. 7, 1907, in Utah. Cap., \$5,000,000, shares \$5 par; nonassessable; issued, \$3,500,000. Shares are listed on the Salt Lake City Stock Exchange.

Property: 24 claims, 300 acres, patented, known as the Illinois and Copper Glance groups, carrying 7 mineralized veins. The principal ore-bodies exposed in the Bingham Amalgamated are on the same vein as the Congor orebodies and of about the same character of ore. Vein is 15 to 40' thick, developed for several hundred feet in depth, but the water and high cost of wagon haul stopped further development. In a tunnel on the west side of the property a 20' vein shows streaks of good ore all through it. The Montana Bingham tunnel cut this vein about 100' deeper, 3,948' from the portal, and crosscut it for 100'. Samples taken from this vein said to run from 3.2-6.5% copper, 7 oz. silver, \$1.20 gold and 25% iron. Development work resumed the latter part of 1915 after an idleness of several years.

The Illinois has a 640' shaft, with a 6 to 9' vein carrying a 2' pay-streak of about 5% copper ore, with occasional assays up to 40%, the average of 50 assays being 2.8% copper, 2 oz. silver and \$2 gold per ton. The Copper Glance group has a 1,400' tunnel, in McGuire gulch. Mine has a total of 2,450' of workings, and ore, including chalcopryite, bornite, chalcocite and cuprite, is estimated by management to average 3% copper, 2 oz. silver and 90 cts. gold per ton.

BINGHAM CENTRAL MINING CO.**UTAH**

At Bingham Canyon, Salt Lake Co., Utah. Idle. This company and the Bingham Standard Copper Co. were controlled by the Bingham Central Standard Copper Co., which sold this stock, 1909, to Utah Metal Mining Co. for stock in latter company and is now controlled by the Utah Metal & Tunnel Co., which see. Described Vol. X.

BINGHAM CENTRAL STANDARD COPPER CO.**UTAH**

Was organized as a holding company, controlling, through ownership of practically entire stock issues, the Bingham Central Mining Co. and Bingham Standard Copper Co., and sold these subsidiary stocks, 1909, to the Utah Metal Mining Co. for 300,000 shares of latter, which was escrowed until 1911 and extended upon payment of 10,000 additional shares until Nov. 8, 1912, and subsequently to Jan. 1, 1914, to permit building by Utah Metal Mining Co. of a \$150,000 aerial tramway from the western end of the big tunnel to the International smelter at Tooele. On release of escrow, 1914, company was to be wound up.

Minority stockholders formed a committee in 1915, with E. J. Huff, chairman, offices at 405 Atlas Blk., Salt Lake City, and will attempt to recover property, claiming irregular disposition of the company's assets. Stock valueless.

BINGHAM COPPER BOY MINING CO.**UTAH**

Out of funds and idle several years, with no sale or market for the stock, so far as known. See Vol. XI, Copper Handbook.

BINGHAM EMPIRE CO.**UTAH**

Address: Knight Investment Co., Provo, Utah. Officers: Jesse Knight, pres.; with A. M. Knight, W. L. Mangum, K. S. Jordan, G. A. Storrs, E. G. Jensen, directors. Inc. July 31, 1915, in Utah for development of property in the Bingham district. Cap., \$10,000, shares 1c par; 484,000 shares in treasury Aug., 1915.

BINGHAM MINES CO.**UTAH**

Office: 60 Congress St., Boston, Mass. Imer Pett, gen. mgr., 404 Dooly Bldg., Salt Lake City, Utah; Joseph Hyland, supt., Lark, Utah. **Officers:** Jas. P. Graves, pres.; Sydney S. Millet, sec.-treas.; preceding officers, Henry N. Sweet, Alfred B. White, Thos. S. Woods, Arthur W. Chesterton and Lewis B. McCornick, directors. Fred R. Sands, purch agt. **Inc.** April 6, 1908, in Maine. **Cap.**, \$1,500,000, shares \$10 par, nonassessable; issued \$961,126.

Bonds authorized \$513,000, 6% due April 1, 1919; \$271,000 outstanding, May 15, 1916. Is a reconstruction of the Bingham Consolidated Mining & Smelting Co., having exchanged 1 share of new stock for 1 of old, plus \$3.50 cash, payable \$1 cash and five 50c installments. Controls the Eagle & Blue Bell Mining Co., a dividend payer, of Eureka, Juab Co., Utah, and Yosemite Mines Co., of Bingham Canyon, Salt Lake Co., Utah, through ownership of \$451,250 out of \$900,000 issued stock. Purchased the entire capital stock of the Victoria Cons. Mng. Co., owning 49 acres mineral land at Eureka, adjoining the Eagle and Blue Bell, in 1914. The entire bond issue will be either converted or retired in 1916, as company's earnings are large enough to warrant this and, if continued, to pay a dividend thereafter. First National Bank, Boston, registrar. Federal Trust Co., Boston, transfer agent. Stock listed on Boston and New York curbs. Annual meeting, third Wednesday in April, at 57 Exchange St., Portland, Me.

Balance sheet Dec. 31, 1915, shows assets \$63,421 cash and loans, and \$64,654 accounts receivable, etc., with accounts payable of \$88,173. Gross earnings in 1915 were \$320,966 and operating expenses \$114,619, leaving a net operating gain of \$95,465, after deducting \$19,154 for prospecting and development work. No dividends have been paid.

Property: 60 claims, patented, 430 acres mineral land, in the Tintic district, comprising the Dalton & Lark and Commercial mines, and 596 acres non-mineral lands. The ores carry lead, copper, silver and gold. The lead ore averages 90c gold, and 11.65 oz. silver per ton, with 0.67% copper, and 18.64% lead. The copper ores average \$1.40 gold and 4.92 oz. silver per ton, with 1.58% copper and no lead. The lead ore shipped in 1915 averaged \$16.39 gross value per ton; the copper ore \$4.96 per ton. Some of the ores are high in iron, hence desirable for fluxing the ores of the district, which are highly silicious, as a rule.

The company now has the deepest shaft in the Tintic district, as connection is made between the Mascotte tunnel and the Yosemite shaft, a distance of 2,150' on dip of the vein. About 3,500' of drifts, crosscuts, raises and winzes was accomplished in 1915. Plans for 1916 include exploration of North Extension claims and development of virgin ground above 1,000' level. Lessees working in the old workings mined 6,846 dry tons of ore in 1915, netting the company \$21,964 as royalty. Mining is by square sets in the large deposits, up to 20' across, and by stulls in the smaller veins. There are many miles of workings.

Equipment: at the Dalton & Lark includes a 250-h. p. steam plant, with several hoists and a 25-drill Ingersoll-Rand air compressor. There are 10 buildings, including machine shop, smithy, carpenter shop, office and dwellings. A private rail line, with electric locomotives, connects with the Denver & Rio Grande railway.

The Commercial mine comprises 5 claims, patented, 30 acres. The main orebody occurs as a fissure in limestone and replacement in latter, with E.-W. strike and average dip of 38°. Ore is exclusively chalcopyrite. All work is prosecuted through the Niagara Mining & Smelting Co. tunnel,

which was lengthened to cut the Commercial orebodies at a depth of about 1,400' on the plane of the vein.

Production: in 1915 was 12,756,525 dry tons of \$41,460 gross value, netting \$29,148. Present ore reserves are chiefly valuable for smelter flux, and as smelter did not require this material the mine was closed down Sept. 1.

Equipment: of the Commercial mine is exclusively electric, including a double-drum electric hoist with 52-h. p. induction motor, 75-h. p. induction motor, a 10-drill Ingersoll-Rand air compressor, and three 50-k. w. electric transformers. Buildings include an office, warehouse, sawmill, smithy, barn and ore bins. Company has no mill, but has privilege of 1/10 of capacity of 2,000-ton mill near mine. Mine is served by the Copper Belt line of the Denver & Rio Grande railway. Company plans complete electrification of property in 1916.

The Eagle & Blue Bell property is described under that title.

Property of Yosemite Mines Co. was closed down, 1914, owing principally to low metal prices. Development resumed in 1916.

The present management has made splendid progress in handling difficult financial and mining problems. Ore shipped to smelters: 49,986.81 tons in 1912, 38,987.95 tons in 1913, 49,866.87 tons in 1914 and 44,975.19 tons in 1915; a total of 269,941.88 tons since 1909. Average grade of shipments in 1915, \$16.39 lead, 4.96% cu. per ton gross value. Production for 1916 estimated by management at 16,000,000 lbs. lead.

As the mines have been producers for 40 years, and company owns 3 and controls 2 others, the life of the property seems assured, and the company has a roseeate future. Figuring 1916 prices, applied to a production equal to that of 1915, profits will be very much larger and earnings of company will approximate \$6 per share, which would justify a \$2 dividend.

BINGHAM-NEW HAVEN COPPER & GOLD MINING CO. UTAH

Taken over by Utah Metal & Tunnel Co., Nov., 1915; for the present the two properties will be operated separately, but the work will gradually be merged. **Office:** 508 McCornick Bldg., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake Co., Utah. **Officers:** J. E. Rothwell, pres.; E. B. Critchlow, v. p.; W. E. L. Dillaway, sec.-treas.; preceding officers, L. E. Stoddard and W. B. Farmer, directors; C. H. Doolittle, gen. mgr.; F. N. Wichman, mine supt.

Inc. Oct. 12, 1902, in Utah. **Cap.,** \$2,000,000, shares \$5 par, nonassessable; issued \$1,143,445. A \$46,000 bond issue was paid, 1909. **Dividends:** paid since 1906; \$275,861 paid in 1915, with total of \$960,493 to 1916. Union & New Haven Trust Co., New Haven, registrar. In Sept., 1915, the company brought suit for \$100,000 against the Utah Metal & Tunnel Co., alleging extraction of ore from the Levant lode, whose apex was claimed by the Bingham-New Haven Co. The result of the suit was the merger of the two companies, the most logical solution of the difficulty, for valuable orebodies lie on the boundary line and litigation, which was inevitable, is now avoided.

Property: 26 claims, 500 acres, adjoining the Utah Consolidated on the S. E., includes the Zelnora mine, near the head of Carr fork. Claims show 3 fault fissures in porphyry and a contact deposit, 3' to 8' in width, between quartz-porphry and limestone. The copper ore averages 3.5% copper, \$6 in gold and silver and about 12% excess iron. The lead ore averages 20% lead, \$7 in gold and silver and 1.5% copper, ores being chalcopyrite, galena and sphalerite. The main ore supply is from 3 beds of limestone, which strike E. W. and dip N. Company now mining 2 deposits of copper, 2 of lead and 1 of complex ore.

Development: by tunnels with a blind shaft starting 900' from the portal of the lowest tunnel, there being a vertical distance of 1,200' between

the highest and lowest workings. The 1,030' lower tunnel cuts a wide fissure vein, giving assays of about 3% copper, 2.3 oz. silver and \$2.50 gold per ton. Terminal at the upper tunnel was moved to the lower tunnel and mine is operated through the latter. The shaft is now down 320' below the 500', or Highland Boy, level, and crosscuts have been driven 200' and 320' below the tunnel level to cut a recently found orebody which averages 6' in width where cut. Estimated 2-3 years' ore reserves in sight. Mine has several miles of workings, with an aerial train connecting with loading bins on the Copper Belt railroad.

Equipment: includes electric power, air compressor and 175-ton mill, equipped with jigs, Wilfley and Deister tables, vanners and ball mill for fine grinding. The completion of a connection with the main working tunnel of the Utah Consolidated Copper Co. in Dec., 1912, permits shipments over that company's tram line to the Tooele smelter, reducing transportation costs 20 cts. per ton.

Production:	Lbs. Copper	Lbs. Lead	Oz. Silver	Oz. Gold
1914	908,424	6,791,644	294,995	9,478
1915	2,574,261	4,903,906	325,448	6,617

Gross earnings were \$718,676 in 1914 and \$726,203 in 1915, derived solely from ore sales.

Daily output of ore, 300 tons at present, will be increased and a flotation plant will be built. About 165 men are employed.

BISBEE & DULUTH MINING & DEVELOPMENT CO. ARIZONA

Mine office: Bisbee, Cochise Co., Ariz. Is controlled, through ownership of 60% of stock issue, by Bisbee-Sonora Development Co.

BISBEE-SONORA DEV. CO. ARIZONA & NEW MEXICO

Office: 1125 G Ave., Douglas, Ariz. **Mine office:** Paradise, Cochise Co., Ariz. H. C. Beumler, pres.; J. P. Sexton, v. p.; S. S. Badger, sec.-treas. and mg. engr.; G. T. Colvin, supt. Inc, Feb., 1907, in Arizona, as successor of the Paradise Development Co. **Cap.**, \$2,500,000, shares \$2 par. Annual meeting, second Tuesday in March. Is a holding company only, controlling, through stock ownership of 60% of stock issue of each, the Badger-Hall Mining Co. and Paradise Mining Co., near Paradise. Properties are described as a unit, under the title of this company, instead of separately.

Property: 35 claims, 595 acres in the California mining district in the Huachuca mountains, near Paradise, Ariz. Lands include the town site of Shamrock, 22 miles from Rodeo, the nearest rail point, in which some lots have been sold. The lands lying mainly between the Manhattan and Sullivan properties are developed by 4 tunnels, 287', 170', 560' and 125' long, and by 2 shafts, 240' and 80' depth, respectively. The Badger-Hall property, 30 claims, 540 acres, is claimed to show an orebody 62' wide at surface and 50' wide at 200' depth, where cut by tunnel. The Paradise property near the Badger-Hall has a crosscut, said to show medium-grade sulphide ore. The Morning Star group of the Paradise Mining Co., lying west of the Cochise Development Co., has a 90' tunnel, showing a little auriferous and argenteriferous carbonate and sulphide ore. **Ore:** occurs as contact deposit running N. W., and dipping at 18° S. W., that lies between limestone and porphyry. Deposit exposed for 600' length and 100' width and to depth of 280', said by management to average 4% copper and 18% lead with \$1.50 in gold and 12 oz. silver per ton. Discovered in 1905 and continuously worked. Has a whim, blacksmith shop and company store.

BISHOP CREEK GOLD MINE. CALIFORNIA

Owned by Rocky Point Cons. Mines Co., which see.

BLACK BEAR CONSOLIDATED MINING CO., LTD. IDAHO

Officers: Peter Bernier, pres., Wallace, Idaho; L. L. Brainard, sec.;

directors are Peter Bernier, Otto Grice, S. D. Lemieux, M. J. Sweeney and E. P. Howard.

In Dec., 1915, the Rex Cons. Mng. Co. acquired control of the Black Bear Cons. by agreeing to take 250,000 shares of stock of that company, paying \$112,500 therefor in monthly payments extending over a period of 10 months. Option has been allowed to lapse, due to a hitch in carrying out the plan called for by option; the \$10,000 initial payment was taken by Black Bear in exchange for treasury stock.

Property: 4 claims, 70 acres, patented, lying between the Frisco and Mace mines of the Federal Mng. & Sm. Co., near Wallace. **Development:** No. 1 tunnel cut the main vein 250' from the portal and has a winze, 125' deep, sunk in ore. No. 2, the main working tunnel, intersects the vein 2,530' from the portal and at a vertical depth of 1,180' below No. 1 tunnel. Workings on this level total 5,500' and are said to expose considerable ore. Vein said to be 5.7' wide, averaging 2.2 oz. silver, 7.7% lead and 16.5% zinc. Estimated ore reserves between tunnels No. 1 and No. 2 are 800,000 tons. See Rex Cons. M. Co.

BLACK BEAR MINING CO.

COLORADO

Mine office: Telluride, Colo. **Inc.** about 1894. Ike Navala, supt. **Property:** 39 claims, includes Black Bear mine in Ingraham basin, Telluride Co., Colo., showing gold, silver, lead and zinc values in an 8' quartz vein; the ore is free milling. Mill returns average about \$5.50 per ton, gold bullion recovered running 30% of the total. Developed by shafts and equipped with electric plant and aerial tramway, connecting with the Smugler Mill at Pandora.

Property was idle for many years; operations resumed the latter part of December, 1914. **Shipments:** averaged 100 tons daily in 1915. Mining and milling costs total \$2.50 per ton, leaving a monthly profit of several thousand dollars if present production is maintained.

BLACK CHIEF COPPER CO.

ARIZONA

Mine near Dewey, Yavapai Co., Ariz. John Milligan, pres.; J. M. Sullivan, v. p.-mgr.; Eugene Milligan, sec.-treas.; preceding officers are the directors. **Inc.** 1908 in Arizona. **Cap.**, \$2,000,000, \$1 par; 914,455 shares issued. Annual meeting 2nd Tuesday in July. About \$8,000 expended in 1914-15.

Property: 6 claims, 10 miles south of Jerome, known as the Uncle Sam group, has several short tunnels and two 100' shafts, with a total of about 700' of underground workings, showing ore said to give assays up to 22% copper, \$4 gold, \$3 silver, 6% zinc and 10% lead. Has a hoist. Plans doing 200' of sinking and 700' of drifting during 1916-18.

BLACK CLOUD MINING CO.

COLORADO

R. H. B. Little, lessee, Salina, Colo. **Property:** Black Cloud mine and mill at Salina, Boulder Co., Colo., shows quartz with gold values. Developed by shaft and equipped with air compressor, electric power and a 20-stamp mill.

BLACK COPPER CO.

NEW MEXICO

Mine office: Elizabethtown, Colfax Co., N. M. Work resumed on this property May, 1914. Developed by shafts and credited with past gold production of \$200,000.

BLACK DIAMOND COPPER MINING CO.

NEVADA

Idle. Address, care Wm. D. Thompson, pres., 524 Monument Sq., Racine, Wis. Mine near Yerington, Lyon Co., Nev. John W. Owen, v. p.; Louis W. Trankle, sec.; preceding officers, W. A. Kohmar and Adam I. Wood, directors. **Inc.** April 9, 1907, in Nevada. **Cap.**, \$1,000,000, shares \$1 par; nonassessable; issued, \$621,700.

Property: 8 claims, patented, 4 miles east of Yerington, shows granodiorite carrying fissure veins of 4 to 9' width, one under development. **Development:** several shallow shafts and 500' of tunnels. Principal work is on Diamond No. 2 claim, with a tunnel run to cut a considerable body of sulphide and carbonate ore shown on surface where average assays are about 3% copper. No work contemplated in 1916.

BLACK EAGLE MINING CO.**NEVADA**

P. E. O'Brien, mgr., 2740 Telegraph Ave., Berkeley, Calif. **Property:** Black Eagle mine and mill at Rawhide, Mineral Co., Nev., said to show gold ore. Employs 20 men. Treating 50 tons daily at the mill at last reports.

BLACK HAWK MINE.**CALIFORNIA**

Owned and operated by D. A. Blue, Randsburg, Calif. **Property:** 7 claims, in the Stringer district, near Randsburg, Kern Co., Calif. **Ore:** quartz in 6" vein shows coarse gold veins, assaying \$20 per ton. Mill test of 50 tons of gravel from the placer claims said to have assayed \$6 gold and 3 oz. of 60% tungsten per yd. Developed by 125' shaft. Equipped with 5-stamp mill and water power. Developing only in 1915.

BLACK HAWK MINING & DEVELOPMENT CO., LTD.**IDAHO**

Controlled by Federal Mining & Smelting Co., which see.

BLACK HILLS COPPER CO.**SOUTH DAKOTA**

Idle. **Office:** Benton Harbor, Mich. Mine near Rochford, Pennington Co., S. D. **Officers:** E. A. Hoffman, pres.; George M. Thresher, sec.; John H. Kerr, treas. Inc. June 2, 1900, in South Dakota. **Cap.,** \$2,000,000, shares \$1 par.

Property: 27 claims, 510 acres, in the Hornblende district, shows fissure veins in slate, with heavy gossan capping, carrying carbonate and oxide ores. Orebody under development is said by company to average 20' width, and to be more than a mile in length, opened by incline shafts and crosscut tunnels, giving a total of about 1,200' of underground openings. Ores average 1.5 to 3% copper, with small values in gold, silver and nickel. Has steam power, with 60-h. p. hoist, good for 1,500', and 4 power drills. **Property** considered of doubtful value.

BLACK HILLS MINING CO.**KANSAS**

Fred Stone, supt., Galena, Kan. **Property:** includes Black Hills, Amboy and Doughball mines, at Galena, Cherokee Co., Kan., showing lead-zinc ore developed by shaft.

Equipment: 100-ton concentrating mill, gas engine, compressor and electric power. Employs about 25 men.

BLACK JACK CONSOLIDATED MINING CO.**UTAH**

Office: Provo, Utah. Mine office: Mammoth, Juab Co., Utah. **Officers:** Jesse Knight, pres.; H. G. McMillan, v. p.; W. Lester Mangum, sec.-treas.; with J. Wm. Knight and S. D. Kimball, directors; E. F. Birch, asst. mgr. Inc. 1907 in Utah. **Cap.,** 100,000 shares, 10 cts par, assessable, as a merger of the Black Jack Mining Co. and Star Consolidated Mining Co. Is controlled by the Knight Investment Co. Shares are listed on the Salt Lake Stock Exchange. Last assessment called in May, 1915, 1/2c per share.

Property: 26 claims, patented, 350 acres in Tintic mining district. **Development:** by a 2,000' tunnel and a two-compartment shaft, planned to be deepened eventually to 2,000'. The 1,000' level shows auriferous copper ore, of fair tenor, in broken ground, and the bottom level, at 1,400', showed a 10' vein carrying silver-lead ore. Mine also has some copper ore high in iron, available for fluxing use.

Results to date, discouraging, although about 25,000' of work has been done. New workings have passed from white into gray limestone, consid-

ered more favorable for ore. Shipments of low grade ore from old workings made to Knight-Christensen mill in 1914 for experimental purposes only.

Management plans prospecting the southern section of the property on the 800' level. Production insufficient to pay operations under present conditions.

BLACK OAK MINES & MILLING CO.

CALIFORNIA

Office: First Natl. Bank Bldg., San Francisco. Mine office: Soulsbyville, Tuolumne Co., Calif. Chas. E. Knox, gen. mgr., Tonopah, Nev.; R. C. Knox, supt.; F. N. Watts, mill supt.

Property: several claims 1 mile west of Soulsbyville. **Ore:** quartz, containing pyrrhotite, sphalerite, marcasite and galena, in a vein in granodiorite. Vein has strike of N. 15° E., with dip 60° to 70° W., varying in width from 1' to 25', and has several branches coming in from the hanging-wall side. The ore occurs in lenses at the intersections of diorite dike crossings and also near faults. Diorite dikes have a strike of N. 55° E., vertical dip, and are 1 to 2' in width.

Development: by a 70° incline shaft sunk in the foot-wall and levels at intervals of 100'. Lowest workings are on the 1,800' level. Two ore-shoots have been developed, one north of the shaft, 500' long, average width 4', the other south of the shaft, 300' long and average width of 20'. Ore milled averages \$20 per ton. **Equipment:** 100-h. p. single-drum electric hoist, Ingersoll-Rand air-compressor, and pumps.

Mill: 20-stamp, weight 1,250 lbs. each, drop 6", 100 drops per minute, crush 3.5 tons per stamp through 10-mesh screens. Ore is crushed in 1.85% KCN solution. Remainder of equipment includes a Dorr classifier, a 5x18' tube mill, treatment tanks, and Oliver filter, capacity 100 tons per day. CaO, 0.15%, is added to batteries and agitators, and 24 lbs. PbO to the tube mill and agitators. Mill makes an extraction of 96%, consuming 1.5 lbs. KCN and 3 lbs. lime per ton of ore. Daily capacity of mill is 75 to 100 tons. Costs per ton are: development, \$1.63; mining, \$2.22; treatment, \$1.59; general and misc., \$0.56; material in mill, \$0.96; labor in mill, \$0.62; total, \$7.59. Employs 85 men. See State Mineralogist's Rep., Mines & Min. Res. of Tuolumne County, p. 138.

BLACK PINE MINING CO.

IDAHO

Hunter B. Supplee, pres. and mgr. **Property:** Black Pine and Crown Point mines, at Elk City, Idaho Co., Idaho. **Ore:** gold-silver, in veins believed to be a continuation of the Mascot lead. **Development:** by 700' tunnel. **Equipment:** 5-stamp mill, operated by power obtained from 120-h. p. water turbine.

BLACK PRINCE COPPER CO.

ARIZONA

Office: 440 Gas & Electric Bldg., Denver, Colo. Mine office: Johnson. Cochise Co., Ariz. Robt. N. Bell, pres. and gen. mgr., Denver, Colo.; F. T. Henry, v. p.; J. B. Wright, sec.-treas.; preceding officers, M. A. Hoag and Richard McKnight, directors. Inc. May 10, 1901, in Arizona. **Cap.,** \$1,500,000, shares \$1 par, non-assessable; issued, 1,221,350 shares. Annual meeting, last Wednesday in May.

Property: adjoins Peabody mine and comprises 8 patented claims, 147 acres, showing deposits in limestone. Mine has a 950' two-compartment shaft, sunk in limestone and showing copper oxides and carbonates, bornite and chalcopyrite. **Shipments:** for 1912, 513,327 tons, returned 8.75% copper and 4.9 oz. silver, and 79,322 tons in 1913, returned 16.1% copper and 12.1 oz. silver. **Equipment:** includes a 15-h. p. hoist, compressor, pump, and 3 mine buildings. In 1915 the company built a new power house. **Claims, Dec., 1915,** to be out of debt and doing development work.

BLACK PRINCE MINE.**BRITISH COLUMBIA**

Operated under lease by J. A. Tipping, Slocan City, B. C., Canada. **Ore:** silver, in 6" vein, in schist. **Development:** by tunnels only. Property is said to have made first shipment in Nov., 1915, and expected to have output of 1 car of ore every 2 weeks. Owing to inaccessibility of property, only the high-grade ore can be profitably mined. Twelve men employed.

BLACK RANGE MINING CO.**ARIZONA**

Address: Oatman, Mohave Co., Ariz. **Officers:** D. P. Wright, pres. and treas.; Del Sherer, v. p.; L. P. Morel, sec.; with J. S. Withers, directors. **Inc.** Oct. 30, 1913, in Ariz. **Cap.**, \$1,000,000, shares \$1 par; outstanding \$650,000. Annual meeting 1st Tuesday in Nov.

Property: 8 claims, 2 patented, 150 acres, located 5 miles south of Oatman, shows fissure veins in andesite. Ore is said to average \$2 per ton. Developed by 300' shaft. **Equipment:** includes a gasoline hoist, air-compressor and pumps. Probably is still in the development stage.

BLACK RANGE TUNNEL & MINING CO.**NEW MEXICO**

E. D. Randolph, sec.-gen. mgr., 219 Main St., Lafayette, Ind. **Officers:** H. E. Black, pres.; A. O. Behrn, v. p.; W. C. Mitchell, treas.; with T. F. Gaylord, B. L. Phillips and Martin Hardsocg, directors; C. B. Hullinger, supt., Chloride, Sierra Co., N. M. Company presumably a reorganization of the Black Range Copper Mining Co. and Black Range Reduction Co. (see Vol. X), both now dead. **Property:** the Silver Monument mine, showing a vein of silver-copper ore.

Development: 2,300' tunnel and shaft. Management working in crosscut on 300' level, 1916, where large flow of water was encountered. Main vein has apparently not yet been found. Equipped with steam plant, Rand compressor and a 25-ton concentration mill.

BLACK ROCK, LTD.**ARIZONA**

Mine near Wickenburg, Maricopa Co., Ariz., has ledge of copper glance, said to be 100' wide, carrying gold and silver values. Developed by 360' shaft, drifts and crosscuts, and equipped with 2 Huntington mills and concentrating tables. Developing at last accounts.

BLACK ROCK MINE.**NEVADA**

Office: 524 Main St., Racine, Wis. Mine office: Yerington, Lyon Co., Nev. Property privately owned by Wm. D. Thompson, of Racine, Wis. **Lands:** 3 patented claims, 52 acres, in Mason district, show 4 parallel fissure veins in quartz-monzonite, of which 2, of 8 to 10' average width, traceable 2,500', have shafts of 40', 80' and 150', showing chrysocolla and chalcopyrite, bottomed in ore estimated to average about 4% copper and 40 cts. to \$3 silver per ton. The incline shafts of 80' and 150' were sunk in ore; the two 40' shafts are in granodiorite and dacite.

BLACK TRAVELER COPPER MINING CO.**MONTANA**

Office: Mullan, Idaho. Mine near Saltese, Missoula Co., Mont. **Officers:** Oliver Roof, pres. and gen. mgr.; Chas. Bryant, v. p.; Dr. J. R. Beau, sec.-treas.; with R. E. Seysler and F. J. Luedke, directors. **Cap.**, \$1,500,000, shares \$1 par; 746,000 issued; assessable; 5c per share called Dec., 1913. **Lands:** 6 claims, 3 miles N. E. of Saltese, near the Saltese Cons. Copper M. & M. Co., show 2 parallel veins, 1, of about 6' width, having a strong gossan.

Development: by 2 crosscut tunnels, the upper cutting a vein of 12' estimated width, carrying copper ore, mainly chalcopyrite, giving assays of about 3%, with richer streaks assaying up to 32.4% copper and 15.8 oz. silver, with traces of gold. The 1,200' lower tunnel planned to be driven 1,800' to reach the vein, cut a vein, 1913, showing 30" of ore assaying 7.7% copper.

BLACK WARRIOR MINE.**ARIZONA**

At Black Warrior, Gila Co., Ariz. See Warrior Development Co.

BLACKBIRD COPPER & GOLD MINING CO., LTD. IDAHO & UTAH

Office: 807 Newhouse Bldg., Salt Lake City, Utah. Mine offices: Newhouse, Beaver Co., Utah. **Officers:** John E. DuBois, pres.; Chas. J. North, v. p.; F. O. Frick, sec.; B. N. Lehman, treas. and gen. mgr.; with L. N. Morrison, directors, at last accounts. Inc. in West Virginia. **Cap.**, \$2,000,000, shares \$1 par; nonassessable. Bonds, \$500,000, at 6%. Annual meeting, fourth Tuesday in January. Is a close corporation and has not answered letters sent them.

Property: Brown Bear mine and adjoining ground, covering 29 claims, patented, 482 acres, in the central part of the Blackbird district, Lemhi Co., Idaho. **Development:** 3 shafts, with drifts and numerous short tunnels. Orebodies are irregular replacements along fracture zones in schist and quartzite. Idaho property is in one of the best mineralized sections of the state and is said to show wide zones of disseminated ore carrying 2½% copper and 50 cts. gold for each per cent copper. This district is regarded as promising. Property shut down since patenting.

Company also owns 97 claims, 87 patented, adjoining the Cactus mine in the San Francisco district of Utah. This property has considerable development and was explored by diamond drilling. Development of the 300' level from an old shaft disclosed a vein of chalcopyrite ore.

BLAINE & EMMETT MINING CO., LTD.**IDAHO**

At Murray, Shoshone Co., Idaho. Is a silver-lead mine, copper being incidental and not recoverable. Described Vol. X.

BLANCHE ROSE MINING CO.**ARIZONA**

Practically dead in 1916. Company relocated land of the bankrupt Chesterfield Copper Co., described in Vol. XI, Copper Handbook.

BLAND MINE.**ARIZONA**

Dr. A. W. Hardtmayer, owner; Jack Evans, mgr. **Address:** Patagonia, Santa Cruz Co. Mine in the Santa Rita mountains, Harshaw district, Ariz. Operated several years in a small way and has about 2,500' underground workings. Property shows 12' vein with sulphide ore. Formerly owned by Bland Mining Co. No recent returns secured.

BLAZING STAR MINE.**CALIFORNIA**

Owned by Union Development Co., 713 Iowa Loan & Trust Bldg., Des Moines, Iowa. Mine, 1½ miles east of West Point, Calaveras Co., Calif., has a 2' quartz vein, strike N. 30° W., dip 80° W.; developed by 400' shaft. Was being reopened at last accounts.

BLISTERED HORN MINE.**COLORADO**

Owned by C. J. Carpenter, John Waldron and Andrew Lejune, supt. Tin Cup, Gunnison Co., Colo. Property shows several veins of gold-silver-lead ore developed by 2,900' tunnel, drifts and raises. The veins are from 2-12' wide and ore of good milling grade. Developing at last accounts.

BLOCK MINES CO.**ARIZONA**

Ed. Block, sec.-treas., Prescott, Ariz. Owns the Billy Boy and Christmas group of mines on the Hassayampa river, Yavapai county. Inc. Aug., 1913. Billy Boy mine developed by 300' tunnel, showing 14" pay-streak carrying gold, silver and copper ore, said to assay \$20 per ton.

BLUE BELL MINE.**ARIZONA**

Owned by Consolidated Arizona Smelting Co. At Mayer, Yavapai Co., Ariz.

BLUE BELL MINING & REDUCTION CO.**ARIZONA**

Mine P. O.: Swansea, Yuma Co., Ariz. W. P. Martin, pres.; E. T. Miner, v. p. and supt.; K. E. Newcomb, sec. **Property:** 23 claims, about 5

miles from Swansea, just across the Bill William's Fork river from the Swansea pumping plant. **Development:** 200' two-compartment shaft and several hundred feet of tunnels, showing ore carrying up to 10% copper, with fair gold and silver values.

BLUE BIRD-CORBIN GOLD, SILVER & COPPER

MINING CO.

MONTANA

Idle. Wickes, Jefferson Co., Mont. Wm. Q. Ranft, owner and mgr. John W. Johns, supt. **Property:** about 4 miles west of Wickes, is one of the old mines of the district, taken over in 1911 together with the Penn Yan claim. Claims show 2 veins of 4 to 14' in width, carrying ore shoots averaging 5% copper, 5% lead, 25 oz. silver and \$1.50 gold per ton. Ore occurs in a tourmalinized vein in andesite tuffs and diorite along a contact with a 50' wide dacite dike that forms the footwall.

Developed by 2,248' tunnel and 225' shaft, with levels at 100' and 200'. Equipped with electrical power. No recent returns secured.

BLUE BULL MINE.

NEVADA

Described under Reorganized Blue Bull Co.

BLUE FLAG GOLD MINING CO.

COLORADO

Office: 703 Exchange Bldg., Denver, Colo. **Officers:** J. F. Erisman, pres.-gen. mgr.; Jos. J. Gunnell, v. p.; R. Shoemaker, sec.-treas.; preceding officers, Jos. S. Pigall, D. A. Schaffint, C. W. Walker, F. S. Brooks, W. E. Doane, directors. Company is a close corporation.

Properties: Blue Flag Mine on Raven Hill, Cripple Creek, the Laurium group at Breckenridge, also holdings in the Harshaw mining district, Ariz., and at Ballarat, Calif. Ore is gold quartz. Blue Flag main shaft is 1,100' deep; management plans sinking to the 1,400' level. Equipped with 150-ton cyanide plant.

The Laurium group is developed by tunnels, one over 1,800' long. Ore: gold-silver-lead-zinc. Property equipped with 75-ton mill.

BLUE GROUSE MINE.

IDAHO

Owned by V. W. Brasch, Paulson Bldg., Spokane, Wash. **Property:** in the Orogrande district, 1½ miles N. W. of Orogrande, Idaho county, said to have the extension of veins opened up in the adjoining Umatilla mine. **Development:** 600' of tunnels, said to show veins 4½ to 10' wide, averaging \$12 per ton in gold and silver.

BLUE JACKET COPPER CO., LTD.

IDAHO

Company has discontinued operations. Fully described Vol. XI, Copper Handbook.

BLUE JACKET MINING CO.

IDAHO

Mine P. O.: Lucile, Idaho Co., Idaho. **Officers:** W. B. Clark, pres., Johns Hopkins University, Baltimore, Md.; B. N. Baker, v. p.; J. M. Lawford, sec.-treas.; with F. T. Homer and Frank E. Johnesse, directors; F. E. Johnesse, gen. mgr. and supt. **Inc.** Oct. 20, 1908, in Idaho. **Cap.**, \$50,000, shares \$1 par, fully paid. Annual meeting, first Monday in January. Company is a close corporation. **Property:** 7 claims, unpatented, about 132 acres, in Crooks Corral mining district, Idaho Co., Idaho.

Geology: ore occurs as replacement along contact between diorite and andesite porphyry. Orebody is from 50 to 70' wide, runs east and west, and dips at an average angle of 35°. It has been opened up by a 300' shaft, numerous tunnels, crosscuts and drifts, aggregating 3,395'. These workings blockout 33,000 tons of ore, carrying 3.7% copper with 1.5 oz. silver and \$1.80 gold per ton. The orebody is more or less oxidized down to the 700' level, though the greater part of the ore in the lower levels is original sulphide and the enriched portion lies between the 1st and 4th levels. Reserves estimated at 542,000 tons. Property has no mill, hoist nor reduction plant of

any kind and has been closed down since 1909 awaiting railroad transportation, which is now 40 miles away. Property is a good one and officers able and responsible.

BLUE JAY MINE.**NEVADA**

Mine office: Yerington, Lyon Co., Nev. Developed by shaft with several drifts. Equipped with steam power and a 30-h. p. gasoline hoist. Mason Valley Mines Co. did not exercise its option taken August, 1913. Messrs. Elbert and Summers reported operating property under lease in 1915 and small shipments made to Salt Lake smelter said to run 20% copper.

BLUE LEDGE MINE.**CALIFORNIA**

Office: 82 Beaver St., New York City. Mine near Hutton, Siskiyou Co., Cal. Property is held by the Mexican S. & R. Company, a subsidiary of the Compania Metalurgica Mexicana, R. S. Towne, pres.-treas. Mine merely being kept in repair and no plans made for resumption of operations.

Property: 27 claims, patented, about 440 acres in the Elliott mining district on Upper Applegate river, 4 miles south of the Oregon line, also a large smelter site at Seattle Bar. Property located 1889, but only slightly developed until 1909. Mr. Towne has spent over \$700,000 in work since that time.

Geology: the vein, with strike of N. 10° S., and almost vertical dip, slightly inclined west, traceable some 3,000' by prominent outcrops of 50 to 250' width, lies between a footwall of gray to black, slightly micaceous schist, and a hanging wall of soft white mica-schist, the walls not always being clearly defined, and with mineralization extending into the hanging wall. Orebodies are lenticular deposits, with clay gouge, said, by several authorities, to be in huge laminations in the schist formation, but ore apparently is persistent to depth. Ore is mainly chalcopyrite, associated with a little sphalerite and occasional native copper, average value being 6% copper and \$5 gold per ton. Development: 9 tunnels, with upwards of 2 miles of workings, blocking out considerable ore, and nearly 7,000' of diamond drilling showed several orebodies.

Equipment: includes a hydro-electric power plant, taking water from Elliott creek under a head of about 150', at pressure of 85 lbs. Buildings include an office, assay office, boarding house, dwelling and sawmill. The company has improved the town site with waterworks, sewers and a school house, and has built a good road between Hutton and Yreka. A 40-mile railway to connect with the Southern Pacific, at Medford, Ore., has been projected. Mine is likely to become an important producer as soon as fully equipped and the railway line to the mine is built.

BLUE LIGHT COPPER CO.**NEVADA**

Address: care C. W. Marsh, pres., Washington, D. C. Mine office: Mina, Mineral Co., Nev. Henry L. Dollman, v. p.; F. M. Baker, Carson City, Nev., sec.; Wm. C. Osborne, treas.; preceding officers, Chas. N. Van Cleave, Chas. E. Test and Richard Stegemeier, directors. Inc. Oct., 1907, in Nevada, as successor of Blue-Light Mining Co. Cap., \$2,500,000, shares \$1 par; nonassessable.

Property: 14 miles from Mina, developed by 600' shaft from which several carloads of rich carbonate ore have been shipped. Shaft has reached sulphide zone, but workings have not yet passed through leached material. Mine is equipped with hoist, buildings, etc. Examined 1913 by R. W. Hadden.

BLUE MOUNTAIN MINING CO.**OREGON**

Office: 9 E. Fifth St., Covington, Ky. Mine office: Sumpter, Baker Co., Ore. Works office: Cable Cove, Grant Co., Ore. Jos. Grever, sec.-

treas., 17 Thoms Bldg., Cincinnati, O. **Officers:** C. L. Arzeno, pres., gen. mgr.; B. J. Stagge, v. p.; A. E. Buxsel, asst. sec.-treas.; Clemens Backhus, Jr., Chas. Neblett, Geo. H. Vonderahe, Bernhard Moeller, Alvin Davidson, directors. O. L. Simons, supt.

Inc. in Ariz. Cap., \$2,000,000; shares \$1 par; fully paid; nonassessable; 1,373,999 issued. Authorized \$50,000 6% bonds; \$37,000 outstanding. Annual meeting 4th Friday in April.

Property: 27 claims, about 500 acres, 200 patented, is said to be covered with timber with the exception of 35 acres, in Cable Cove district, 11 miles N. W. of Sumpter in Baker and Grant counties, Oregon, at head of the north fork of John Day river. Claims include the Baby McKee group, Annex, Last Chance and others, said to carry the Eagle, Rawson, Cloud and Marty veins with gold-silver ore.

Ore: occurs in fissure veins in grano-diorite, running slightly E.-N. and dipping in opposite directions. One vein has an average width of 4', a proven length of 2,200' and proven depth of 700'. The Eagle vein is said to be 60' wide and developed for 6,800' in length.

Development: includes a 1,900' main working tunnel with a 262' cross-cut at 1,500'; showing a 6' vein opened up for 25' with concentrating ore. The 640' Baby McKee tunnel, now caved, yielded specimen rock years ago. Company owns the Alpine mill, besides a 10-ton experimental mill and the 60-ton Imperial mill.

In 1916 company took a lease on the Imperial Gold Mng. Co. property, 20 patented claims, of which the Blue Mountain holdings are an extension. The property carries 5 veins with ore shoots 100'-200' long, carrying arsenopyrite 38.70%, galena 8.20%, zinc blende 12.10%, pyrite 3.4%, copper pyrite, 1.4%, lime 2.7%, insol. 30%. This assays 1.5 oz. gold per ton, 12 oz. silver, 7% lead, 8% zinc, 18% iron, 30% insol., 17.8% arsenic and 15% sulphur.

Ore reserves: at the Imperial tunnel are reported to be 1,000 tons averaging \$110 per ton and 13,000 tons \$10 ore. Company appears to have too small a capital to develop its property and is not in experienced mining hands.

BLUE RIBBON GOLD MINING CO.

UTAH

Minersville, Utah. **Officers:** W. B. Seymour, pres.; L. Shaw, v. p.; Fred R. Pryor, sec.-treas., with J. H. McOmie and Clara D. Smith, directors. **Inc. Feb., 1915, in Utah. Cap.,** \$100,000; shares 10c par; issued \$60,460.

Property: 8 claims in Jarlose mining district, 6 miles E. of Minersville, Beaver Co., Utah. **Ore:** gold in shoots in vein 6' to 12' wide, between well-defined walls of rhyolite. Average assay said to be \$9.40 per ton. **Development:** by 50' shaft. Plan the addition of a 25-h. p. gasoline hoist, and sinking shaft to 500' depth. Is a prospect only.

BLUE VEIN COPPER MINING CO.

MONTANA

Office and mine: 17 Owsley Blk., Butte, Silver Bow Co., Mont. F. L. Melcher, pres.; Lewis A. Smith, sec.; W. F. Noyes, treas. **Inc. June 21, 1906, in Montana. Cap.,** \$1,000,000; shares \$1 par. **Property:** 9 claims, patented, being the Little Boulder, Valentine, Bunker Hill, Blue Vein, Blue Vein No. 1, Myrahl, North Star No. 1, the Ozone and Columbia lode claims in the southern part of the Butte district. Idle since Nov., 1909.

BLUE WING MINING CO.

NORTH CAROLINA

Office: 35 Congress St., Boston, Mass. Operating office: Virgilina, Va. **Officers:** F. E. Wood, pres.; T. M. Russ, v. p.; D. M. Hill, sec.; J. P. Sylvester, treas.; Robt. G. Lassiter, gen. mgr. **Inc. 1907, in West Virginia.**

Cap., \$100,000; shares \$1 par, nonassessable. Property is in the Virgilina copper belt, Granville and Person counties, N. C.

Property: 1,488 acres, showing a 4' fissure vein in schist, with north and south strike, traceable 1 mile, and proven to depth of 350', estimated by management to carry ore averaging 3% copper, 1 oz. silver and 10 to 20 cts. gold per ton. Ore is highly silicious, and difficult of treatment without admixture of basic ores, which are unobtainable in the district. **Development:** by shafts, the ore showing bornite and glance with quartz and occasional calcite gangue.

Equipment: includes a 40-h. p. hoist, air compressor and 7 power drills. Buildings include engine house, boiler house, ore-sorting shed with picking belt, and carpenter shop. Mine poorly operated in the past, owing chiefly to lack of working capital and proper equipment for operating on a big scale. All ore mined thus far has been hand-sorted and shipped to smelters. Property valuable and with fine crushing and concentration by flotation process could be profitably operated. No recent returns secured.

BLUEBIRD COMPANY (THE)

MONTANA

Office: 706 Sears Bldg., Boston, Mass. **Officers:** W. B. Dickerman, v. p.; Clarence W. McGuire, sec.-treas.; with F. M. Stone and H. K. McHarg, directors. **Inc.** 1893, in New York. **Cap.**, \$500,000; shares \$5 par; 66,667 shares issued.

Property: 237 acres, in Butte, Montana, shows silver, copper and zinc ores. Company has never operated its property, but the mine was under option to J. H. Simpson of Butte, April, 1916.

BLUESTONE MINING & SMELTING CO.

NEVADA

Office: 43 Exchange Place, New York. **Mine office.** Yerington, Lyon Co., Nev. **Capt.** J. R. DeLamar, owner; W. O. Fletcher, sec.; Chas. A. Weck, supt. Is not incorporated.

Property: the Bluestone mine and a group of 20 claims adjoining the Mason Valley mine. The Bluestone is the oldest property in the district, claims having been patented previous to 1890. Mine has been opened to a depth of 540' and has about 6,500' of workings, including a 1,300' main haulage tunnel, cutting an ore shoot about 300' wide and 500' long at a point 300' below the apex. This shoot is said to carry an 80' paystreak of high-grade ore, ranging up to 20% in tenor, with balance of ore carrying 2.5% copper. Management estimates 1,600,000 tons of ore in sight, averaging 2.6% copper.

Ore is mainly chalcopyrite, associated with considerable epidote, in a garnet-limestone gangue, there being practically no oxidized ores, even at the outcrop. Ore is uniform in character, and after a light roast is well adapted to magnetic separation. Drill holes prove that ores extend to 750' depth.

Equipment: includes a 50-h. p. hoist and a 35-drill electric air-compressor. A 100-ton mill pulverizes the ore, in rolls, to pass an 8-mesh screen, after which ore is slightly calcined in a tower roaster, to magnetize the pyrite. Roasted ore is then passed through a Wetherill magnetic separator, which takes up the mineral, and discharges the waste, giving a concentrate of about 15% copper. Magnetic separation is claimed to have given a 95% extraction, though 85%, under working conditions, will be satisfactory.

The magnetic concentrating plant is reported running and the furnace has been enlarged. Company has spent \$250,000 in development and equipment of property. Oil flotation process is being experimented with in 1915-16. Management is able and property considered valuable.

BLUSTER CONSOLIDATED MINING CO. NEVADA

T. B. Beadle, pres.-gen. mgr.; Frank Benan, v. p.; H. L. Rummel, sec.; J. D. Goodwin, treas. **Property:** at Jarbridge, Elko Co., Nev., shows gold ore in 7' veins, said to assay \$10 to \$40 per ton.

Equipment: 10-stamp mill, sawmill, aerial tramway, electric power. Tailing being impounded for cyaniding at a later time. **Ore reserves:** management estimated 100,000 tons of milling ore, valued at \$12 per ton, blocked out and on dumps, Jan., 1915. **Production:** claimed to be \$12,000 in bullion per month.

BOB LEE CONSOLIDATED MINING CO. COLORADO

Idle. H. H. Mitchell, sec.-treas., 65 Independence Bldg., Colorado Springs, Colo. **Cap.,** 1,500,000 shares, 1c par; issued Jan. 1, 1916, 1,325,000 shares. **Property:** 5 claims, 19 acres, patented, on Tenderfoot Hill, Cripple Creek, Teller Co., Colo.

Development: includes 3 shafts, deepest 300' with 700' drifting at bottom; \$15,000 spent on property. Company in arrears for 7 years taxes, \$1,800. No cash in treasury; liabilities \$1,500.

BOB MCGEE MINING CO. MISSOURI

Operating on land of J. I. Walker at Duenweg, Jasper Co., Mo. **Cap.,** \$30,000. Mine opened by three 160' shafts. Developing in 1915.

BOBS FARM MINING CO. CALIFORNIA

Sacramento, Calif. J. H. Byers, pres.; W. H. Montgomery, sec. **Property:** 100 acres, in Sec. 5, T. 37 N., R. 12 W., in Trinity Reserve, at an elevation of 5,000', was located in 1883. Said to be the best producer in the New River mining district, Trinity Co., but is very expensive to operate as supplies must be packed over a trail from Hawkins Bar or North Fork, a distance of 40 miles from the latter town.

Ore: gold in vein with diabase hanging wall and quartz porphyry foot-wall; strikes E.; dips 45° N.; width of orebody 2', and length 260'; maximum depth of workings 700'. **Development:** tunnels; longest, 1,300'; 6 levels from 60' to 700' long; 2 crosscut tunnels, 300' and 600' in length; several thousand feet of workings.

Equipment: includes 3-stamp mill and one 3' Huntington mill, run by steam and water power. Twelve men employed in 1914. Said to have produced \$350,000.

See Mines & Min. Res. of Trinity Co., State Mineralogist's Report, 1915, p. 151.

BOHEMIA MINING CO. MICHIGAN

Office: 85 Devonshire St., Boston, Mass. Mine office: Lake Mine, Ontonagon Co., Mich. Operating office: Dee Bldg., Houghton, Mich. **Officers:** Wm. A. Paine, pres.; Chas. A. Snow, v. p.; Robt. H. Gross, sec.-reas.; preceding officers, John H. Rice, Thos. S. Dee, Richard M. Edwards and F. Ward Paine, directors. Inc. Jan. 29, 1910. **Cap.,** \$2,500,000; shares \$25 par; assessable; paid in, \$8; issued, \$1,875,000. Of the 75,000 shares issued, 30,000 were given for lands, and 45,000 were sold to the public, at \$8. Boston Safe Deposit & Trust Co., transfer agent. Stock is listed on the Boston curb, 1916 quotations around \$2. Annual meeting, third Wednesday in April.

Property: 960 acres, originally known as the Piscataqua, in very early days, and later as the Henwood. It is hoped that the property is traversed by the cupriferos amygdaloidal bed of the Lake Copper Co. Diamond drilling was done 1910. Drill holes have yielded a number of cores, from various amygdaloidal beds, with copper in fair quantities, but with nothing remarkably promising or that would justify sinking a shaft. Suspended operations March, 1911.

Annual report, Feb., 1915, shows cash in bank, \$129,454, and states that as soon as sufficiently important developments are made on adjoining properties, development work will be resumed.

BOISE ROCHESTER MINING CO.

IDAHO

Atlanta, Elmore Co., Ida., and care of J. D. Falk, pres., Boise, Ida. R. H. Richardson, supt. **Property:** the Bagdad-Chase Gold Mining Company holdings, also known as the Pettit mine. Claims show a contact fissure vein, on which a tunnel (1915) has opened up an ore shoot 3' to 6' wide and 500' long, said to run \$10 to \$15 per ton in gold and silver. The quartz carries sulphides, including pyrite and rich silver minerals. Ore is treated in a 20-stamp concentration mill and then cyanided. A Bleichert tram connects mine and mill. Recent addition of tube mills and Pachuca tanks is expected to raise extraction from 60% to 85%.

BOLEO; COMPAGNIE DU

MEXICO

Secretary and office: M. Georges Odier, 56 Rue de Province, Paris, France. Mine at Santa Rosalia, Sur, Baja California, Mex. Albert Mirabaud, pres.; Charles La Forgue, managing director; William d'Eichtal, Maurice Ephrussi, Marquis de Montaigu, Henri Puerari, Ernest Tambour, Charles de Wendel and Alex. Tombelaine, directors. Ernest Michot, director-general; R. Plonin, mgr. M. Michel Berger and André d'Eichtal, auditors.

Inc. May 16, 1885, in France. **Cap.**, \$12,000,000; shares \$100 par. There are also 46,000 founders' shares. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud, and owns a considerable share interest in the Compagnie d'Inguaran. Is exempt, until Dec. 17, 1925, from all federal and local taxes, except stamp taxes; is exempt, until 1935, from export and import duties on fuel consumed; is exempt, until 1942, from custom duties and local duties.

Balance sheet of Dec. 31, 1915, published May, 1916, shows; assets, \$37,119,557, which includes: works \$1,000,000; ore and copper matte, \$6,198,029; supplies on hand and en route, \$5,792,483; live stock \$488,267; cash on hand and in banks, \$7,233,532; notes receivable, \$5,799,642; acct's receivable, \$10,214,122. Liabilities include: stock outstanding, \$12,000,000; reserve fund, \$8,517,189; acct's payable, \$8,335,418. Operating profit for 1915 was \$7,941,489, as compared with \$4,587,442 in 1914.

By a fixed rule 5% of the profit goes into the reserve fund, 8% to the ordinary shares and 2% of the remainder to the directors. Of the balance then left, 77% goes to the ordinary shares and 23% is divided among 46,000 "founders' shares. The result is that ordinary stockholders get 73½% of the profit, founder shareholders 19½% and directors 2%.

Dividends: \$62.5 in 1901; \$62.5 in 1902; \$104.16 in 1903; \$135.41 in 1904; \$200 in 1905; \$312.5 in 1906; \$200 in 1907; \$25 in 1911; \$36 in 1912 with \$34.1 for founders' shares; \$35 in 1913, with \$21 for founders' shares; \$22 in 1914, with \$10.90 for founders' shares; \$40 in 1915, with \$24 for founders' shares.

Property: 11 groups of copper claims, 20,000 hectares, granted by the Mexican government, also 11,920 hectares of grazing lands south of the mines. Principal groups are the Soledad, Providencia and Purgatorio. Lands include 5 known copper deposits of importance, the copper-bearing formation covering 3,000 hectares, with possibilities of further extensions.

Geology: the ore occurs in a formation of Tertiary conglomerate, sandstones and tuffs, the cupriferos tuffs overlying conglomerates of eruptive rock pebbles, and being surmounted by argillaceous tuffs, all traversed by fissures. The ores comprise a remarkably varied series of oxidized copper minerals in which the metal occurs in combination with silver, lead,

cobalt, manganese and other metals. The prevailing oxide is melaconite, more or less mixed with manganese and iron oxides; and the prevailing sulphides below water level are covellite and copper glance. The following rare minerals are peculiar to this deposit: boleite, an oxychloride of lead, copper and silver; cumengeite, oxychloride of lead and copper; fosegeneite, a chlorocarbonate of lead; sphaerocobaltite, a carbonate of cobalt. Practically every known oxidized ore of copper occurs here, as well as those of lead, manganese and iron. Gypsum is abundant and native sulphur occurs. All minerals occur in an unctuous, decomposed tuff, locally called soap-clay. There are 3 cupriferous beds, the upper averaging about 3' in thickness, the middle 2 to 3', and the bottom 2 to 10'. The middle bed carries oxide and carbonate ores in oolitic concretions, known locally as boleos, hence the name of the mine. The lowest bed, partly below the water line, carries sulphide ores, as well as oxides and carbonates. This bed, No. 3, has been the chief source of ore supply of the property. It has averaged 1 meter in thickness, but varies from a few inches up to 16' in different parts of the property. The ore is disseminated through the tuffs in thin, irregular veins, with clay gouge, and has a marked concentration toward the bottom of each bed, where the ore forms compact layers of 6 to 12". The main workings are 15 to 200 meters above sea level, the mine being opened by numerous tunnels, and by 7 shafts of the following depths: Sombrero, 98 meters; Carmen, 53 m.; Purgatorio, 55 m.; Central, 156 m.; Amelia, 48 m.; Santa Rita, 86 m.; San Juan, 86 m. The mine is extensively developed.

Owing to the peculiar nature of the mine, all drilling is done by hand, the ore is hand-sorted, and about half is machine-briquetted at a cost of only about \$0.8 per ton, the argillaceous gangue serving as a natural binder.

Equipment: the mine has complete steam and electric plants, generating upwards of 2,500-h. p. from steam engines, of which 2,000-h. p. is transformed by two 500-k. w. 3-phase current generators and two 250-k. w. 3-phase generators. The electric plant, at Santa Rosalia, furnishes power for hoisting, traction engines and a lighting system having 50 arc lights and a number of incandescent lamps. The company is courageous in installing new machinery. The climate is tropical, and the country extremely arid. Potable water is brought from a reservoir on the Yaqui plateau, through a 16,074-meter pipe line, having pumps at Santa Agueda and Santa Rita. The mines and works are connected by a 30-kilometer private railway, equipped with 9 locomotives and 250 cars.

The smelter, rebuilt 1901 and 1906, has 12 water-jacket blast furnaces, of 200 to 250 tons capacity each, 6 with 12 and 6 with 15 tuyeres each. There are 6 large Root blowers, driven by three 175-h. p. compound engines. Sea water for jackets is supplied by a duplex pump of 2,400 cubic meters hourly capacity, operated by a 250-h. p. engine. Electric locomotives on the slag line dump molten slags into moulds in rough holes in the ground, and, after cooling, the masses of slag are dumped over the end of the breakerwater, serving a useful purpose in its extension. Fuel for smelting is German coke and English coal, and patented coal briquettes are used for general fuel. The first fusion product is a matte of 60 to 65% copper tenor, blown up to black copper of 93 to 94% average tenor, production being about two-thirds matte and one-third black copper. Matte and bars are shipped to England and France for refining, the management believing this preferable to adding a converter plant.

The works at Santa Rosalia include a 2-story power building, of steel, concrete and brick, and extensive machine shops, capable of handling all classes of mining work, the company occupying a singularly isolated position.

The harbor of Santa Rosalia has breakwaters of 650' and 2,500', with a 340-meter jetty and 2 new wharves, the dock having an area of 15 hectares, with breakwaters composed of large blocks of slag. The harbor works include a dredge and three 200-ton lighters used therewith. The port handled only 47,879 tons of freight in 1915, as compared with 148,536 tons in 1914. The company owns two steamers, plying between Santa Rosalia and the eastern coast of Mexico. These boats were seized by the Revolutionists in 1914, but later were returned to the company. Copper is shipped to Europe on the steamers of the Compagnie Chargeurs Reunis.

The town of Santa Rosalia has a population of 9,500, of whom 200 are Europeans, dependent solely upon the mines and works, and is controlled absolutely by the company. The town is well laid out, and has 4 general stores, warehouses, saw mill, church, 4 school houses, theater, amphitheater and market. The company gives free medical and surgical attendance, medicines and an excellent hospital service to employes.

The labor question has given considerable difficulty, owing to the scant population of Lower California, necessitating the importation of workmen. Wages average about 2 pesos daily for miners.

In 1915 the company employed 3,360 men. Almost all hand labor is Mexican with some Yaqui Indians. Europeans are only employed as foremen and for special work.

Production: 29,120,000 lbs. in 1910; 27,686,400 lbs. in 1911, and 28,336,000 lbs. in 1912. The production of ore mined for 1911 was 355,100 tons of 3.47% ore; 364,850 tons of 3.51% ore in 1912; 371,300 tons in 1913; 324,000 tons in 1914; 316,800 tons in 1915. The smelter handled 356,700 tons of ore in 1911; 360,000 tons of ore, yielding 12,650 tons of copper in 1912; 374,350 tons, yielding 3.47% or 13,000 tons copper in 1913; 324,000 tons, yielding 3.53% or 11,480 tons of copper in 1914; 317,000 tons, yielding 3.62%, or 11,500 tons of copper in 1915.

Railway transported 607,088 tons, in 1914, as against 675,743 tons in 1913. Reserves of ore amount to 6 years' supply.

The company's policy of secretiveness, concerning mine operations together with its refusal to permit inspection by visiting engineers and geologists, has made it impossible to give detailed information concerning a unique ore deposit and its exploitation. The property is one of exceptional merit and has been ably managed for many years. Company has been able to continue operations despite revolutionary disturbances in Mexico.

BONANZA-BUTTE MINING CO.

MONTANA

Care: John Kenoffel, 131 E. Aluminum St., Butte, Mont. **Inc. June, 1915, in Mont.,** with Chas. H. Lane, Wm. Youlden, J. J. McCarthy, H. H. Walrath, Wm. Meyer, John and Geo. E. Johnson, directors. **Cap., \$500,000;** shares \$1 par.

Property: the Bonanza, Bonanza Extension, and Ruth claims, 4 miles north of Butte. One claim shows 2 parallel veins, of 1' to 5' width; South-erly vein shows no ore; the other, Bonanza vein, is opened by a 55' shaft and 300' crosscut tunnel. The known ore-shoot is too low-grade to be profitably worked. The vein is in a granite area surrounded by rhyolitic rocks, near the B. & M. reservoir, on the road to Lowland Creek. The ore carries a little gray copper, but the bulk of the black material seen in it is tourmaline and not copper glance.

BONANZA MINE

WASHINGTON

Property: 200 acres, located 3 miles from Bossburg, Stevens Co., Wash. The mine, an old-time producer, said to have had an output of \$1,000,000, and idle for 15 years, was reopened in 1915 by lessees who

started shipping silver-lead ore to the Trail smelter. **Developed:** by incline shaft with 6 levels, and a total of 3,000' underground workings. See U. S. G. S. Bull. 550, p. 63.

BONANZA MINING CO.**IDAHO**

Office and mine: Montpelier, Bear Co., Idaho. **Officers:** Col. E. J. Parrish, pres.; E. M. Stewart, v. p.; A. D. Young, sec.; H. H. Hoff, treas.; preceding officers, Chas. Sweet, M. F. Whitman and Ira Chaffin, directors; R. C. Eckloff, gen. mgr., at last accounts. **Inc.** Nov. 1905, in Idaho., as successor of Montpelier Copper Mining & Smelting Co. **Cap.**, \$5,000,000; shares \$1 par.

Property: 25 claims, unpatented, 500 acres, 9 miles S. W. of Montpelier on the Oregon Short Line Ry.

Geology: the U. S. Geological Survey report (Bull. 430-B., p. 49) describes the geological occurrence of the ore as an impregnation of sandstone and underlying shale, only 4' thick in all, with copper carbonate stain associated with carbonized fossil plant stems. There is no well-defined orebody. Good specimens are obtainable but average values are very low. Workings include a shaft said to be 350' deep on a dip of 50° and a 50' shaft farther south. The copper bed is traceable for 8 miles on the east side of a Red Bed ridge of Permian rocks. Property regarded as of doubtful value.

BONANZA MINING CO.**MEXICO**

Office: Cananea, Sonora, Mexico. Geo. Kingdon, pres.; C. T. Knapp, v. p.; Geo. Young, sec.-treas.; Casey Stites, asst. sec.; preceding officers and M. J. Elsing, directors. Is the operating Mexican corporation of the Superior Bonanza Mining Co., which see. **Inc.** June 7, 1904, in Mexico. **Cap.**, authorized and issued, 10,000 pesos; par value of share \$1 (Mexican). Holds title to the mineral properties of that company, located near Imuris, Sonora, Mex., consisting of 198 pertenencias, or approximately 491 acres. Controlled through stock ownership by Greene Cananea Copper Co. Purchase was made in 1911, but the mine has not been worked since that time. Contains a siliceous ore, low in copper content, but with notable quantities of gold. Was purchased to provide a reserve of flux for the iron in the Cananea ores.

BONANZA MINING CO.**NEVADA**

Mine office: Winnemucca, Humboldt Co., Nev. Company controlled by Chas. Baagoe and D. F. Shiveley of Winnemucca. **Property:** 5 claims, 5 miles from Winnemucca, shows a contact fissure vein 11'-22' wide and proven for length of 115', between diorite-porphry hanging wall and lime shale footwall. Development includes 3 shafts, deepest 215' with cross-cuts, a tunnel driven east from No. 2 shaft, 37' deep and a winze sunk all in ore. Mine has no equipment.

BONNEY MINING CO.**NEW MEXICO**

Office: Lordsburg, Grant Co., N. M. Abel L. Allen, pres.; J. B. Foster, sec.-treas.; with J. F. Galster, J. W. Christ, Ed. F. Laffin, directors. Frank Maloit, Jr., supt. **Inc.** in Dist. of Columbia. **Cap.**, \$500,000; shares \$1 par, nonassessable.

Property: 6 claims, 108 acres, includes the Bonnie mine in the Virginia district, 5½ miles south of Lordsburg. **Ore:** occurs as black and red oxides and chalcopyrite, carrying gold and silver values found in 5 fissure veins in andesite forming the hills at the northern end of the Pyramid mountains, at an elevation of 4,500 to 5,500'. Main shaft is 320' deep with 3 levels, said to show veins 2 to 12' wide.

Geology: veins of district, according to U. S. Geological Survey, are narrow and characterized by quartz with plentiful barite, rhodochrosite and

other carbonates and carry ore in bands and bunches in central part of quartz. Wide silicious zones occur but are barren. Values considered superficial by authorities.

Equipment: includes air-compressor, drills, steam hoists, pumps, dwellings, offices and mine buildings. Shipments to Douglas smelter in 1915 averaged \$5 gold, \$4 silver and 4% copper or about \$24 per ton. Total costs given at \$9.50 per ton. Plan sinking main shaft to 500' depth in 1916.

BONNIE MINING CO.

ARIZONA

Address: R. M. Garrett, Prescott, Ariz. Mine on upper Lynx creek, Yavapai Co., Ariz., is an old one recently reopened. The shaft, 123' deep, at last accounts, will be carried down to 250', when drifting, to cut the face of the main tunnel 500' distant, will begin. The ores, formerly gold-silver, are now high-grade copper, in a vein 26" wide at 123' in depth. Operations interrupted in 1914, to be resumed in 1916.

BOREALIS CONSOLIDATED MINES CO.

CALIFORNIA

Address: Dr. G. W. Hillegas, pres., Bacon Bldg., Oakland, Calif. **Property:** 40 acres, including the Eureka mine, in Ophir district, 4 miles from Auburn, Placer Co., Calif. **Ore:** quartz, exposed in shoots, averaging \$12 per ton. **Development:** by 3 compartment shaft. **Ore reserves:** estimated in 1915, by company, at 17,000 tons of \$12 ore in sight on Eureka ground.

Equipment: 20-stamp mill, electric hoist, good for 1,500', and air compressor. Employs 22 men. Regular shipments of concentrates to custom smelter made in 1915.

BOREN GULCH MINING CO.

COLORADO

La Plata, Colo. C. C. Carnell, gen. mgr. Company being reorganized, 1916, as Boren Gulch Gold Mng. Co.

BOSS GOLD MINING CO.

NEVADA

Goodsprings, Clark Co. **Officers:** S. E. Yount, pres.; J. F. Kent, v. p.; F. A. Hale, Jr., sec.-treas.; with O. J. Fisk and R. B. Chapman, directors. O. J. Fisk, gen. mgr. **Inc.** 1914, in Nev. **Cap.**, \$1,000,000; shares \$1 par; outstanding \$408,500. Annual meeting 3rd Wed. in Jan. Financial statement of Jan. 10, 1916, shows cash in bank, \$17,090. During first 11 months of 1915 the property was under lease and bond to the Platinum Gold Mng. Co., which apparently failed to conclude its option on account of poor financial arrangements.

Property: 5 claims, 85 acres, unpatented, 12 miles west of Goodsprings and 3 miles from new townsite of Platina.

Geology: orebodies consist of oxidized copper ore, mostly chrysocolla and limonite, and of gold-platinum-palladium ore in fine-grained siliceous gangue. The latter ores contain a small quantity of bismuth-bearing plumbojarosite (a hydrous sulphate of iron and lead). The shoots can be mined separately. The orebodies occupy a nearly vertical zone of fracturing in the horizontal strata of dolomite. The zone is 30' wide on surface, 100' long, with precious metal shoots confined to the 12' resting on the footwall. **Ore reserves:** blocked out and on dump, estimated Jan., 1916, as 14,200 tons valued at \$296,000. Assays said to be 2 to 15% copper, 0.2 to 100 oz. gold and 0.2 to 100 oz. platinum per ton.

Development: several tunnels, with a total of 5,000' underground work. Equipment includes an 800' tramway. Ten men are employed.

Production: in 1915, of the Platinum G. M. Co., consisted of 160 tons of copper ore, assaying 11.3% copper, 0.3 oz. gold and 2.5 oz. silver per ton. No gold-platinum ore was shipped. Company is shipping copper ore and experimenting with processes for the treatment of the gold-platinum ore. See U. S. G. S. Bull. 620-A.

BOSTON & ALTA COPPER CO.**MONTANA**

Address: c/o Geo. H. Hill, Helena, Mont. Mine near Corbin, Jefferson Co., Mont. **Officers:** John Joyce, pres.; Marcus L. Hewett, v. p. and gen. mgr.; Chas. H. Innes, sec.-treas.; above with Walter Callender, Warren Curtis, Sr., Jas. G. Gregg, Archibald S. Spriggs, Wm. Tatham and Chas. B. Van Nostrand, directors; Richard M. Atwater, Jr., cons. engr.

Inc: Nov., 1909, in West Virginia. **Cap.,** \$3,000,000; shares \$10 par; as successor of Alta-Montana Copper Co. to take over and work the Alta mine, whose output of \$32,000,000 has made it one of the big mines of the world.

The Alta mine, passing from the original owners to the Helena Mining & Reduction Co., was shut down, 1903. The Alta Montana Co., Kelly Mining & Reduction Co., Alta-Montana Copper Co., and Boston & Alta Copper Co., owned property successively. The New Mexican holdings of the Kelly Smelting & Refining Co. were segregated, holdings of present company being exclusively in Montana.

Property: 640 acres, including the Alta group of 8 claims, carrying about 7,000' of the Alta or mother lode of the Corbin camp, property including some placer ground near Corbin, and a townsite. The Alta lode consists of fissures in granite, with dip to the north, the main, or Alta vein, of about 20' average width, being developed for about a mile horizontally. Values in developed workings are mainly in silver and lead, with a little copper and gold, and occasional sphalerite, the lead and zinc decreasing and copper increasing with depth. Copper ore is mainly chalcopyrite, carrying silver and a little gold, apparently of low average grade, and somewhat refractory, though it can be mined cheaply. Mine assay records, during 1903, the last year of work by the old owners, gave an average of 1.75% copper, 4% lead, 9 oz. silver and \$1.40 gold per ton.

Development: the old Alta mine had about 17 miles of workings, developed mainly by tunnels, No. 8 being the main tunnel, and was dry, even to the greatest depth attained. New development is by a 1,000' three-compartment shaft, near portal of No. 8 tunnel, with about 700' of laterals, but money gave out and operations were suspended in Aug., 1910, since which date leasors have gouged the old workings near the surface, but no other work has been done. A crosscut at 665' depth showed the Alta vein to be about 30' wide, 560' from the shaft, said to give a fair copper showing.

Equipment: company is said to have a hydro-electric power plant, estimated as capable of developing 1,400-h. p., on Prickly Pear creek, a small auxiliary steam plant, an electric hoist good for 1,200', and a 10-drill air compressor. There is a 30x70' boarding house, and an old mill, of little present value, but having a good site.

The Alta was a large and profitable producer for 2 decades, but ore became low in grade and refractory, hence suspension in 1893, when silver suffered marketwise. The property was reported upon favorably by Pearse, Kingston & Browne, who stated that it was "not so much a mining venture as a manufacturing proposition on a large scale," and also stated that "mining risks are practically nil" in this venture. Company has issued \$1,400,000 out of its capital stock and in 1912 had an outstanding debt of \$30,000, and at least \$40,000 more is needed to put company on its feet. Company is not regarded favorably, on account of the chain of reorganizations, and its promotion by Marcus L. Hewett, whose record as a promoter includes a number of unsuccessful ventures.

Property operated by lessees in 1915.

BOSTON-AMERICAN MINING CO.**WASHINGTON**

Office: Bloomington, Ill. **Mine office:** Monte Cristo, Snohomish Co., Wash. **Officers.** H. D. Cowden, pres.; D. A. Ward, v. p.; H. B. Cowden, sec.; F. W. Boston, treas.; preceding with J. H. Adams, P. E. Low, C. A. Riddle, directors. D. R. Kyes, supt.

Inc., 1913, in Wash. Cap., \$2,000,000; shares \$1 par; outstanding 1,446,000; nonassessable. The company may be a reorganization of the United Mng. Co., which see, for circular letter of Jan. 23, 1915, to B. A. stockholders says "with but few exceptions the stockholders of the United Mining Co. have an equal proportional holding in the Boston-American Mining Co."

Financial report of the B. A. Mng. Co. as of Jan. 1, 1915, shows: receipts from sale of stock \$37,012, received from loans \$14,000, expenditures \$50,410; balance, \$602. It is reported that, due to lack of finances, it was deemed advisable to suspend all work on the United property and develop the B. A. property.

Property: 17 claims, unpatented, 315 acres, at Monte Cristo, Wash., said to show a dike of low-grade ore 300' wide, containing fissure veins with streaks of ore from a few inches to 4' in width. Ore said to contain gold, silver, copper, zinc and arsenic. Mineralized zone said to have been proven by workings over a length of 750' and to show for 5,000' on surface.

Development: 9 tunnels, the longest, 1,850' in Dec., 1915, is 1,400' below the next higher tunnel. Total underground workings about 5,000'. Management claims to have 120,000 tons ore blocked out and to have shipped 18 carloads ore that assayed \$29 per ton in gold, silver and copper, 8% arsenic and 2½% zinc.

Plans continuing the main tunnel through the property with intention to "ship ore when we encounter the ledge."

The statements made by the management in the literature put out are grossly misleading. Provided the "ledge," when found, does contain shipping ore, and can be profitably worked, it is certain that the costs and net profits promised by company's literature, will never be realized.

BOSTON & ARIZONA MINES CO.**ARIZONA**

General office: Tucson, Ariz. **Officers:** Geo. P. Gregory, pres.; Henry C. Young, Jr., v. p.-gen. mgr.; Gerald S. Howland, treas. **Inc. 1915. Cap., \$100,000; shares \$1 par.** Stock listed on Boston curb. Federal Trust Co., Boston, transfer agents; Exchange Trust Co., registrars.

Property: 5 claims, in the Old Hat mining district, 25 miles south of Tucson, Pinal Co., Ariz., said to show an orebody 25' wide and 100' long, with copper-silver-gold values. Ore occurs between grano-diorite foot and quartz lime hanging-wall. Developed by 247' tunnel. A prospect.

BOSTON-BUTTE COPPER & ZINC CO.**MONTANA**

Hon. W. W. McDowell, pres., Butte, Mont. **Inc. 1913, in Mont. Cap., \$1,000,000; shares \$1 par.** **Property:** 12 patented claims at Butte, adjoining the Anaconda Copper Mining Co. property on the N. E. Idle and undeveloped.

BOSTON-COLBY COPPER MINING CO.**MONTANA**

Mine P. O.: Saltese, Missoula Co., Mont. Peter Peterson, pres.; Hon. Andrew Flaig, 1398 21st St., Milwaukee, Wis., sec., gen. mgr. and principal owner. **Inc. Sept. 16, 1903, in Montana. Cap., \$1,500,000; shares \$1 par; with 1,200,000 treasury shares, 300,000 still in treasury.**

Property: 9 claims, unpatented, 180 acres, and a 5-acre mill site, lying next east of the Butte-Coeur d'Alene Copper Mining Co., immediately west of Saltese, in the East Coeur d'Alene, formerly known as St. Regis district.

Lands have 2 copper-bearing veins, No. 1 of about 40' width, and No. 2, to the south, of about 3' width, carrying mainly chalcopryrite, with some bornite, of good average grade. **Development:** by 2 crosscut tunnels, upper of 400', lower of 900' length with about 500' of drifting in both tunnels. Property crossed by C., M. & St. Paul railroad. Wood and water are abundant. Assessment work only has been done for several years, owing to lack of funds.

BOSTON & CORBIN MINING CO.

MONTANA

C. R. Jeffers, sec.-treas., 67 Milk St., Boston, Mass. **Mine office:** Corbin, Jefferson Co., Mont. **Officers:** Harry M. Stonemetz, pres.; R. C. Grew, v. p.; preceding officers, Chas. H. Cole, E. L. Goulston, Ellis L. Dresel and Wm. M. Bradley, directors. Dan Courtney, mgr. **Inc. Aug.** 1913, in Me. **Cap.,** \$5,000,000; shares \$5 par; nonassessable; issued, 859,570 shares. Paul Revere Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent.

Company was formed to take over the property of the Boston & Corbin Copper & Silver Mng. Co. and shares of the new company were exchanged for securities of the old company on basis of 75,200 shares for \$200,000 6% convertible bonds and 100,000 shares exchanged share for share upon payment of a subscription of \$1.50 per share for the old stock. Balance sheet July 31, 1914, showed a balance of cash and quick assets of \$51,713. Monthly expenses at mine, after closing down, averaged \$597 in 1914.

Property: the Bertha mine and 12 patented claims aggregating 157 acres, about 1 mile west of Corbin, having about 4,500' of the strike of the Bertha vein. **Geology:** country rock is granite with intrusive porphyry rocks, carrying a vein system consisting of a number of parallel fissures. The geological conditions are often called similar to those of Butte, but ore is mainly chalcopryrite, instead of chalcocite, as in Butte, with some enargite and a little bornite of good grade, all argentiferous and slightly auriferous. Lands said to have 16 veins, of which 3 are under development. The Bertha vein is a well-defined, but narrow fissure in granite, varying from 2 to 5' wide with strong walls. The concentrating ore is pyritic and low grade, the concentrates running 7% copper, 8.6 oz. of silver per ton with \$2.38 for excess iron; a total value of nearly \$20 per ton. Former estimates proved too optimistic as to values, development being disappointing. Property examined by Frank H. Probert in March, 1913.

Development: mine is developed to a depth of 1,200' and has 15,000' of workings, not including 4 short discovery tunnels, the Boston Fraction crosscut tunnel, 1,500' Corbin crosscut tunnel and 880' Bertha drift tunnel.

A 200-ton concentrator, costing \$125,000, was finished and put in operation March, 1913, but operations of mine and mill were suspended Nov. 10, 1913, on account of the low grade of ore. Results obtained during the period the mill was operated are as follows: tons ore treated, 30,346; copper assay, 1.85% per ton; silver assay, 2.4 oz. per ton; cost per ton, mining, \$2.87; cost per ton, concentrating, \$1.11; production 611,924 lbs. copper and 45,950 oz. silver. The mill should never have been built, as development of the mine at that time, and since, did not warrant it.

Ore reserves: at time of closing down were figured at 10,712 tons of presumably the same value as the ore milled.

Equipment: includes an electric hoist, capable of raising 5-ton loads from a depth of 2,000', at the rate of 900' per minute, and a 15-drill Ingersoll-Rand air compressor, direct-connected to a 150-h. p. motor. Power is bought from the Montana Power Co. at a considerable saving over steam. There are 19 buildings, including a boiler house, engine house, compressor

house, bunk house, boarding house, changing house, warehouse, office, laboratory, smithy and dwellings. Cost of wagon freight to railway is \$2 per ton on ore.

In February, 1916, the mine was unwatered as it was believed ore could be profitably mined at the prevailing high price of copper. Reported in May that concentrator had started operating and shipments were being made.

BOSTON DEVELOPMENT CO.

UTAH

Office: 325 Judge Bldg., Salt Lake City, Utah. **Officers:** F. H. Vahrenkamp, pres.-gen. mgr.; Thos. Austin, v. p.; E. J. Kearnes, treas.; preceding officers, R. Winder, and B. F. Fitzgerald, directors; R. B. Garff, sec.; T. W. Bowen, supt. **Cap.,** \$500,000; shares \$1 par.

Property: the old Maxfield mine on the north side of Cottonwood Canyon, in the Big Cottonwood district, 3 miles north of the Cardiff mine, and 2 hours by auto from Salt Lake City, was taken over on a \$250,000 bond and lease, 1914. The Maxfield mine, discovered in 1872, is one of Utah's well-known early day mines; it is credited with a production of over a million dollars in gold, silver, copper and lead. The present management is said to have spent \$70,000 in 1915 in unwatering and equipping the mine.

Ore: above the water level is silver-lead, carbonate; below, it is galena, containing gold, silver and copper. Orebodies vary in width from 6' to 24'.

Development: mainly by tunnels. The mine is about worked out above the main tunnel which was driven north 1,465', then west for 1,065'. New management plans systematic development work including the sinking of the incline shaft from its present depth of 218' to 400' depth. **Equipment:** 2 air compressors, pumps, and electric power. **Production:** started in 1915 and in Jan., 1916, the daily output was 20 tons ore, said to average \$40 per ton, all coming from the 1,700' level. Several new orebodies are said to have been discovered which promises well for the venture made when the old mine was taken over. Employs 50-60 men.

BOSTON DUENWEG MINING CO.

MISSOURI

Owens the property being operated by the Wilson Mines Co., and the O. F. & L. Mng. Co., Jasper Co., Mo.

BOSTON-ELY MINING CO.

NEVADA

Dead. Impossible to locate officers; letters unanswered. Appears as if company's officers were afraid of service in some legal proceedings. Hosmer Robinson & Co., of Boston, were formerly interested, and gave company a standing.

BOSTON-IDAHO MINING CO.

IDAHO

Office: 720 Scollay Bldg., 40 Court St., Boston, Mass. **Mine office:** Ketchum, Blaine Co., Idaho. **Officers:** Levi Diamond, pres.; Joseph Briggs, v. p., Winthrop, Me.; M. A. Costello, sec.; E. M. Schwarzenburg, treas.; with A. H. Bailey, Winthrop, Me., David A. Calhoun, Portland, Me., J. H. Hickey, Boston, Mass., and W. C. Smith, directors. C. Fred Howe, supt., Ketchum, Idaho. **Inc.** May 28, 1907, in Maine. **Cap.,** \$2,500,000, in 1,000,000 common, \$1 par; and 150,000 preferred, \$10 par. In treasury \$200,000 common, \$1,300,000 preferred. Bonded debt \$125,000 authorized, \$110,000 issued.

Should not be confused with another company of same name, operating 2 gold dredges on Elk and Moore creeks, near Idaho City, which has a bond on the Banner mine.

Property: 500 acres, 29 claims, 7 patented, 12 held by location, 8 leased and bonded; 2 mill sites, at Boyle Mtn., Idaho, comprising one zinc and two lead-silver mines. Claims cover a granite-limestone contact showing

fissure veins a few inches to several feet wide, cutting across the granite. Veins carry complex sulphide ores showing argentiferous galena, zinc blende and other sulphides in irregular stringers and replacements. The ore shipped is reported to show from 9% lead and 10 oz. silver to 79% lead and 36 oz. silver, per ton, with 19% to 54% zinc. Over a million dollars' worth of ore is reported to have been taken out by former owners. **Development:** 3,000' tunnel work with depth of 900'.

Property large, requiring \$150,000 or more to develop lead-silver and \$100,000 to explore zinc deposits, and company thus far has not been able to secure funds for this work.

A 100-ton Traylor mill was reported making concentration tests in 1914.

Buildings include an office, laboratory, 2 warehouses, boarding house, bunk house, 2 smithies, 2 stables, 2 powder houses, a 5,000' sawmill, 2 ore houses and 8 dwellings.

BOSTON & JEROME COPPER CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. J. C. Scott, pres.; C. R. Ewing, v. p.; A. A. Macpherson, sec.-treas.; preceding officers, L. W. Pugh and Jas. Prosser, directors. Inc. 1907, in Arizona. **Cap.**, \$1,500,000; shares \$1 par; increased, May, 1908, to \$2,500,000; shares \$5 par; issued \$129,090. **Lands:** the Juniper group of 9 claims, 146 acres, 2 miles south of Jerome. **Development:** includes 3 tunnels of 400' aggregate length, and a 130' shaft, sunk on a large porphyry and schist dike carrying carbonate copper stains. Ore was not found in commercial quantities and property has been idle since Feb., 1908.

BOSTON & LAKE SUPERIOR MINERAL LAND CO. MICHIGAN

Office: Leopold Bldg., Houghton, Mich. Fred W. Nichols, resident agt. Property is mineral land in the Lake Superior copper district. No mining work ever done.

BOSTON MINE LEASING CO.

COLORADO

Idaho Springs. **Officers:** Wm. P. Brennan, pres.; A. L. Carnahan, v. p.-mgr.; Lombard Williams, treas.; H. H. Bradlee, sec.; preceding officers, J. P. O'Connell, directors. Inc. June, 1915, in Colo. **Cap.**, \$100,000; shares \$1 par; all outstanding; nonassessable. Receipts from ore sold in 1915 were \$30,196, of which \$12,000 was distributed in dividends.

Property: a lease on a large portion of the property of the Edgar mine at Idaho Springs, has options on the lease of all other property eastward owned by the Big Five Mng. Co., and traversed by veins of the Edgar mine, also options on the Bryant-Crystal group. Leases are for 5 years.

Ore: occurs in fissure veins, in schist, strike N. E.; with dip 65° S.; consists of lead and zinc sulphides, containing gold and silver. Smelting ore, from a 2' width of the vein, said to average: gold 0.78 oz., silver 21 oz., copper 1%, lead 13.8%, zinc 5%.

Development: a 65° incline shaft, 100' deep and tunnels. The Central tunnel of the Big Five Co. cuts the main vein 2,460' from portal and 800' below surface. There is 1,100' of drifting on the vein, and 10,000 tons ore blocked out. **Equipment:** hoist, and pump. Compressed air is bought from the Big Five Mng. Co.

Production: 2,582 tons ore, in 1915. Company plans increased development during 1916.

BOSTON & MONTANA DEVELOPMENT CO.

MONTANA

Offices: Daly Bank Bldg., Butte, Mont., and 35 Congress St., Boston, Mass. Mines at French Gulch, Deer Lodge Co., Mont., and Elkhorn, Beaverhead Co., Mont. **Officers:** Hon. W. R. Allen, pres.; W. C. Siderfin, v. p.; L. P. Benedict, sec.; W. H. Coade, treas.; preceding with exception

of L. P. Benedict, J. G. Brown, Helena, Mont., C. M. McCoy, Butte, Mont., Chas. E. Miller, Wisdom, Mont., Geo. Gallup and Joseph J. Wall, Boston, directors.

Inc. 1913, in Mont. Cap., \$15,000,000; shares \$5 par; 1,661,000 issued April, 1916; no bonded debt. Operating expenses July 1, 1914, to July 1, 1915, \$66,812. U. S. Corporation, New York, transfer agt.; Equitable Trust Co., New York, registrar. Stock listed on Boston and New York curbs.

Property: is extensive, covering two entire mining districts, including 27 lode claims and 6 placer claims in the French Gulch district, Deer Lodge county, Mont., and 89 lode claims in the Elkhorn district, Beaverhead county, Mont. Company will practically control all these districts.

Both French Gulch and Elkhorn were opened in 1865, in the rush which followed the discovery of gold at Bannack, a few miles to the south, in 1862.

The French Gulch group of claims includes 1,100 acres, patented, water rights to 5 streams and 15 miles ditches and flumes. About \$750,000 is said to have been spent in development work. The claims have been opened up by shafts and tunnels, principally upon the Spain, Lucky Strike, Golden Crown and Leo. The work on the Spain consists of a 900' tunnel and 200' shaft, with 800' of drifting on the 200' level. The drift tunnel is about 350' below the apex and shows the vein to carry from a few inches to 4' of sulphide ore, averaging \$17 a ton, according to estimates made by James E. Beveridge, E. M. Ore is said to be blocked out to the value of \$500,000.

The Lucky Strike has a 200' tunnel following a contact vein reported to be 20 to 40' wide, and 100' shaft with 300' of drifting on the vein whose thickness is reported to be 35', with a paystreak of ore running from \$41.50 to \$80 gold, 5 to 7 oz. silver and 2½% copper.

The vein has been opened to the west by another 100' shaft, with 600' of drifting, showing an orebody 12' wide averaging \$18 a ton, according to the management. Eight hundred feet of tunneling on the Golden Crown claim shows a 1 to 3' vein said to carry \$8 to \$20 ore.

Besides these there are numerous smaller shafts and tunnels on the various claims in the French Gulch group.

The Elkhorn property consists of the Central and other groups, including the Idanha, Park, Aspen, Blue Eyed Annie and other mines, about 1,500 acres, all adjacent, either owned or held under bond and lease. This tract is crossed by numerous big, strong, well-mineralized quartz veins, cutting quartz monzonite and showing narrow zones of alteration adjacent to the veins. In the western part of the estate the veins are silver bearing and were opened, and high-grade ore extracted many years ago, a mill being erected on one property. The ore contains gray copper and high-grade silver sulphides and occurs in shoots whose size and extent is as yet undetermined, since the workings are shallow, seldom exceeding 100' in shafts or tunnel backs. The veins appear to belong to two distinct systems, one E. W., the other N. E.-S. W., the latter having a southerly and flatter dip and being the larger veins.

The eastern claims include the Park, a large N. E.-S. W. vein, 20'-30' wide and dipping 75° N. W., traceable across four claims. It is formed of hard white brecciated quartz with altered granite streaks and carries shipping ore with copper and lead sulphides, having gold-silver values. Samples from a number of open cuts for a distance of 250' along the vein average 1.7% copper and 13.6 oz. silver, and the lead ore from these cuts carries 7.5% lead, 3% copper and 11 oz. silver for 4' across, the full width of the vein not being disclosed. An old 250' shaft sunk to develop this

vein, encountered a fault and did not reach the vein. High grade ore has also been found in several shallow shafts and cuts to the S. W., but the development does not permit a definite estimate of amounts.

Copper ore occurs in the Idanha or Mono vein, a great lode 20'-30' wide with a dip of 55° to the south. This vein is parallel to the Park and $\frac{1}{2}$ of a mile N. W. of it. It is a copper bearing quartz pyrite vein, which resembles the older veins of the Butte district. It is developed by a 900' tunnel, giving a 250' back at the face. This tunnel cuts the ore at a point 600' from the portal and crosses the vein at a slight angle, crosscuts exposing its full width. Eight samples show an average of 2.9% copper and 6 oz. silver per ton for 10', there being a persistent hanging wall band and two other bands of sulphide ore. This vein will be opened and worked by the new working tunnel, now 2,500' long and 1,200' below the outcrop.

The Aspen is an E.-W. cross vein, and is said to be faulted by the other system. It is 2'-5' thick and has been exposed for 600' by a drift tunnel, showing for this distance a 12" pay streak of silicious ore carrying bornite, chalcopyrite and gray copper. This ore shows values of 0.9% copper, 40-60 oz. silver and \$10 gold per ton.

The Mary Montreal vein, developed by a 250' tunnel, the Red Sky vein, opened by a 100' shaft and long drift tunnel, and the Elkhorn vein, with half a dozen shallow shafts close together, all show high grade oxidized silver ore. The Blue Eyed Annie vein is said to carry 15' of \$15 ore on the 200' level. There are also half a dozen other veins of promising outcrop, but slight development.

The company has driven a new double-track tunnel about 1,000' below the Idanha tunnel (No. 1) for over 2,000', and has 2 crosscuts, each more than 500' long at the present time (May, 1916), which are being driven to intercept the Park vein in the S. E. crosscut and the other neighboring veins and the Idanha copper vein to the west.

Company expects to start hauling ore by motor trucks from both its French Gulch and Elkhorn properties, summer, 1916.

Company controls the Southern Montana Railway, now being financed, which will be built through the Big Hole Basin, and will give both camps railroad transportation. Company will operate through leases and subsidiary companies, in which it will retain around 50% of the stock.

The company's plans are daring and ambitious and the properties long known, but heretofore unworkable for lack of cheap transportation. The property is regarded as promising and the management competent and honest.

BOSTON-PARRY SOUND COPPER CO.

ONTARIO

Mine office: Parry Sound, Parry Sound district, Ont. Inc. June, 1908, in Maine. **Cap.**, \$1,000,000, shares \$1 par. **Property:** 200 acres, in the vicinity of the Willcox and McGowan mines. Idle some years, but owners are well-to-do and expect to reopen property some day. Is a close corporation.

BOSTON-SIERRA MADRE MINE INDUSTRY CO.

COLORADO

Property sold for taxes in 1914 to L. E. Armstrong. Fully described Vol. XI. Copper Handbook.

BOSTON SONORA MINES CO.

MEXICO

Inc. about Dec., 1911, in Arizona, by Thomas Patterson, Wm. A. Clark, H. C. Wilderson, James V. Howard and Royal B. Young, all of Massachusetts. **Cap.**, \$1,000,000, shares \$5 par.

Property: at Cananea, Mexico, includes several claims near the Calumet-Sonora (Carnegie Lead & Zinc Co.) ground, crossed by several re-

placement veins showing bunches of good ore in the shallow pits and prospect shafts thus far put down. Is a prospect only.

BOSTON & TINTIC MINING CO.

UTAH

Office: Provo, Utah. **Mine office:** Mammoth, Juab Co., Utah, Jesse Knight, pres.; Wm. H. Tibbals, v. p.; W. Lester Mangum, sec.-treas. **Inc.** 1899 in Utah. **Cap.**, \$1,000,000, shares \$1 par, assessable; issued, \$747,000. **Property:** 3 claims, patented, 46 acres, near Black Jack mine, carrying 2 fissure veins, in porphyry, of which 1, of 3 to 5' average width, traceable 2,000', has been opened by tunnels of 40', 70' and 120', and by a 240' incline shaft that followed the vein and cut bunches of good ore assaying 1 to 3% copper, 20 to 55% lead, 25 to 45 oz. silver and 80 cts. gold per ton. The ore occurs on a limestone-porphry contact and a new 103' shaft is said to be in shipping ore. Property bonded to Chief Cons. Mng. Co. in 1915 for 2 years, with option to purchase at \$110,000. Royalty of $\frac{1}{8}$ on all ore extracted to apply on purchase price.

BOSTON & WYOMING COPPER MINING CO.

WYOMING

Idle. Office: Care Jas. A. Shinn, Leadville, Colo. **Mine office:** Esterbrook, Albany Co., Wyo. **Inc.** Jan., 1903. **Cap.**, \$500,000. **Property:** the oldest in the district, includes 120 acres mineral lands and 120 acres miscellaneous lands, taken over from Esterbrook Mining Co. The Esterbrook mine has a 4' fissure vein, traversing diorite, schist and granite, carrying cuprite, chalcopyrite, cerussite and galena, estimated by former owner to average 2 to 4% copper, 25 to 30% lead, 2 to 4 oz. silver and \$1 to \$2 gold per ton, developed by 2 short tunnels and 5 shafts, deepest 335'.

BOULDER TUNGSTEN PRODUCTION CO.

COLORADO

Office: Boulder, Colo. **Officers:** J. G. Clark, pres.; M. M. Rinn, v. p.; J. N. Williams, sec.-treas.; F. H. Nye, supt. **Inc.** in Colo. **Cap.**, \$1,500,000, shares \$1 par. Commenced operations Jan. 1, 1912. **Property:** 37 claims, 165 acres, in the Grand Island mining district, 2 miles from Nederland, Boulder county, said to show 4 to 10% tungsten ore in veins, a few inches wide.

Development: by tunnels; main tunnel now in over 500' and 400' below upper workings. **Equipment:** 40-ton concentrating plant. **Production:** said to be \$3,000 per day in tungsten concentrates.

The company has ignored all requests for information.

BOUNDARY CONE GOLD MINES CO.

ARIZONA

Oatman, Ariz. **Officers:** F. H. Biles, pres.; J. D. L. Williams, Rex Arms Apt., Los Angeles, sec.; Calvin Hartwell, treas.; preceding, with W. F. Ball, S. M. Barnes, Chas. Grimes, T. C. Job., directors. Frank Dryden, supt. **Inc.** in Ariz. **Cap.**, \$1,500,000, shares \$1 par; reserved in treasury 500,000 shares.

Property: 8 claims, 82½ acres, patented, 1 mile S. W. of Oatman. **Ore:** gold. **Development:** shaft, 680' deep, March 10, 1916, sinking to 750' level; 4,000' workings on upper levels. On the 450' level management reports an oreshoot 150' long, 15' in width, with average assays of \$14 per ton, and on the 550' level to have a shoot that was 150' long when work was stopped and shaft sinking resumed. Shaft makes 15,000 gallons water daily, handled by bucket.

Equipment: hoist, 300 cu. ft. air compressor, blacksmith shop. Plans crosscutting to vein on 750' level, development of orebody and erection of a mill.

BOWENA COPPER CO.

BRITISH COLUMBIA

Office: 415 Rogers Bldg., Vancouver. **Officers:** D. McCallum, pres.; C. M. Buscombe, v. p.; C. M. Oliver, sec.-treas.; preceding officers are directors. Company promoted by Donald M. MacGregor, **Inc.** May, 1913,

in B. C. **Cap.**, \$250,000, shares \$1 par; outstanding, \$207,500. Annual meeting Dec. 13. Claims to have spent \$800 in development work during 1914-15.

Property: 3 claims, 150 acres, Crown-granted, on the east side of Bowen Island, 12 miles west of Vancouver, said to show disseminated copper ore, assaying 1.9% copper, containing gold and silver.

Development: 170' tunnel, which management claims has blocked out 10,000 tons ore. Trial shipment, July, 1915, of 1,847 tons, said to have assayed 5.5% copper. Plans continuing the tunnel and building a concentrator.

New York Curb in April, 1915, exposed this company, together with the Peerless Oil Co., of Canada, and the Shushanna Mining & Milling Co., claiming they were worthless.

BOWYER GOLD & COPPER CO.

ARIZONA

Office: Quartzite, Ariz. Mine office: Bouse, Yuma Co., Ariz. Jos. Bowyer, pres.; E. N. Jenkins, v. p.-sec.; with E. E. Northrop, E. B. White and Geo. Mee, directors. Phoenix National Bank, treas. **Inc.** July 15, 1909, in Ariz. **Cap.**, \$5,000,000, shares \$5 par, nonassessable. Annual meeting first Monday after first Tuesday in July.

Property: 7 claims, known as the Bowyer group, also 160 acres miscellaneous lands, in the Plomosa district, on the western slope of the Dome Rock mountains, about 20 miles west of Bouse. Property has 3 contact deposits, between schist hanging and limestone foot, showing 50 to 200' gossans and carrying malachite and chalcocite, estimated to average 2 to 10% copper and \$1 to \$10 gold per ton. Company has sunk a 50' shaft near the hanging wall, all in ore, and has reached the sulphide ore beneath the leached zone. Company plans development work in 1916.

BOYER COPPER MINES CO.

NEVADA

Mine P. O.: Boyer, Churchill Co., Nev. Arthur Howe Carpenter, cons. engr., 210 Noble Ave., Crafton, Pa. **Property:** 49 claims, 1,000 acres, also a 10-acre mill site and 160 acres of placer lands, at Boyer, about 30 miles from Wonder, Nev., and 75 miles south of the S. P. R. at Winnemucca, in the copper belt of the Piute mountains, formerly developed by Alva Boyer, now controlled by Crofton Umacke, of Reno, Nev.

Property: covers a mile of the western end of a contact between whitish andesite and an underlying greenstone, or andesite, which shows copper pyrite peppering the rock. The ore bed has a dip of but 20° and a thickness of 100' and is much altered, the footwall being a hard, silicious band. The lower 30' carries 5% copper, but the orebody developed was figured by Prof. Carpenter and A. H. Carpenter to assay 1.7% copper and about 70 cts. per ton in gold. High-grade ore occurs in small iron-capped veins which extend up through the porphyry and carry a breccia of rock fragments cemented by copper glance and bornite.

Development: by tunnels, now inaccessible. Present company has done about 500' of work on Treasury Box hill and exposed a faulted block of 200' length, 100' width and with 500' depth on the dip, assaying as above. Property promising when railroad facilities are provided. Only prospecting done in 1915.

BRADEN COPPER MINES CO.

CHILE

Controlled by Kennecott Copper Corp.

Office: 120 Broadway, New York. **Officers:** S. R. Guggenheim, pres.; Geo. F. Hilton, v. p. and asst. sec.; L. Fredrick, treas.; C. K. Lipman, sec.; directors, J. K. MacGowan, Eugene Meyer, Jr., Murry Guggenheim, S. R. Guggenheim, Wm. Braden, Messmore Kendall, E. L. Newhouse, C. K. Lipman, G. F. Hilton, J. E. Bamberger. **Inc.** May 26, 1909, in Delaware.

Cap., \$10,000,000, shares \$5 par; increased 1911 to \$14,000,000, nonassessable; issued \$6,052,500 to Aug. 31, 1915.

Bonds: \$8,000,000 authorized, \$7,000,000 issued in a \$4,000,000 issue of 10-year 6% first collateral trust convertible bonds, and an issue of \$2,000,000 second collateral trust 7% convertible bonds, of which 1,000,000 are held in trust; also 2,000,000 3-year 7% debentures. Upon the retirement of all convertible bonds the full capitalization of \$14,000,000 will be issued. Also an authorized \$20,000,000 issue of 15-year 6% sinking fund gold bonds, nonconvertible, due Feb. 1, 1931. Issued \$15,000,000. For the purchase of this last issue a minimum of \$1,000,000 per annum will be applied, payments being made semi-annually, starting Feb. 1, 1917.

Owens entire capital stock and bond issue of the Braden Copper Co., the Braden Copper Mines Co. being purely a holding company, controlled by the Guggenheim interests. Farmers Loan & Trust Co., New York, registrar. Annual meeting, fourth Monday in June.

In Dec., 1915, offer was made by the Kennecott Copper Corp. to purchase the stock of the company, payment to be made in Kennecott Copper Corp. stock. As an alternative any stockholder had the privilege of receiving \$15 in cash for each share of the Braden Copper Mines Co. As a result of this offer the K. C. Corp. now owns 97½% of the stock of the company, which, based on the market value of K. C. Corp. stock at the time the offer was made, cost the K. C. Corp. \$42,281,300.

Braden Copper Co.

Office: 120 Broadway, New York. Mine office: Rancagua, O'Higgins, Chile. **Officers:** S. R. Guggenheim, pres.; E. L. Newhouse, v. p.; L. Fredrick, treas.; C. K. Lipman, sec.; G. F. Hilton, asst. sec.; preceding officers, Murry Guggenheim, Wm. Braden, Eugene Meyer, Jr., Messmore Kendall, J. E. Bamberger, Simon Guggenheim, H. F. Guggenheim, E. A. Guggenheim, Karl Eilers, E. A. Cappelen Smith, J. K. MacGowan and H. R. Wagner, directors; Pope Yeatman, cons. engr.; S. Severin Sorensen, gen. mgr.; O. L. Myers, gen. aud.; H. R. Graham, mine supt.; J. K. MacGowan, purch. agt.; R. E. Douglass, mill supt.; B. F. Colley, smelter supt.; Jas. Chambers, supt. R. R.

Inc. June 18, 1904, in Maine, and name changed to present title, Aug. 9, 1904. **Cap.**, \$2,332,030, shares \$10 par, non-assessable; fully issued. Company is protocolized in Chile. Is controlled, through ownership of entire stock issue, by Braden Copper Mines Co. Has a \$4,000,000 issue of 6% first-mortgage convertible bonds. Annual meeting, 4th Tuesday in July. Annual report for fiscal year ending Aug. 31, 1915, gives total profits \$1,344,210; interest on bond and loans, \$806,675; leaving undivided profits for year of \$537,534.

Property: 174 claims, about 2,362 acres, including 16 acres at Rancagua for railroad yards, etc. Mines are reached from Valparaiso by the Chilean State railroad, 158 miles to Rancagua, and from that point by company's narrow-gauge railway, 43 miles to the smelter and mill and 1½ miles farther to the mines. The elevation is 7,700 to 9,000', the mine being in a very rugged region on a part of the main range of the Andes. Holdings include 3 principal orebodies, the Teniente, the Fortuna and the Regimiento No. 2, and two smaller orebodies, the Centinela and the Bornite.

Geology: all the rocks are igneous and the rock at the mine is an andesite surrounding a body of tuff, which represents the old crater of a volcano. This light gray tuff is no longer loose and friable, but cemented into a hard concrete-like mass. The ore deposit is unique, being a volcanic vent of nearly circular section 4,000' across and filled by tuff and an agglomerate of rounded boulders of all sizes. The crater rim is surrounded

by highly fractured and brecciated andesite, the fractures being mineralized around the circumference. The ore zone has been further fractured by porphyry dikes, which occasionally cut into the tuff.

The orebodies occur around, but outside the rim of the crater, in the andesite at, or near, its contact with the tuff. The ore consists of shattered andesite, often finely brecciated near the tuff contact, the copper minerals filling the cracks and openings. The orebodies are limited on one side by the tuff, but in the andesite the grade becomes lower, passing from breccia to fractured rock and fading out in the more blocky country rock. The fractures in the rock range from a mere film of sulphide ore up to 3 to 4" of mixed bornite and chalcopyrite, mainly the latter. The orebodies dip at 70° toward the center of the crater. Five distinct orebodies have been proven, and four, the Fortuna, Teniente, Centinela and Bornite, are being worked. All are marked by strong outcrop stained with copper minerals. The zone of oxidation is shallow, ranging from a few feet to 150' in depth, and as the property carries mainly disseminated ore, the management holds to the belief, with strong reason, that values will carry to great depth.

The Fortuna orebody is typical of all the deposits. It is lens-shaped in horizontal section, is developed for 3,000' in length and has a maximum width of 260'. It has been well developed on all the levels; below the 4th little increase can be expected, as the rock has tightened and ore is lower grade. The lowest tunnel, No. 4, is 1,425' below the outcrop. The copper occurs as bornite and chalcopyrite, associated with ankerite and quartz. The Fortuna orebody is the principal one in point of development. The shrinkage stoping system, similar to that employed at the Ray Cons., is used. Stopes are carried up 7 metres wide, with 5-metre pillars. The topography of the country is such that shafts are unnecessary; all ore can be taken out through tunnels, and, even though parts of the mine are very wet, pumps are not required.

Development: by 5 tunnels; No. 4 and No. 5 are haulage ways at present. The Fortuna was gophered extensively, by former owners, for high-grade ore, which was followed and extracted wherever found. Average grade of Fortuna ore is lower than in El Teniente mine. Workings show copper sulphides and occasional metallic copper throughout the brecciated material for depth of 2,000'.

The Teniente orebody, whose outcrop is supposed to be in the crater of the old volcano, shows high-grade ore at the surface in bunches and stringers. It is the largest and most important orebody, having a length, on Teniente No. 1 level, of 4,800', and an average width of 300'. The depth as taken in computing ore averages about 840'. It is in this orebody that the greatest increase of tonnage is to be expected. It is much the largest of the orebodies and, with the exception of the small Bornite orebody, the richest. Its size and value have only been proved in the last few years, and stoping operations are just beginning.

No. 1 Teniente level and No. 2 Fortuna level have been extended along the tuff contact entirely around the crater, $2\frac{1}{2}$ miles. The Teniente is the oldest mine of the district, having been worked by the Spaniards for the high-grade ore in the small veins.

The Centinela orebody is being mined above Teniente No. 3 level and will probably extend below it. The Bornite orebody is practically worked out above the 4th level. Mining is being done between the 4th and 5th levels. The orebody is rich, but small, and no great extension in depth is looked for. Regimiento No. 2 orebody lies beyond the Fortuna, is lower grade and its size has not yet been determined.

Ore Reserves Estimated Jan. 1, 1915

Ore-body—	Developed Ore		Probable Ore		Possible Ore	Ore Grade
	Dry Tons	Grade	Dry Tons	Grade		
Fortuna	14,318,730	2.42%	2,770,000	2.20%	.....	.....
Bornite .....	.....	.....	121,800	2.64%	.....	.....
Teniente	45,320,232	3.14%	13,817,436	2.87%	24,197,323	2.68%
Regimiento	5,586,628	2.76%	3,406,490	2.58%	3,051,941	2.67%
Centiniela .....	.....	.....	104,300	2.20%	.....	.....
Total	66,225,590	2.94%	20,220,028	2.72%	27,249,264	2.68%
Grand total .....	.....	.....	.....	.....	118,694,880	2.84%

Considered as 2.50%

Figured estimate of grade of average ore, 2.84%, cut down 12% to 2.50% for the following reasons: In mining low-grade copper ores it is found that the average percentage of copper in ore mined is lower than called for by assay plans; lower-grade ore, not at first contemplated, is mined, and there is an inter-mixture of low-grade capping and wall rock.

Electric power is used throughout. The old hydro-electric plant, near El Teniente mine, 72 kilometers from Rancagua, takes water from 2 small cordilleran rivers, La Coya and El Teniente, through a 20x36" wooden flume, of 2 kilometers length, leading to a power house having 3 turbines, 2 developing about 1,000 h. p., and the third actuating a 175-k. w. 3-phase General Electric dynamo. The hydro-electric plant on the Cachapoal river has four 2,000-k. w. Pelton wheels and generators, developing 8,000 k. w., ultimate capacity estimated at 12,000 to 15,000 k. w. Power is delivered to smelter over a line about 18 miles long, at a voltage of 33,000.

The motor-driven aerial tram of 2,630 meters length, with 550 meters drop and 1,000 tons daily capacity connecting the mine and mill, now called Sewell, was formerly used for ore transportation, but is now in use as a store delivery system. The main line, of 2,000 meters length, runs from the mill to the central transfer station, where connection is had with a 1,000-meter line to El Teniente mine and a 500-meter line to La Fortuna mine. An electric tram line covered with snow sheds its entire length, owing to drifting snow and numerous snowslides, connecting the lowest level No. 5 of the mine with the coarse ore bins at the mill, handles the ore, capacity 5,000 tons daily.

There are two separate concentration plants. The old mill, built in 1906, of 250 tons capacity, was planned as the first unit of a 500-ton mill, and was remodeled and capacity increased, 1911, to 450 tons daily. Equipment includes Hartz jigs, Overstrom and Wilfley tables, Frue vanners, Wilfley slimers and the Sherman slime-settling system. The mill yields concentrates of about 25% average copper tenor.

The experimental leaching plant was in operation during the past year, testing the process for extraction of copper from concentrate; believed that process might be successfully carried out on a commercial scale, but cost of plant would be large and, at the present time, not advisable.

A 20-ton sulphuric acid plant provides the acid required in the flotation plant. Wilfley table concentrates are roasted in a Wedge 7-hearth furnace, the feed carrying from 6% to 7% moisture, 16% copper, 13.6% silica, 28.6% iron, and 33.3% sulphur. Hearth temperatures, from 1 to 7, respectively, in degrees Centigrade are 380, 460, 600, 750, 790, 680, 630. The furnace shaft makes one revolution in 3 minutes 20 seconds, and 12 h. p. is required to operate the furnace when treating 35 tons of concentrates per 24 hours. The calcine contains about 3% sulphur.

The lead chambers are four in number, each with a volume of 46,750 cu. ft., and formed of timber framing and $\frac{1}{8}$ -in. lead sheets. The following table gives certain data on chamber operations:

Chamber No.	Temperature, Deg. C.	Color of Gas	Deg. Baume of Drip
1	80	Gray	51-52
2	75	Light gray	50-51
3	60	Slightly yellow	49-50
4	48	Pale yellow	46-48

The daily production of chamber acid is from 23 to 24 tons at 66 deg. Be. Five tons produced in the Glover tower bring the total to 28 or 29 tons per day. The plant has been in operation since March, 1913.

A smelter is now in operation at Rancagua. This plant, with blast furnaces, converters and refinery, was completed during the latter half of 1911. Since that time several improvements have been made, the most important being the addition of nodulizing kilns. These are similar to the kilns used in the manufacture of Portland cement. The 4th and largest one installed is 8' in dia. and 109' in length. Speed of kilns about 1 rpm. Heat is applied by an oil burner at discharge end. By feeding nodules instead of raw concentrates the furnace capacity has been almost doubled, due to absence of water in the charge. Coke consumption was practically cut in two.

The smelter equipment at present consists of 14 storage bins for concentrates, lime, coke, etc.; 4 sinter grates, with a daily capacity of 50 tons concentrates, roasted to 40 tons; 4 nodulizing kilns, with daily capacity for the first 3 installed of 215 tons concentrates, roasted to 180 tons; 2 blast furnaces, one being 48"x300" and the other 48"x360". Daily capacity is 300 tons raw concentrates, or 600 tons nodulized concentrates; 3 Pierce-Smith basic-lined converters, two having 33 tuyères, the other 17 tuyères; 1 copper casting apparatus. The power plant at the smelter includes 1 Nordberg 2-cyl. engine for converter air supply, capacity 10,000 cu. ft. air per min., at 13 lbs. pressure, rope driven, by a 600-h. p. motor; 1 No. 9 Connorsville blower, capacity 20,000 cu. ft. air per min., at 3 lbs. pressure, belt driven, by a 250-h. p. motor, 1 Rateau-Battu-Smoother turbo-blower, for blast furnace supply, direct connected to an 800-h. p. motor, capacity 39,000 cu. ft. per min., at 3 lbs. pressure; 1 Ingersoll-Rand, Imperial type 10, compressor. Another turbo-blower is being erected. This is for converter air supply and will be direct connected to a 1,700-h. p. motor, capacity 24,000 cu. ft. air per min., at 13 lbs. pressure.

General summary of smelter operations:

	Per day
Tons of concentrates treated.....	350
Tons of coke consumed.....	60
Tons of fuel oil consumed.....	10
Tons of matte converted.....	150
Tons of copper produced.....	60
Number of men employed.....	350
Electric energy used, 1,500-h. p.	

The new concentrator has 3 sections of 1,200 tons, nominal capacity, each; the coarse ore goes from bins to gyratory crushers, to two 72"x20" rolls, to a 48" Symmons disk crusher, to Marcy mills and thence to 3,000-ton fine-ore bins for delivery to mill itself. Concentration is effected by 4 impact screens, 2 sets of rolls, 4 trommels, 6 Wilfley tables, 8 Hardinge mills, 2 Yeatman classifiers, 8 conical settling tanks, 6 Wilfley tables, 16 conical settling tanks, 6 Hardinge mills, automatic samplers for concentrate and tail rolls and storage bins.

The experimental Minerals Separation Co.'s flotation plant, with a daily capacity of 240 tons, has been in operation since the fall of 1912. It proved so successful that a 3,000-ton plant, to treat the entire mine output, was built and is now in operation.

It consists of 8 standard M. S. units that treat the tonnage handled by the 3 mill sections. Extraction is over 77%, and it is expected an 80% extraction will be obtained with the completion of the air cell installation. Daily production of all concentrates is about 350 tons. Average assay is: copper, 19%; iron, 23%, sulphur, 28%; lime, 2%; silica, 17%; alumina, 8%.

The complete works, including the concentrators, leaching plant and smelter, are planned to treat 4,500 tons of ore daily, estimated to average 2.50% and to yield 60,000,000 lbs. fine copper yearly, at a cost, estimated by the management, of 7½ cts. per lb. laid down in New York, with the possibility of reducing the cost to 6½ cts. per lb. if capacity of plant is increased to 10,000 tons. This is now being considered.

Production is estimated at 3,000,000 lbs. fine copper in 1908; 7,500,000 lbs. in 1909; 9,000,000 lbs. in 1910; 9,500,000 lbs. in 1912, and 18,098,000 in 1913.

Production:

	Tons Milled	% Cu	% Rec. Mill	Ratio Conc.	% Cu. Smelter	% Rec. Smelter	Net Prod. Lbs. Cu.	Cost Cts. per Lb.
1915 (a)	1,106,420	2.09	74.92	11.29	17.68	94.49	32,733,573	8.78 cts.
1914	900,299	2.12					28,304,092	

(a) For year ending Oct. 31, 1915. 35,444,000 lbs. for calendar year 1915.

The property is one of exceptional promise and is being developed and equipped with the aid of the best technical skill.

BRADEN MINE.

OREGON

Gold Hill, Jackson Co., Ore. Owned by C. R. Ray, of Tolo, Jackson Co., Ore., and at last accounts was leased to the Opp Mng. Co. Located in S. E. ¼ section 27, T. 36 S., R. 3 W., 3 miles from Gold Hill. Opened up about 30 years ago. Largest production for any one year was \$30,000 in 1907.

Ore: gold in 2' vein, strike N. 30° E., dip 25° S. E. Vein filling is quartz and sulphides. Ore assays about \$9 gold per ton. **Development:** several thousand feet of drift tunnels, longest over 1,200'. Equipment includes a 20-stamp mill.

See S. S. G. S., Bull. 546, p. 39.

BRADFORD MINE.

ARIZONA

Near Patagonia, Santa Cruz Co., Ariz. Mine is property of Ferry estate, developed by 400' shaft. Lessees are said to have shipped 5 cars of ore to the Copper Queen smelter at Douglas. Operations to be resumed in 1916.

BRADFORD MINES, LTD.

NOVA SCOTIA

Halifax, Nova Scotia. **Officers:** E. F. Heffler, pres.; A. E. Abrams, v. p.; W. C. Milner, sec.-treas.; with S. Youngman and G. J. Partington, directors. Inc. Oct. 3, 1914, in Nova Scotia. **Cap.,** \$500,000, shares \$1 par; outstanding, 354,823 shares. Transfer office and registrar, Security Reg. & Transfer Co., New York. Listed on New York Curb.

Property: at Sheet Harbor and Tangier, Nova Scotia, contains ore with gold and silver values.

BRADLEY LEAD & ZINC CO.

MISSOURI

W. S. Pate, mgr. Owns a lease on the St. Louis-Joplin Lead & Zinc Co.'s land, comprising a part of the A. B. C. Mining Co. ground and the Martha Ball mine, in the Chitwood district, near Joplin, Jasper Co., Mo.

Ore: lead-zinc occurs in disseminated deposits in the A. B. C. and as sheet-ore, 20' thick at depth of 200', in the Martha Ball.

Development: by shafts. **Equipment:** 250-ton mill on Martha Ball ground. Active operations began March, 1915. Company operating a second 250-ton mill in the West Joplin district, Oct., 1915.

BRANT GOLD & COPPER CO.

COLORADO

Geo. Brant, pres., Pitkin, Colo.; Chas. Albertson, v. p.; L. I. Turner,

sec. Inc. May, 1913, to acquire the Abe Lincoln and Sunnyside mines, 3½ miles south of town of Pitkin. Abe Lincoln has tunnel 254' long, from which a 300' drift has been run on a vein 3' wide that assays up to \$41 per ton in gold and copper.

Ten-stamp mill in operation 1914, and a block of treasury stock offered for sale to public to furnish funds for hoisting plant and other machinery. The Abe Lincoln is operated under lease by the Hahnwald-Leasing Co.
BRANT INDEPENDENT MINING CO. COLORADO

Office: 429 N. Y. Life Bldg., Kansas City, Mo. **Mine:** P. O. Pitkin, Gunnison Co., Colo. R. B. Anderson, pres.; J. F. Anderson, v. p.; G. E. Crowell, sec.; M. J. Ostergard, treas.; preceding officers, M. Woolley, J. W. Hickman, T. R. L. Daugherty, R. J. Edwards and R. R. Thiele, directors.

Inc. April 12, 1906, in Ariz. **Cap.**, 5,000,000 shares, par value \$1, fully paid, non-assessable; 4,600,000 shares issued. **Bonds**, \$150,000, 8% authorized, \$60,000 issued. **Dividends** to date, \$8,174. **Annual meeting**, second Tuesday in January.

Property: 96 claims, partly patented, of about 1,056 acres, in Box Canyon and Quartz Creek districts of Gunnison county, Colo. Four mines, the Camp Bird, I. X. L., Gold Ridge and Roosevelt, opened up and proven by Camp Bird shaft 200' deep; I. X. L. shaft 60' and 90' crosscut and the Gold Ridge tunnel which follows vein for 130'. Ore occurs in fissure veins 6 to 20' wide in diorite and granite, said to carry 8% copper and \$20 gold per ton. The Camp Bird mine has been operated under lease by other parties.

Crosscut tunnel, started in April, 1911, to drain and open up the entire territory at depth, had been driven 1,700' March 1, 1916. **Equipment:** includes hydro-electric plant of 400-h. p. capacity, completed in 1915, 4-drill air compressor, 50-h. p. motor and drills. Quartz creek runs through the property. Mine is only a few feet from D. & R. G. R. R. and county road.
BREWER GOLD & COPPER MINING CO. UTAH

Idle. Office: 212 Utah Savings & Trust Co. Bldg., Salt Lake City, Utah. **Mine office:** Ibabah, Tooele Co., Utah. J. P. Gardner, pres.; S. W. Morrison, v. p. and treas.; H. B. Windsor, sec.; John Mortimer, asst. sec. **Inc.** Feb. 16, 1907, in Utah. **Cap.**, \$50,000, shares 10 cts. par, assessable; 4 assessments have been levied. **Lands:** 11 claims, 6 patented, on Dutch mountain, in the Clifton district, 50 miles from a railroad, having a limited amount of development work, showing silver-copper ore. Shut down several years, awaiting building of branch railway line from Wendover, on the Western Pacific railroad.

BRISTOL CONSOLIDATED MINES & SMELTING CO. NEVADA

Frank Sullivan Smith, 60 Wall St., New York, receiver.

Company originally owned 21 or more patented claims in the Bristol mining district, Pioche, Lincoln Co., Nev. In 1911 practically all this property was transferred to the Day Bristol Cons. Mines Co. In 1914 the latter company went into receivers' hands and the property finally passed to the Cons. California-Nevada Co., which company was recently merged with the Internat'l & Intercontinental Mng. & Ref. Co., holding company (Uvada Copper Co., operating company), which see.

BRITANNIA MG. & SMELTING CO., LTD. BRITISH COLUMBIA

Office: Care Howe Sound Co., Moore & Schley, 747 Fifth Ave., New York. **Canadian office:** 31 Davis Chambers, Vancouver, B. C. **Mine** at Britannia Beach, New Westminster district, B. C. **Smelter** at Crofton, Vancouver Island, B. C. **Officers:** Hon. Edgar Dewdney, pres.; J. W. D. Moodie, v. p. and gen. mgr.; G. M. White, sec.-treas.; preceding officers, D. G. Marshall and C. B. McNeill, directors; E. J. Donohue, gen. supt.; C. P.

Browning, mine supt. Company is a close corporation, controlled by the Howe Sound Co., of New York, in which G. B. Schley, of Moore & Schley, New York, owns control.

Inc. 1908 in British Columbia. Cap., \$2,500,000, shares \$25 par; issued \$2,299,150; was organized to take over the Britannia mine and assets of the Britannia Copper Syndicate and the property of the Britannia Smelting Co., Ltd. Annual meeting, first Monday in March.

Balance sheet: for 1915 showed assets of \$5,478,645, which included plant and property \$4,664,793, and current assets \$283,300. Liabilities showed loans, Howe Sound Co., \$1,186,966; Tacoma Sm. Co., \$53,000; current liabilities, \$191,275; profit and loss account, \$821,589. **Operating statement:** for 1915 shows total operating profit, \$809,924; depreciation, snow-slide loss, miscellaneous, \$615,686, leaving a net profit for 1915 of \$194,238, as compared with \$25,631 for the previous year, but \$411,133 was charged off for construction and equipment in 1914, company's policy being to pay for all new construction and equipment out of net earnings.

Property: 164 Crown-granted mineral claims, 16 beach lots, 7,538 acres; also 167 un-Crown granted mineral claims 7,500 acres, and 8 timber licenses, 4,366 acres on the east shore of Howe Sound. In 1915 company bought the Howe Sound Power Co., owning important water rights on Furry Creek, in South Valley, with the intention of increasing the hydro-electric development.

The Britannia mine lies on Britannia mountain, 4 miles from and about 3,500' above the sea; has approximately 8,500' of the strike of a mammoth mineral zone. Orebody consists of mineralized schist in lenses and large irregular bodies, ranging from 300 to 600' in width, the schistose silicious material being impregnated with copper and iron pyrites. The ore consists of chalcopyrite and pyrite in quartz and averages 2% copper, but as mined, 1915, runs 3.0%. There are 8 known orebodies, of which 3, more or less developed, carry an average of about 2.5% copper, 0.04 oz. silver and 50 to 80c gold per ton.

Development: by large glory holes and by a number of tunnels at elevations below the outcrop of 500', 600', 700', 850' and 1,050', the latter being known as the 1,000' level. A new low-level tunnel, 4,336' long, completed July, 1913, to this distance, but which will eventually be driven on through the mountain, gives a depth of 2,200' on the orebody and 1,200' below the old workings. It is now the main working tunnel and is known as the 2,300' level. At 3,922' from the portal a raise was driven to the 1,050' level and later enlarged to a 3-compartment shaft. Underground work in 1915 totaled 2,595' as compared with 8,000' in 1914.

Ore reserves: estimated Jan. 1, 1916, in the Fairview mine; broken ore in stopes, 578,200 tons, which should average 3.5% copper; ore developed, 2,855,900 tons; probable ore, 2,544,000 tons; possible ore, 4,275 tons; total, 10,253,000 tons, all of which management states should average 2.0% copper in the Bluff, Jane and Empress mines, idle in 1915, management estimates 1,482,800 tons positive ore, with a total of 6,944,000 tons of positive, probable and possible ore of 1.53% copper.

Equipment of the shaft includes a double-drum electric hoist on the 1,050' level and a Gates crusher in the rock-raise between the 1,050' and 2,200' levels, placed on the 1,800' level and run by a 75-h. p. motor. This rock raise, 200' east of and connected with, the shaft, serves as a storage bin for ore, with capacity of 4,000 tons above the 1,800' level and 2,000 tons below the 1,800' level. The raise is lined with 12" by 12" timbers. Electric motors haul the ore from the chute to the portal of the tunnel. From the portal the ore is hauled 3 miles by electric railway to head of a 33% incline,

5,400' long, vertical drop of 1,600', which leads to the bins of the concentrator at the water's edge.

Equipment: includes 300-h. p. steam, 400-h. p. water and 500-h. p. electric power. A new hydro-electric plant of 2,500-h. p. has been installed. A 35-drill Rand air compressor, at the beach, sends air to the mine through an 18" pipe line. There is a 3-mile transmission line, with two 300-k. w. 6,600-volt generators, driving the machinery plant at the mine, actuated by a Pelton water wheel, located at the beach, which receives water from a creek under an effective head of about 1,900'.

The old 300-ton concentrator has been remodeled and added to until its capacity has reached 850 tons daily. It will be kept running until the new mill is in full operation. Equipment includes Gates crushers, Hancock jigs, five 8' and 26' Hardinge mills and concentrating tables. Tailing from tables goes to a Mineral Separation flotation plant, which was added in 1912. Ratio of concentration is 5 to 1, with extraction of 94% copper and 95% silver content.

The new mill when in full operation will have a daily capacity of 4,000 tons. The first 1,000-ton unit went into commission in Nov., 1915, and at last reports was treating 20,000 to 35,000 tons ore per month. Intentions of management are to reduce present 3% average grade to about 2½% copper in order to use the large tonnage of low-grade ore available.

Smelter returns show average value of ore treated to be about 3.08% copper, 0.33 oz. silver per ton, and no gold values.

There are 2 townsites in connection with the company's operations, one at Britannia Beach, on the shore of Howe Sound, and the other, known as the Mine Townsite, laid out at the portal of the new tunnel. It has all necessary buildings for equipment and men, the mine buildings being the best and most comfortably equipped in British Columbia. There is a large company store at Britannia Beach.

The company owns a reduction plant known as the Crofton smelter and formerly shipped its ores across Howe Sound for treatment at this plant. The company's smelting plant is described Vol. X. A contract, dated July 15, 1915, was made for a period of 7 years with the A. S. & R. Co.

When the new mill is operating at full capacity the company estimates costs per ton as follows: Mining, 50c; milling, 35c; transportation, 5c. These are exceptionally low, and it is doubtful if they can be attained. Total tonnage milled in 1915, 212,158 tons, cost per ton \$0.63; mining costs, including development and crushing, \$1.77 per ton. Concentrates assayed 15.04% copper, 1.67 oz. silver and 0.013 oz. gold. Net cost of producing copper said to be 7.3 cts. per lb.

Production was suspended Oct., 1907-1910. Production since 1909 is as follows:

	Lbs.Copper	Oz.Gold	Oz.Silver	Total value
1915.....	9,058,045	397	50,306	\$1,616,133
1914.....	11,841,232	213	68,515	1,640,379
1913.....	13,167,000	89	72,300	2,052,188
1912.....	14,300,000	....	76,500	2,383,285
1911.....	8,685,000	....	46,000	1,074,334
1910.....	520,000	1,000	7,500	64,000

Extensive development is planned for 1916; this includes driving 9'x13' tunnels at the 2,700' and 4,100' levels and exploration of new ground.

The Britannia proved a hard problem to handle for years, but has made money under the present management, which is thoroughly capable. A successful future seems certain, and the results are a tribute to the far-seeing judgment and persistency of Mr. G. B. Schley.

BRITISH AMERICAN MNG. CO., LTD.**BRITISH COLUMBIA**

Office: 2616 Chicago Ave., Minneapolis, Minn. **Officers:** H. J. Peterson, pres.; E. E. Harnish, v. p.; O. L. Grondahl, sec.; preceding officers, J. D. Smith, Geo. King, R. C. Payne, A. G. Bylin, directors; L. M. Olson, treas. John Minear, supt. Inc. Dec., 1906, in Ariz. Cap., \$1,000,000, shares \$1 par; outstanding \$591,000.

Property: 3 patented claims on Texada Island, B. C., said to show copper, gold and silver ore in vein. Development is by 160' incline shaft. **Equipment:** hoist, 3-drill air compressor. Plans sinking to 300' level. A prospect.

BRITISH-AMERICAN NICKEL CORP.**CANADA**

Office: Toronto, Ont. Mine office: Sudbury, Ont. **Officers:** F. S. Pearson, pres.; J. F. Taylor, v. p.; J. C. McAllister, managing director; J. A. Holmes, mgr.; C. F. Buck, chief engr.; R. W. Deacon, met. engr.; E. E. Hibbert, supt.; W. C. Wilson, auditor; J. H. Roe, purch. agent:

Inc. Aug., 1913, in Canada by Dr. F. S. Pearson, E. R. Wood and associates. Cap., \$30,000,000; \$10,000,000 in 6% preferred debenture stock, redeemable at \$106, and \$20,000,000 common; fully issued. Company took over the properties, processes, etc., of the Dominion Nickel Copper Co., Ltd.

Property: 17,000 acres, including 10,800 acres mineral land, with 5,000 timber, 1,500 mill and smelter ground and 283 acres townsite in the Sudbury mining district, Ontario. Includes the following mines: Whistle, Wild Cat, Jackson, Nickel Lake group, W. D. 16, Elsie, Gertrude, Victor, Murray, Lady Violet and Falcon Cridge. Lands contain 21 known orebodies, 7 of which have been developed. Company has spent about \$650,000 on diamond drilling, 1907-13. The Whistle mine has been developed and is ready for production. The town of Nickelton has been built at this mine.

Company purchased several properties from the Lake Superior Corporation and now has the largest holdings of ore reserves in the Sudbury district next to those of the International Nickel Co. Diamond drilling at the Murray mine disclosed a large orebody, reported to contain over 8,500,000 tons of ore.

At the Murray mine, a 1,200' three-compartment shaft was sunk 700' and extensive underground development planned, but the mine was closed down in August, 1914.

Smelter now being constructed in Snyder township, about 5 miles N. W. of Sudbury, 1½ miles from the Murray mine, will have 3 blast furnaces of 500 tons daily capacity, 1 reverberatory furnace of 300 tons daily capacity, a converting plant with 3 basic-lined converters, and will treat 1,500 tons of ore daily, turning out 80% copper-nickel matte, which will be refined at the company's own works. Mines are connected with the Canadian Pacific, Canadian Northern Ontario, and Algoma Eastern railroads by a private railroad, 6 miles long, known as the Nickel Range railway, equipped with a 75-ton locomotive and 21 cars. Company has appropriated \$3,500,000 for construction of mine and smelting plants and electrolytic refinery, all of which were expected to be completed and in operation by Sept., 1914, but the outbreak of the European war stopped all work. Properties were examined, in fall of 1912, by B. B. Lawrence, of New York, on whose advice they were purchased.

BRITISH COLUMBIA COPPER CO., LTD.**B. C. & WASHINGTON**

Controlled by Canada Copper Corp., Ltd.

Office: 42 Broadway, New York. Mines and works office: Greenwood, B. C. **Officers:** Newman Erb, chairman; L. W. Mayer, pres.; Colgate Hoyt, v. p.; A. J. Ronaghan, v. p.; R. H. Eggleston, sec.-treas.; preceding officers,

with exception of R. H. Eggleston, August Heckscher, directors. Oscar Lachmund, gen. mgr.; L. W. Mayer, cons. mg. engr.; F. S. Norcross, gen. supt. of mines; all of Greenwood, B. C.; A. F. H. Meyer, chief of office staff, Greenwood, B. C.; Riddell, Stead, Hodges & Winter, official auditors, Vancouver, B. C.

Inc. March, 1898, in West Virginia. Cap., \$3,000,000, shares \$5 par. Original capitalization was \$1,000,000, increased to \$2,000,000 and in 1907 to present amount; 591,709 shares issued; fully paid and non-assessable. New York Trust Co., transfer agents; Empire Trust Co., New York, registrar. Dividends paid are as follows: No. 1, in 1907, \$201,200; Nos. 2 and 3, in 1911, \$147,930; Nos. 4 and 5, in 1912, \$177,512; No. 6, in 1913, \$88,756; total, \$615,399. Control passed March, 1914, to the Canada Copper Corp., Ltd. (N. P. L.) by exchange of 90% of the outstanding stock, the new company loaning \$340,000 for purchase and development of new properties.

The company controls the New Dominion Copper Co., Ltd. (non-personal liability) through ownership of 64% of the stock and bonds to par value of \$237,675. Profit and loss account for 1915 shows operating disbursements and custom ore purchased \$402,390. Proceeds of metal sold and misc. earnings \$467,624, leaving a balance of \$66,033. General expenses and power charges during time plant was shut down amounted to \$90,951, leaving an operating loss of \$24,917 for the year.

Company has borrowed \$460,000 from the Canada Copper Corporation, Ltd., to April 1, 1916. Annual meeting, second Tuesday in March.

Property of the company is extensive, about 1,900 acres, of which 80 are smelter and mill sites and the balance mineral lands. Claims held under Crown Grant or U. S. patents. The producing properties of the company are the Mother Lode mine, at Greenwood, B. C., the Napoleon mine in Washington, the Queen Victoria mine and Lone Star mine and the Copper Mountain group of claims.

The Eureka group near Nelson, the L. H. group and the Butte claim at Wellington camp, held under option in 1914, were abandoned, as exploratory work was unsatisfactory. A $\frac{3}{4}$ interest in the Emma mine was sold for \$55,000 in 1915.

The Mother Lode group of mining claims near Greenwood, in the Boundary district, comprises 339 acres. The copper ore occurs in a contact deposit between limestone and eruptive rocks, largely as altered limestone that has been replaced by massive garnet, magnetite, silica and alumina, together with iron and copper sulphides. Much lime is also present as calcite. All these minerals are present in such proportions as to make the ore practically self fluxing. Copper occurs exclusively as chalcopyrite, the ore carrying from 1 to 1.75% copper with from 75 cts. to \$2 per ton in gold and silver. The main orebody measures about 160x1,200' running nearly north and south, the greatest width being 260' and the dip about 70° easterly. Diamond drill work is reported to have failed to find an extension of the orebody. The new discovery in the southern end of property is apparently a separate orebody. Work during the year amounted to 433' drifting, 666' raising and 711' diamond drilling. There are other smaller and less important ore deposits in the claims nearby.

The ore is mined by both quarrying and underground stoping, though the first method is now almost abandoned owing to the depth of the quarries. Due to different mining methods used at different periods, the mine became honeycombed and stoping was impossible. A large blast was set off in Sept., 1913, which was a record for underground work. Number of holes, 4,830; 40% dynamite, 49,550 lbs.; wire, 18.5 miles; estimated amount broken, 400,000 tons. The shaft has four compartments, 2 for the 5-ton

skips, 1 for a man cage, and 1 for ladders and pipe lines. On the 2 lower levels ore is hauled by electric motors and on the upper levels by horses. It is dumped into capacious pockets at the shaft and hoisted to a bin at the head of the shaft, where it is crushed by one of a pair of Farrel crushers, with jaw openings 24x36" and 36x42", respectively. From the crushers it passes to the railway bins over a 200' Robins belt conveyor. At the bin end of the conveyor the ore passes an automatic sampler, which cuts out the daily sample.

From Jan. 1, 1914, to Aug. 20, 1914, when mine and smelter suspended operations temporarily, resuming July, 1915, the mine produced 178,000 tons ore at a cost of 85½ cts. per ton. **Shipments:** for 1915, 105,085 tons, averaging 0.21 oz. silver, 0.87% copper, 0.037 oz. gold. Management estimates ore reserves at 100,000 tons, April 1, 1916. Other mines of the company produced 13,000 tons.

The Lone Star group of 3 claims, 52 acres, is 8 miles S. E. of Greenwood and is connected with the Canadian Pacific railway at Boundary Falls by a 28,560' aerial tram, having 72 towers of from 15 to 67' in height, with 3 tension and 2 anchor stations. The ore of this mine is contained in two orebodies in a highly altered, eruptive rock now largely altered to a talcose schist. Approximately 300,000 tons have been developed by drilling and other work, the major portion of the area being as yet unprospected. The mine is equipped with a 7-drill compressor driven by an electric motor, the hoist being run with compressed air. The average assay value of the Lone Star ore is higher than that of other Boundary district ores, but it is silicious and as it carries alumina as well, it is much more refractory.

Work in 1914 was largely exploratory, but the 1,988 tons shipped carried 60 cts. gold; ¼ oz. silver per ton and 2.423% copper. Operations were suspended in May. **Development:** in 1915 consisted of 697' of drifting and crosscutting; shipments amounted to 6,510 tons, averaging 0.032 oz. gold, 0.913 oz. silver, 2.60% copper per ton. **Ore reserves:** April, 1916, estimated to be 170,000 tons of 1.60% copper. The ore is amenable to wet concentration with subsequent flotation treatment.

The Napoleon mine, about 60 acres, is in the Pierre Lake district at Napoleon, Wash., 7 miles from Marcus. The ore is needed for its sulphur content. Output for 1914 until shut down in May was 5,332 tons, averaging gold 10.94 cts. and silver 0.08 oz. per ton, with copper 0.204%, silica 20.3%, iron 35.3%, lime 5.3% and sulphur 17.7%.

Equipment: includes 2 compressors of 10-drill capacity, Farrel crusher and a 4,100' aerial tramway to the Great Northern railway. The sulphide ores are capped by 75 to 150' of oxidized ore. To treat this ore a 10-stamp mill has been erected, with a 100-ton cyanide plant. All power is steam, electric lines not having been extended into the district. **Ore reserves:** Jan. 1, 1915, 3,300 tons as floors of stopes. Costs per ton laid down at the Greenwood smelter were \$2.8575. Mine is to be reopened in 1916.

The Victoria mine, purchased 1912, comprises 5 claims near Nelson, B. C., about 110 miles easterly from Greenwood. Ore is an altered limestone, similar in genesis, nature and mineral contents to the Boundary ores, carrying about 1.26% copper with some silver and gold. Mine is equipped with a 5-drill electrically-driven compressor and the ore is taken to the Canadian Pacific railway, on the bank of the Kootenay river, over a 3,000' aerial tramway. Operations were suspended March, 1914, due to low copper content of the ore, but mine was operating under lease in 1915 and shipped 754 tons of ore to the company smelter, averaging 0.77 oz. silver, 0.0037 oz. gold, 2.28% copper per ton.

Copper Mountain: at this camp, 14 miles by road south of Princeton, B. C., the company owns and has bonds on various groups of claims, covering an extensive area of mineralized grano-diorite, a so-called "porphyry" or disseminated ore intruded by barren quartz porphyry dikes. For two years or so the company has been prospecting this ground by diamond drilling and trenching, with especial reference to the location of the barren fikes; 18,315' of trenching and 28,134' of diamond drilling were done in 1914.

Company holds bond and options on the following properties, all considered tributary to the smelter: (1) Ada B. group; (2) Silver Dollar claim; (3) Annie L. claim; (4) Princess Maud claim; (5) Red Eagle claim; (6) Triangle Fractional claim, all in Princess camp; (7) Eureka group, and (8) Queen Victoria group, both near Nelson; (9) L. H. group, near Silverton; (10) Riverside group, near North fork of Kettle river; (11) Copper Mountain district; (12) Greyhound mine, Deadwood camp.

Ore reserves: by Dec. 31, 1915, 9,075,000 tons of "reasonably assured" ore, about 1.7% copper with 20c gold-silver per ton, in addition to 2,000,000 tons of probable ore of same grade copper, were estimated. When work has progressed farther it is planned to build a concentrator to treat this ore.

The B. C. 2,500-ton smelter at Greenwood, 5 miles by rail from the Mother Lode mine, receives its ores over the Canadian Pacific railway, and does a general custom business also. The plant is electrically operated, requiring about 1,600-h. p. A 600-ton sampling mill has a custom ore bin connected with the sampler by a belt conveyer. All ores are coarse crushed at the bins, then pass the samplers, and then go to the receiving bins over a belt conveyer. The cupola building has 3 blast furnaces. The ore bins have a capacity for 12,000 tons ore and 4,000 tons coke. There are 6 Baldwin-Westinghouse electric motors for the charging and slag lines. The slag cars have 25-ton side-dumping ladles operated electrically from the locomotives.

The converter building adjoins the blast-furnace building and has 2 stands, with 84x126" shells, taking matte with from 35 to 55% copper and producing blister copper of 99 to 99.5% copper, carrying 20 to 50 oz. silver and 5 to 10 oz. gold. Stands are tilted by hydraulic accumulators, and shells, matte, etc., handled by a 40-ton, 4-motor traveling crane. There is a 72" silica mill for linings. In the power house are three 300' Connersville blowers, a Nordberg compressor for the converters, and four 300-h. p. motors. There are 3 motor generators furnishing direct current to the railway locomotives and an air compressor for operating furnace gates, steam hammers, etc., and an electrically-operated hydraulic accumulator.

Power is purchased on a watt-meter basis from the Bonnington Falls Co. plant, 85 miles distant. The voltage is 40,000, transformed to 2,200 volts, 60 cycle, 3 phase at the smelter. All machinery is electric or air-driven. The works have a briquetting plant handling flue dust. Smelting fuel is coke, costing under \$6 per ton, consumption being about 90,000 tons yearly.

The new smelter suffered a scarcity of coke in 1912, and for 2½ months but 2 furnaces were running; 740,589 tons was smelted in 13 months ending Dec. 31, 1913, as compared with 608,945 tons for the year ending Nov. 30, 1911; 443,022 tons came from the company's mines; the balance was custom ore. The smelter was idle until July, 1915, when one furnace was put in operation, treating 7,374 tons custom ores and 115,140 tons company ore to Dec. 31, 1915. Output was 1,850 tons of matte, containing 48% copper. In April, 1916, a second blast furnace was blown in and smelter

is now treating about 1,400 tons daily. 350 men employed in Greenwood mine and smelter.

Production:			Fine				Fine
Year	Gold	Silver	Copper	Year	Gold	Silver	Copper
	oz.	oz.	lbs.		oz.	oz.	lbs.
1905....	26,226	95,410	5,601,309	1911....	31,144	134,266	9,944,987
1906....	20,238	82,193	5,820,651	1912....	25,863	142,025	11,146,811
1907....	24,967	101,114	8,643,133	1913....	26,640	137,052	8,296,902
1908....	13,597	58,204	5,567,355	1914*...	14,442	63,501	4,116,190
1909....	18,244	64,234	6,325,000	1915....	5,417	23,002	1,734,385
1910....	24,962	84,180	7,143,456				

*Jan. 1, to Aug. 23.

The company cannot earn much money from its Mother Lode mine unless copper sells at about 15 cts. a lb., but its Copper Mountain properties will, when developed and equipped, have a production that should restore the company to the rank of dividend payers.

BRITISH COLUMBIA PHOENIX CO., LTD. BRITISH COLUMBIA

Secretary and office: H. W. Batty, 146 Bishopsgate, London, E. C., England. Geo. S. Waterlow, chairman, and L. C. F. Robson, directors. Company is a reorganization, July, 1914, of the British Columbia Phoenix Syn., Ltd. **Cap.**, £5,000 in 20,000 shares of 5s each; 6,205 shares issued and fully paid. Shareholders in the B. C. Phoenix Synd. Ltd., received 1 share of 5s fully paid in the new company for 10 shares, 1s each, of the old company.

Properties and interests taken over from the liquidator of the B. C. Phoenix Syn., Ltd., include an interest in the New Velvet-Portland Mine, Ltd., consisting of a mortgage debenture, loans to the receiver and accrued interest, an unsecured debt and also the equity of redemption. The mine was leased for one year from July, 1915. Other properties and interests include mining claims in British Columbia, real estate in Rossland and sundry shareholdings and other interests.

BROADWATER COUNTY MINING CO.

MONTANA

Idle. Officers: J. J. Fisher, pres., Harlowton, Mont.; Len Jobb, sec.; John A. Matthews, treas. **Inc.** 1910. **Cap.**, \$225,000; shares \$1 par. **Property:** 7 claims, includes the Evening Star, Copper Glance and Lombard, about 5 miles west of Townsend, on the Radersburg road. Claims show good outcrops and development is said to disclose veins 4 to 12' wide, with chalcocite assaying up to 60% copper, 6 oz. silver with gold and lead values. Management plans having property prospected and reported on with a view to resumption of operations in near future.

BROOKLYN ARIZONA MINING CO.

ARIZONA

Address: c/o J. B. Hill., sec. Andover, Mass. Mine near Mayer, Yavapai Co., Ariz. **Benj. B. Tuttle, v. p.;** **Jas. S. May, treas.** **Inc.** March, 1907, in Me. **Cap.**, \$2,500,000; shares \$10 par; nonassessable; fully issued. Bonds authorized \$500,000; about \$75,000 outstanding. Was promoted by the American Securities Co. Annual meeting, first Wednesday in April.

Property: 82 claims, about 1,600 acres, including the Brooklyn group of 14 claims, in the Squaw Creek district, about 20 miles S. E. of Mayer, carries auriferous and argentiferous copper sulphides. **Development:** by 750' main shaft and 2,500' tunnel. **Equipment:** includes compressor, double-drum hoist, 3,000' cable and Partridge smelter. Former mismanagement fully described in Vols. X and XI. Company reported in new hands, 1915, and operations likely to be resumed.

BROOKLYN MINING CO.

CALIFORNIA

Mine at Dale, San Bernardino Co., Cal. **Development:** by 800' shaft,

at which depth a rich find of gold ore was reported in 1914. Has gasoline power and a 3-stamp mill. Property optioned to Los Angeles parties for \$190,000, who were developing and shipping at last accounts.

BROOKLYN MINING CO.**NEVADA**

Idle. E. S. Shields, sec.-treas.; 19 W. Granite St., Butte, Mont. Mine near Contact, Elko Co., Nev. S. V. Kemper, pres.; T. M. Hodgens, v. p. Inc. 1898, in Montanā. Cap., \$500,000; shares \$1 par; 213,000 shares issued. Has no debts.

Property: 7 claims, 75 acres in the Contact district, with ore deposits occurring on the contact between limestone and porphyry. This ore belt is about 18' wide, runs E.-W. for several thousand feet, dips at 75° and is said to contain 8% copper, with about 2 oz. of silver and \$1 gold per ton.

Development: by 196' shaft with 600' of workings, said to have developed 2,000 tons of ore. Property idle, waiting the advent of railway. Equipped with 25-h. p. boiler, 15-h. p. gasoline engine and hoist. Is 40 miles from railway.

BROWN BEAR MINING CO.**CALIFORNIA**

Address: Redding, Shasta Co., and Deadwood, Trinity Co., Calif.; Thos. McDonald, pres.; B. McDonald, supt. **Property:** 586 acres, of mineral land, 200 patented, and 671 acres of timber land, includes the Brown Bear mine, on north side of Deadwood Gulch at Deadwood, discovered in 1875, and worked ever since. The property is a consolidation of several mines and as a whole has been the largest producer in the Weaverville Quadrangle and the most famous mine in Trinity County. It is credited with a production of \$7,000,000 to \$10,000,000.

Geology: there are 2 main veins, the Monte Cristo and the Last Chance 200' south of the former, which lie for the most part in Bragdon slate formation, but also cut an intrusive soda granite porphyry. Veins are parallel, and strike N. 80° E. The Monte Cristo dips steeply to the north; the Last Chance dips south 60° to 80°. Width as a rule is not over 2', more commonly about 6", but stopes have been mined to a width of 22'. Ore-shoots are several hundred feet in length; those of the Last Chance vein pitch at a flat angle to the east. The veins show clay slips along both walls, so it is rare that the ore is frozen to the wall. Quartz is the principal gangue mineral the ore contains pyrite, galena, sphalerite, and arsenopyrite. Pyrite being the most common, rich ore is usually found, where galena and sphalerite are present. The best ore mined runs about \$100 per ton, but the average grade is between \$20 and \$50.

Development: 7 crosscut tunnels ranging in length from 100' to 2,400', the lowest being 1,080' below the outcrop. There are several miles of underground workings. **Equipment:** includes a 10-stamp mill, 2 Wilfley tables and water power obtained from Deadwood Creek through a 3-mile ditch.

At present the company employs only about 5 men. Lessees are working the mine.

See Mines & Min. Res. of Trinity County, State Mineralogist's Rept., p. 141; and U. S. G. S. Bull. 540, p. 70.

BROWN MOUNTAIN SMELTING CO**COLORADO**

T. B. Crawford, sec.-treas., 403 Wyoming Block, Denver, Colo. **Mine office:** Ouray, Ouray Co., Colo. **Officers:** W. E. Kreamer, pres.; P. J. York, v. p.; A. E. Ackerson, mine supt. Inc. 1911, in Colo. Cap., \$300,000; shares \$1 par; issued, 280,000.

Property: the Hill, or Ouray smelter and the Guadalupe mine with 432 acres mineral land and 25-acre mill site in the Red Mountain district. The Guadalupe mine is reported to show an 18' vein of copper ore averag-

ing 3% copper, 5 oz. silver and \$5 gold per ton in sulphide ore. **Development:** totals 3,000', including a 2,000' tunnel and a 500' crosscut blocking out 50,000 tons of ore. **Equipment:** at mine, 350-h. p. water power.

The 250-ton smelter, 6 miles from Ouray, has 2 blast furnaces of the Loder type, turning out 40% matte, which is shipped to the Garfield smelter for further treatment. It was blown in Oct., 1913, and is now under lease to Wanakah Mining Company for a period of two years.

BROWN WHITLOW GROUP **ARIZONA**

Mine address: Superior, Pinal Co., Ariz. Owned by J. C. Brown and J. W. Whitlow. **Property:** 5 claims, in Pioneer district, near Superior; adjoins the old Silver King mine, once the richest silver property of Arizona. **Development:** by tunnel, which cuts a 7' contact vein of copper ore carrying low-grade and silver values.

Reported under lease to parties connected with Magina Development Co., 1914.

BROWNELL-ARIZONA MINING & SMELTING CO. **ARIZONA**

Mine office: Casa Grande, Pinal Co., Ariz. **Property:** formerly held by Producer Mining & Smelting Co., is supposed to include the Jack Rabbit mine, 80 acres, in Pinal county, together with the Producer and Century-Chief group of 320 acres, and Index group of 220 acres, in Pima county, all in the Quijotoa mountains. Company sold stock, 1910, on the strength of a clever brochure, written by Alfred Henry Lewis, the talented writer, whose statements are not hampered by a knowledge of copper mining. Company not favorably regarded.

BRUCE MINES, LTD. **ONTARIO**

Office: St. Catharines, Ontario, Canada. **Mine office:** Bruce Mines, Algoma, Ont. **Officers:** R. W. Leonard, pres.; Alex. Longwell, v. p. and gen. mgr.; J. J. Mackan, sec.; A. B. Wilmott, cons. engr., 404 Lumsden Bldg., Toronto. **Inc.** 1908, as successor of Copper Mining & Smelting Co. of Ontario, Ltd. Idle many years.

Property: the old Bruce mines, freehold, was discovered 1843, and worked extensively, 1846-76, producing copper to the value of about \$3,500,000. Lands are 65 acres of surface rights, and mineral rights to 12,800 acres, or 20 sq. miles, on Georgian bay, granted, 1854, from the crown. The mine has 6 known veins, practically parallel, of which 2, of 4 to 18', have been more or less developed, the principal vein traceable 8,000', having a strike of N. 23° W., and of 18' maximum width, traversing diabase, carrying mainly chalcopyrite, with some chalcocite, and quartz gangue, estimated by former management to average 5% copper, but run-of-mine ore ranges 2.5 to 5% copper.

Development: by 10 shafts, deepest 450'. Practically everything above the 360' level is stoped out. The waste heaps carry about 117,000 tons of discarded ore, estimated to average 1.5% copper, which perhaps is too high.

Equipment: A 200-ton concentrator, 1½ miles from the mine, has an Austin crusher, 5 sets of rolls, 12 Hartz jigs, 18 Frue vanners, 2 double-deck slime tables and 18 sizers.

Miscellaneous improvements include a coal wharf, merchandise wharf, electric light plant, and telephone system.

The Bruce Mines & Algoma railway, formerly under the same management as the mine, is a standard-gauge line, 10 miles long. The extension of the railroad to Ridout on the Canadian Pacific railroad's main line, is reported to have been financed in England.

Production: 1846-75, was 47,593 tons of ore and concentrates, yielding 19,125,920 lbs. fine copper. Property has changed hands repeatedly

but has secured no production since suspension, 1876, by the old company. The ore is rich but occurs in bunches and specks in a quartz gangue. The quantity is not great enough to insure large output and cheap costs. With flotation plant and economical management, property might be made to pay expenses and provide for new development.

BRUNSWICK CONSOLIDATED GOLD MINING CO. CALIFORNIA

Grass Valley, Nevada Co., Calif. **Eastern office:** 136 Liberty St., New York. **Officers:** W. H. Oscanyan, pres.; R. Chester Turner, v. p.-gen. mgr.; J. Stadtfeld, sec.-treas., with J. A. Beckwith, Theo. C. Camp, directors. J. J. Halpin, asst. sec.-treas.; C. H. Mallen, supt. **Inc.** Jan. 11, 1890. **Cap.,** \$500,000, shares \$1 par; 395,287 shares issued. J. J. Halpin, 136 Liberty St., New York, transfer agent; Farmers Loan and Trust Co., New York, registrar. Listed on San Francisco Exchange.

Financial statement: for fiscal year ending Jan. 27, 1916, shows balance Jan. 28, 1915, \$83,034; receipts from bullion, \$196,072; from concentrates, \$26,421; misc., \$4,462; disbursements included dividends, \$71,151; mine, \$71,979; old mill, \$10,484; new mill, \$28,893. Cash on hand and New York City bonds, Jan. 27, 1916, \$49,628. Total production, 1893-1916, \$1,384,843. Dividends: in 1906, 3c; in 1913, 6c; in 1914, 24c; in 1915, 18c per share.

Property: located on the Mother Lode, at Grass Valley, has gold quartz veins in schists and slates. For geology see Lindgren's Gold-Quartz veins of Nevada City and Grass Valley districts, Calif.; 17th Ann. Rept., pt. 2, 1896, pp. 1-262.

Development: by incline shaft to 1,100' level, now being sunk to the 1,300' level. Underground work in 1915 totaled 2,905'. Ore blocked out ready for stoping, Jan. 27, 1916, 16,000 tons. Also a considerable tonnage of low-grade ore indicated by exposed faces. **Equipment:** includes two 20-stamp mills, one going into commission in Oct., 1915.

Production:

	Costs Per Ton			Value Ore Per Ton	%	Bullion Prod.		
	Tons	Mng.	Mlg.			Total	Ext.	Oz. Au.	Oz. Ag.
1915	22,004	\$4.97	\$0.84	\$ 8.59	\$11.11	90.8	9,466	2,069
1914	16,237	6.05	.93	10.22	.....	93.9	12,992	2,622

Company is planning to erect a small cyanide plant to treat concentrates at the mine.

BUCHAN'S MINE

NEWFOUNDLAND

P. O.: Millerton, N. F. Wm. Scott, supt. Property is owned by the Terra Nova Co. and described under that name. This company is a subsidiary of the Anglo Newfoundland Development Co., which has a timber and mineral concession over about a million acres in the center of the island, near Grand Falls. Company has built largest pulp paper plant in the world and mining is merely a side issue.

BUCKEYE BELMONT MINES CO.

NEVADA

1055 Spitzer Bldg., Toledo, Ohio. **Mine office:** Tonopah, Nev. **Officers:** A. B. Tillinghast, pres.; W. B. Kober, v. p.; W. B. Voorhees, sec.; preceding officers are directors. E. F. Rowley, treas.; Letson Balliet, mgr. and supt. of properties.

Inc. 1908, in Nev. **Cap.,** \$2,000,000; shares \$1 par; nonassessable; outstanding \$700,000. Annual meeting 1st Thursday in Jan. Private corporation. Stock unlisted. Is a holding company, operating property formerly owned by Belmont Extension Mng. Co., now defunct, and holding interests in the Buckeye Eagle and Buckeye Tonopah companies. Reported in Oct., 1915, to have taken an option upon a drift gravel property in Plumas Co., Cal.

Property: 15 claims, 13 patented, 300 acres, at Tonopah, adjoining the Tonopah Belmont on a portion of the east end line. **Ore:** quartz with silver sulphides and gold occurring in fissures in trachyte. Veins strike E. W. and dip 30°.

Development: 3 shafts, 125', 900', and 1,234' deep, with 5,000' underground workings. Operations in 1915 consisted of developing the 900' and 1,200' levels. **Equipment:** includes 2 electric hoists, of 52-h. p. and 120-h. p., one 40-h. p. gasoline hoist and two 8-drill air compressors.

Plans for 1916: completing the raise from the 1,200' to 900' level, drifting and sinking the 900' shaft to the 1,500' level. Property is in the development stage; no production has been made to date. It is said to be operated at a high degree of efficiency and along conservative lines.

BUCKEYE COPPER & GOLD MINING CO. ARIZONA

Main office: New Philadelphia, Ohio. **Mine office:** Turkey, Yavapai Co., Ariz. **Officers:** Michael Siebold, pres.; Wm. Rommel, v. p.; Fred Graff, sec.; C. D. Grimes, treas.; with A. W. Reiser, L. Hardman, Geo. Edell, M. M. Davis; Alvin Graff, mine supt. **Inc.** July 24, 1912, in Arizona. **Cap.**, \$3,000,000; shares \$1 par; nonassessable; issued \$1,790,000. Annual meeting, first Tuesday in September.

Property: 35 claims, 720 acres and a 20-acre smelter site, in 3 groups, is 2 miles from Turkey, in Black Canyon district of Bradshaw mountains. Claims show chloritic schists and diorite, carrying fissure veins with occasional native copper and malachite, but mainly azurite, chalcopyrite and bornite, estimated to average 4% copper, 3.5 oz. silver and from a trace to \$6 gold per ton.

Development: 726' two-compartment shaft on the Columbia claim, a 520' two-compartment shaft on the Sullivan claim, with 2 other 200' shafts, various pits of 10 to 40' depth and tunnels of 87' and 314', with about 5,000' workings. **Equipment:** includes 15-h. p. and 40-h. p. gasoline hoists, a small air compressor and several mine buildings.

BUCKEYE EAGLE MINING CO. NEVADA

Tonopah, Nev. Control held by Buckeye-Belmont Mines Co. Same officers and directorate as that company.

BUCKEYE TONOPAH MINING CO. NEVADA

Tonopah, Nev. Control held by Buckeye-Belmont Mines Co.; same officers and directorate as that company.

BUCKHORN MINES CO. NEVADA

Mine at Buckhorn, Eureka Co., Nev. Geo. Wingfield, pres.; E. R. Richards, mgr. Property shows gold ore, occurring in a zone said to be traceable for 2,000' on surface.

Development: shafts and tunnels. **Equipment:** includes hoists, compressor, electric power and 350-ton cyanide plant. Employs 125 men.

BUENA TIERRA MINING CO., LTD. MEXICO

T. D. Pillans, sec., 11 Cornhill, London, E. C. Eng. **Directors:** R. T. Bayliss, chairman; L. A. Butler, W. McDermott, J. H. M. Shaw, cons. engr.; R. M. Raymond, gen. mgr., and A. C. Brinker. **Cap.**, 330,000 shares, £1 par; all issued and fully paid. Reg. Feb. 10, 1912, in England, to acquire from the Exploration Co. of England and Mexico, Ltd., the Buena Tierra mine, 89 acres, in the Santa Eulalia district, Chihuahua, Mex., 15 miles S. E. of Chihuahua. Purchase price was £300,000, payable £178,201 cash, £121,799 in fully-paid shares. Property reported on by R. T. Bayliss and R. M. Raymond. Dividends paid, 2 shillings per share.

Ore: principally lead and zinc carbonates assaying 10 oz. silver, 15% lead and 25-50% zinc. There is also a low-grade mixed sulphide. Ore-bodies occur in limestone lying almost flat, but instead of following the

fissures, spread out into flat beds near them, their average width is 30', average thickness 40'. The Chorro orebody has a depth of over 1,000'. Developed orebodies are most numerous at 450' depth, but most of the mines have ore down to a depth of 1,300'. Ore reserves estimated early in 1915 at 300,000 tons.

Development: by shafts; Buena Tierra shaft is 1,400' deep. Raises are put up from the levels at intervals of 75'-200' and the ore is mined in small bunches, little powder being required and practically no timber.

The Mexican revolution has interfered with production during the past few years and property has not been operated steadily. Lead ore is shipped to the A. S. & R. Co.'s smelter at Chihuahua or El Paso and the zinc ore to the United States.

Development costs are high, due to difficulty of finding orebodies. If a daily tonnage of 300 tons can be maintained, conditions are good for low costs.

BUENA VISTA GOLD MINING CO.

MEXICO

Owned by El Rayo Mines Co., which see.

BUFA MINING, MILLING & SMELTING CO.

MEXICO

Idle. **Office:** 1030 I. N. Van Nuys Bldg., Los Angeles, Cal. Mine at La Bufa, Sahuaripa, Sonora, Mex. Wm. E. Richardson, pres. and gen. mgr.; Baron W. Riley, sec.; Frank R. Richardson, treas. Inc. 1902, in Arizona. **Cap.**, \$1,500,000; shares \$1 par. Has paid 5 dividends, last being \$60,000, July, 1905.

Property: 123 acres, a 10-acre mill site, and 5,000 acres ranch lands, showing 6 fissure veins, of which 2 under development average 4' width, opened by a 600' incline. **Ore:** said to give average assays of 10% copper, 10% lead, 4% zinc, 150 oz. silver and \$2.50 gold per ton, from argentiferous tetrahedrite and copper sulphides. **Development:** shafts of 300' and 600', and a 225' tunnel, with 8,000' of workings and about 20,000 tons of high-grade ore said to be blocked out, with a considerable amount of low-grade ore on the dump, for eventual treatment.

Equipment: includes a 120-h. p. plant at the mine, with 2 hoists, 2 Rand air compressors and 7 power drills. Mine buildings include several small shops, a store, sawmill and about 20 dwellings.

The 35-ton concentrator has a small sampling mill attached. There also is a 20-ton leaching plant.

The smelter, at the mine, receives ore by gravity tram. Equipment includes 10-ton and 25-ton reverberatory furnaces, built of silica brick, made on the ground. Fuel is inferior wood, cut on the premises. Product is a matte carrying 50% copper, 600 to 800 oz. silver and 1.5 oz. gold per ton, shipped, by burro, at Aguascalientes, via Guaymas, for refining, some rich ore being shipped also. Production, 1906, was about 750,000 lbs. fine copper. Management said to be waiting for peace to resume operations.

BUFFALO MINES, LTD.

ONTARIO

Office: 14 Wall St.; New York. **Mine office:** Cobalt, Ont., Can. **Officers:** Chas. L. Denison, pres.; Robt. W. Pomeroy, v. p.; H. B. Crandall, 2nd v. p.; G. C. Miller, sec.-treas.; preceding and A. W. Johnston, directors. T. W. H. Jeacock, asst. sec.; Thos. R. Jones, supt.

Inc. 1906, in Ont. Cap., \$1,000,000; shares \$1 par. **Transfer offices:** Imperial Trust Co., Toronto, and U. S. Mortgage & Trust Co., New York. Registrar, Imperial Trust Co., Toronto. Annual meeting in May.

The Buffalo has been one of the largest producers in Cobalt, yearly output being about 2,000,000 oz. It is said that the greater part of the high-grade ore has been mined, but there remains a large tonnage of low-grade ore capable of being worked at a profit.

Income statement: year ending April 30:

	Total Inc.	Net	Dividends	Surplus	Total Surplus
1915	\$ 372,260	\$ 79,690	\$ 50,000	\$ 27,158	\$379,968
1914	858,825	386,990	660,000	270,218(a)	352,810
1913	1,258,864	891,193	650,000	233,450	623,028

(a) Deficit.

Balance sheet for year ending April 30, 1915, shows: assets of \$1,530,-348, which includes cash and accounts receivable, \$13,015; ore and bullion, \$377,411; plant and equipment, \$150,401; mining rights, \$907,092; liabilities include notes and accounts payable, \$112,092.

Property: 40 acres, in the town of Cobalt, includes the Buffalo mine.

Development: vertical shafts. Work for year ending April 30, 1915, consisted of 2,515' of drifting and raising, compared with 2,463' in 1914, and 40,363 sq. ft. of stoping compared with 53,478 in 1914. Total work to May 1, 1915, comprised shaft work, 1,301'; drifting, 16,698'; stoping, 2,365,906 cu. ft.

Ore reserves: estimated May 1, 1915, as 16,097 tons of broken ore and 26,000 tons unbroken ore.

Production: years ending April 30:

	Tons			Oz. Ag.			Total Prod.
	Milled	per Ton	Rec.	Cyanided	per Ton	Rec.	
1915(a)	51,667	19.50	72.22	8,385	9.86	82.26	822,791
1914	77,616	25.31	76.14	13,388	10.13	77.80	1,637,809
1913	55,783	45.83	82.64	10,320	15.45	74.70	2,235,853

(a) Concentrating mill and cyanide plant closed for 4 mos.

BLUE VALLEY GOLD MINES CO.**UTAH**

Office: 1025 Kearns Bldg., Salt Lake City, Utah. **Officers:** John T. Hodson, pres.; M. R. Evans, v. p.; W. Scowcroft, sec.-treas.; R. G. McQuarrie, mgr., and D. H. Morris, directors. **Inc.** 1913. **Cap.**, \$100,000; shares 10c par.

Property: 15 patented and 2 unpatented claims, millsite and group of placer claims, 35 acres, in Gold Strike district, near Enterprise, about 40 miles from Modena on the S. L. R. R.

Ore: free milling gold quartz found in fissure veins, 3' wide, along porphyry dike in lime, quartz, andesite and rhyolite formation, is said to run as high as \$50 per ton. **Development:** 2,247' of workings, including 2 tunnels, 500' and 705' long. **Ore reserves:** estimated at 10,000 tons milling ore in sight, valued at \$20 per ton. **Equipment:** 3-stamp, 10-ton mill. Employs 4 men.

Production: consisted of several high-grade shipments in 1915. Plan erecting reduction plant in 1916.

Worked under lease by Goldstrike Mining & Leasing Co., with practically same management.

BULL VALLEY HASSIAMPIE GOLD MINING CO.**UTAH**

Goldstrike, Washington Co., Ariz. Officers: H. J. Burgess, pres.; Ren Bryson, v. p. & supt.; J. A. Bryson, sec.-treas.; with S. C. Bryson, A. B. Hemenway, J. D. Alsop, J. Z. Alger, directors. **Inc.** July 28, 1913, in Utah. **Cap.**, \$100,000; shares 10c par; outstanding \$70,500. Annual meeting 1st Monday in July.

Property: 3 claims, 60 acres, unpatented, adjoining Bull Valley Gold Mines Co., in the Goldstrike mining district, covers a large belt of porphyry and quartzite. **Ore:** gold in fissure vein, 17' wide, with 80° dip, said to assay from \$1.20 to \$14.60 per ton.

Development: 150' incline shaft, with 165' of drifting on the 100' level. Plans sinking to the 300' level. Property is still in the development stage.

BULLION BECK & CHAMPION MINING CO. UTAH

Care U. S. Smelting, Refining & Mining Co., 55 Congress St., Boston, Mass., and Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. **Officers:** Geo. W. Heintz, pres.; Jos. F. Smith, v. p.; Ambrose Nord, sec.-treas.; C. E. Allen, mgr.; preceding officers, J. H. Horlick and M. C. Morris, directors. L. C. Doty, supt. **Cap.**, \$1,000,000; shares \$10 par; 63,787 issued; last assessment of 20c called in April, 1914. Dividends: to end of 1909, were \$2,738,400, last dividend being 10 cts., July 11, 1908. Company is a veteran of the Tintic district and a close corporation whose stock is mostly held by the U. S. S. R. & M. Co. through its ownership of the Centennial Eureka Co., which holds a majority interest in the Bullion Beck & Champion Mining Co. Balance sheet December, 1915, shows gross earnings of \$3,453; current assets \$7,459 and current liabilities \$1,363.

Property: 3 claims, adjoining the Centennial-Eureka, which is under the same control, and with which sideline agreements stopping litigation were secured, 1908. Mine was discovered, 1876, and has been a producer since 1880.

Development: 1,300' shaft, with 200' winze below the bottom level, and by the Beck tunnel. Ore is mainly carbonate and chloride in limestone formation, carrying copper, gold, silver, lead and zinc values.

Equipment: includes a 200-ton mill, with steam and electric power.

Production: in 1915 was 2,700 tons, averaging \$11 per ton and yielding 41 oz. gold, 29,306 oz. silver, 775,728 lbs. lead, 27,042 lbs. copper and 375,670 lbs. zinc.

About 60 men working leases on property.

BULLION MINE MONTANA

The Bullion mine lies at an elevation of 7,400' on the N. W. side of Jack mountain, 10 miles by road from Basin. A concentrator and smelter of 200 tons daily capacity, was constructed and several thousand feet of drifts and tunnels run, but property is now idle.

Mine shows fissure veins in Butte granite. Ore contains lead, zinc and copper sulphides with arsenopyrite in quartz gangue carrying tourmaline. Mine, formerly owned by Northwestern Metals Co., bankrupt, was sold in June, 1916, at sheriff's sale, for \$22,000.

BULLION MINING CO., LTD. IDAHO

Mine P. O.: Wallace, Idaho. William Squance, pres.; R. A. Marshall, v. p.; Jas. H. Taylor, sec.-treas. and mgr., with Frank Taylor, directors. Inc. 1902, in Idaho. **Cap.**, \$1,500,000; shares \$1 par, issued 1,248,668; in treasury, 251,332 shares; 9 assessments, one-half cent a share, levied up to Nov. 1, 1912, yielding \$39,229.

Property: 10 claims, 3 patented, 220 acres, near Lookout, 2 miles from the Chicago, Milwaukee & St. Paul railway, and 4 miles from Borax station, on the Northern Pacific line, on the Idaho slope of the Bitter Root divide, with a good wagon road to Borax. Property has a quartz vein of 4 to 20' width, with average of 6 to 12', and nearly vertical dip, carrying shoots of copper ore, 2-4' wide, mainly chalcopryrite. Concentrates estimated to average 19.8% copper, 3 oz. silver, \$2.40 gold, 28.5% iron and 4% silica per ton.

Development: by shafts and 2 crosscut tunnels, 1,500' long, one 200' vertically above the other. The upper one has 130' crosscut and 186' drift on vein. Lower tunnel cuts a 28' vein 350' from portal, with 4' of solid ore. Orebody proved for 35' upward by raise and downward by shaft.

Equipment: includes steam power, a 12-h. p. hoist, Pelton wheel, and a 5-drill Ingersoll-Rand air compressor.

A trial shipment of 24 tons to the East Helena smelter, Sept., 1912, showed 56% copper and 1 oz. silver per ton. Concentration tests on 5.2% ore showed a 73% recovery. No production since 1912. Diamond drill work was done in 1913 and company plans driving lower tunnel 2,533' to intercept ore at depth of 430' in 1916.

BULLWHACKER COPPER CO.**MONTANA**

Reorganized as Butte Bullwhacker Mng. Co., which see.

BULLY CAVE CO.**CALIFORNIA**

Address: c/o Hatch & Clute, 100 Broadway, New York. Mine at Winthrop, Shasta Co., Calif. **Officers:** Walter F. Welch, pres.; Vincent P. Donihee, v. p.; Frank M. Clute, sec.-treas.; first two named and Frank F. Gearn, directors. E. J. McLaggan, supt. **Cap.,** \$5,000.

Property: owns the McClure group and has an option on the Michigan group on Bully Hill adjoining and west of the Bully Hill Copper Co.'s mine. Claims show two mineralized shear zones with clay gouge walls and about 40 "ore channels" 1½' to 6' wide. The ore carries iron pyrite with chalcopyrite and zinc sulphide.

Development: by Hawkeye tunnel, 1,050' with 74' and 150' drifts; Ydalpom II tunnel, 1,115' and 3 drifts; North Star tunnel, 1,050' and 2 drifts; Recorder I, 600' drift and winze; Recorder II, 400' tunnel; Ydalpom I, 150' tunnel.

Equipment: includes all necessary machinery, houses, etc. Company also owns a gold mine at Cave Creek, Maricopa Co., Ariz.

BULLY HILL COPPER MINING & SMELTING CO.**CALIFORNIA**

Office: 30 Church St., New York. Mine P. O.: Winthrop, Shasta Co., Cal. **Officers:** John B. Keating, First Nat'l Bank Bldg., San Francisco, Cal., pres. and mgr.; L. B. Judson, v. p.; M. F. Westover, sec.; Herbert R. Hanley, asst. mgr.; preceding officers, A. H. Jackson, A. W. Burchard and D. M. Riordan, directors. **Inc.** 1900, in New Jersey. **Cap.,** \$2,500,000; shares \$25 par, reduced 1905 to \$1,000,000. Bonds, \$400,000, issued for construction of Sacramento Valley & Eastern railroad, stock of which is owned by the Bully Hill. Is controlled, through practically entire stock ownership, by the General Electric Co., Schenectady, N. Y.

Property: 450 acres, 320 patented, near Delamar, Shasta county, includes the Bully Hill, Rising Star, Rising Sun, and old Winthrop & Baxter groups, all in the eastern end of the copper belt. Owns 14-mile railway (Sacramento & Eastern), connecting with S. P. R. R. at Pitt station.

Geology: ore occurs in nearly vertical N. E.-S. W. shear zones, or veins, in metarhyolite, varying from 4' to 400' and averaging 30'. Definite walls, if present, are post-mineral gouges; basalt forms the east wall. The ore forms irregular lenticular bodies that average 45' wide by 200' long and are connected by narrow seams of ore. Ore is a complex mixture of sulphides carrying chalcopyrite with zinc and antimony and low gold-silver values.

Development: several tunnels, lowest No. 3, crosscutting the vein at 1,100' and 600' below the outcrop. A 950' shaft was sunk at this point with levels 100' apart, and all necessary connections for work and air.

The 400-ton smelter has one blast furnace, two calcining furnaces, five converters and all necessary machinery, etc. It has been idle since 1910.

Company built a small experimental plant at Delamar, Cal., to try out electric smelting and recovery of zinc values. This plant, remodeled in 1915, produces 300 to 400 lbs. metallic zinc per day, using direct electrolysis of zinc sulphate solution with regeneration of acid. (See Met. & Chemical

Engr'g. Feb. 1, 1916, p. 120.) The ore has also been tested by the Minerals Separation Co.'s flotation process with favorable results.

BUNKER HILL CONS. MINING CO.

CALIFORNIA

Office: Humboldt Bldg., San Francisco. Mine office: Amador City, Amador Co., Cal. W. F. Detert, pres.; E. Hampton, sec. Inc. 1907. **Cap.**, \$200,000, shares \$1 par. The mine has paid dividends for several years; in first half of 1915 six monthly dividends were paid, totaling \$30,000. Owing to heavy construction and new equipment expense the dividend rate has been reduced from 5 to 2½ cts. per share.

Property: 3 claims, the Bunker Hill, Mayflower and Nevada, 1½ miles north of Amador City, 2,587' on the lode. **Geology:** the ore is gold, occurring in the Bunker Hill vein, strike N. 25° W., dip 58° E., with average width of 6'. From surface to 200' level the vein occurs on the contact between Mariposa slate on the west and metadiabase on the east; from the 200' to the 1,400' level, the vein is in slate; from the 1,500' to the 2,400' level the vein has a greenstone footwall and slate hanging-wall. On the 1,400' level an orebody has been opened 40' west of the Bunker Hill vein, and running parallel with it. This orebody is 860' long, average width 30', and at a point 860' north of the shaft joins the Bunker Hill vein; at points it forms the footwall of the Bunker Hill vein. Ore occurs in the form of lenses, the schist being cut by numerous stringers of quartz; the rock is highly impregnated with pyrite, as high as 4 to 5%. The gray orebody has been developed on the 1,400', 1,500', 1,750' and 1,950' levels. Three ore-shoots have been developed on the property; the north and south shoots on the Bunker Hill vein have an average length of 500', average width of 6', while the gray orebody is 600' long, average width of 15'.

Development: by shafts; main shaft is double-compartment, 2,587' deep, and sunk on an incline of 58°. From the 1,950' to the 2,400' level it is sunk in metadiabase. On the 2,400' level the distance from the shaft to the Bunker Hill vein is 280'.

Equipment: includes a double-drum hoist, driven by a 300-h. p. motor, Ingersoll-Rand compressor, driven by 100-h. p. motor, pumps, a 40-stamp mill and a cyanide plant. Ore is hoisted in 2½-ton skips, and is crushed by a Knight crusher, before being trammed 550' to the mill. Stamps, weighing 1,150 lbs. each, drop 6½", 96 drops per min., crush 5 tons per stamp daily through No. 4 punched screen. Pulp flows over double-compartment amalgamating plates to 24-6' Frue vanners; tailings from the vanners go to the cyanide plant, where sands are treated in eight 100-ton leaching vats, treatment taking 8 days. Concentrates are first agitated with lime in Pachuca tanks, 50 lbs. lime for 11 tons ore, then agitated 8 hours with strong KCN solution; treatment lasting 3 to 4 days. Mill tailing runs 99c per ton; a 45% extraction is made. Tailing is treated on a royalty basis. W. E. Darrow, V. R. Fitzsimmons et al., Sutter Creek, owners. The Bunker Hill Company employs 155 men. See U. S. G. S. Folio 63; and M. & M. Res. of Amador Co., p. 20, Cal. State Mng. Bureau.

In the first six months of 1915, 42,087 tons of ore was mined and milled, producing \$151,591, an average value of \$3.60 per ton; aggregate total expense, \$109,792.

BUNKER HILL MINES CO.

ARIZONA

Owned by Phelps, Dodge & Co., Inc.

Office: 99 John St., New York. Mine office. Tombstone, Ariz. **Officers:** Jas. Douglas, pres.; C. H. Dodge, v. p.; A. C. James, v. p.; Geo. Notman, sec.-treas.; Dr. E. Grebe, supt. **Cap.**, \$1,000,000; outstanding \$750,000.

Inc. to take over and operate the property of the old Tombstone Cons. Mines Co. at Tombstone, discovered in 1878 and at one time one of the largest producers of gold-silver-lead ore in the Southwest. At a depth of 560' the volume of water became so great all attempts to handle it were unsuccessful and operations were discontinued until Phelps, Dodge & Co. acquired possession.

Development: in 1915 was carried out principally on the claims tributary to the following shafts: Flora Morrison, Grand Central, Telephone, Bunker Hill, Silver Plume, Oregon, Lucky Cuss, Tribute, West Side, Toughnut, Silver Thread and Tranquility. New work totaled 5,049' in 1915. Results from prospecting in the old workings and in new ground have not yet shown orebodies of great size or commercial importance.

The old cyanide plant of the Tombstone Cons. was converted into an experimental plant for the testing of Tombstone ores and was put into operation in June, 1915. Results up to 1916 were inconclusive.

Power is supplied by a central power plant from which compressed air is conveyed by pipes to the different mines. About 300 men are employed.

Production:

	Ore Tons	Gold Oz.	Silver Oz.	Lead Lbs.	Copper Lbs.	Manganese Lbs.
1915	10,746	1,373	109,783	269,303	23,760	1,171,599

BUNKER HILL MINING & SMELTING CO.

WASHINGTON

Office: 1123 Broadway, New York. Mine office and works: Reiter, Snohomish Co., Washington. **Officers:** T. A. Mead, pres.; John D. Campbell, sec.; Le Roy B. Sherman, treas.; preceding officers, J. E. Bowman, A. W. Avery, Wilbur Morris, Eric T. Christensen and Manfred Rockefeller, directors. Inc. Oct. 24, 1902, in Maine. **Cap.**, \$3,000,000; shares \$1 par; reduced, March 23, 1908, to \$1,500,000, and afterward increased to \$2,000,000, shares \$1 par, in \$1,500,000 common stock and \$500,000 cumulative 8% preferred stock, latter to provide for payment of bonds, second mortgage notes and script notes; outstanding Jan., 1916, 1,497,000 common shares and 380,000 preferred shares. Annual meeting, last Tuesday in October. Was the successor of Bunker Hill-Sullivan Copper Mining Co.

Property: 18 claims, 343 acres, known as the Copper Bell group on Bald mountain, one-half mile from Reiter station, Great Northern railroad, and 5-acre mill site, on May creek below Lake Isabel. Mineral claims show 9 fissure veins in granite and a contact deposit between granite and diorite. **Development:** by shafts of 86' and 600' with about 1 mile of workings, shows orebodies of various widths carrying chalcopryite averaging 1% copper, 0.5 oz. silver and 40 cts. gold per ton. Company also owns 3 claims, 40 acres, at mouth of Lake Isabel, about 1¼ miles N. E. of the Copper Bell group.

Production during 1906-08, inclusive, valued at \$7,500. Since 1908 no work has been done except what was necessary to hold the property by possessory rights.

BUNKER HILL & SULLIVAN MNG. & CONCENTRATING CO.

IDAHO

Office: 1022 Crocker Bldg., San Francisco, Calif., and Kellogg, Idaho. **Officers:** Fred W. Bradley, pres.; San Francisco; J. W. P. McFall, v. p.; Wm. H. Crocker, treas.; Geo. F. Holman, sec.; G. D. Abbott, asst. sec.; Stanly A. Easton, mgr.

Inc. 1885, in Oregon. **Cap.**, \$3,270,000, all issued; shares \$10 par. Not listed. Company is practically a close corporation, control being vested in a holding company known as the Nevada Bunker Hill & Sullivan Co.

Transfer agt. and registrar, asst. sec. of the company at San Francisco. Annual meeting, 3rd Thursday in June.

General Balance Sheet (Year Ending Dec. 31)

Assets—

	Property & Plant	Supplies	Cash, Ore & Concts.	Dividend Reserve	Miscel.	Total
1915....	\$4,977,268	\$253,583	\$603,416	\$1,047,554	\$190,274	\$7,072,095
Liabilities—						Total
1915.....	Capital Stock	Surplus	Account	Miscel.		\$7,072,095
	\$3,270,000		\$3,691,165	\$110,930		

Income Account (Year Ending Dec. 31)

	Gross Shipm'ts	Divid's Rec'd	Other Income	Cost Prod'n	Other Deduct's(a)	Bal. to Surplus
1915....	\$4,139,393	\$532,558	\$130,082	\$3,076,591	\$1,062,750	\$445,691

(a) Includes \$1,062,750 dividends, \$217,001 property depletion.

Net earnings available for dividends: \$1,819,888 in 1915; \$1,017,829 in 1914; \$1,285,751 in 1913. Reports state that the cash surplus on March 1, 1916, was \$2,000,000, of which \$1,000,000 was in a contingent reserve and the remainder been set aside to finance the construction of the proposed new smelter.

Recent dividends: in 1910, \$3.15; in 1911, \$2.65; in 1912, \$2.30; in 1913, \$2.50; in 1914, \$3; in 1915, \$3.25 per share; in 1916 to April 5, \$1 per share. Total dividends paid to April 5, \$17,263,500. As a result of apex litigation with the Caledonia Mng. Co., the B. H. & S. Co., controls that company, owning 1,305,000 shares out of 2,605,000 issued. See Caledonia Mng. Co. The Sierra Nevada is also a subsidiary of the B. H. & S. Co. The company is the largest lead producer in the world.

Property: about 5,000 acres, patented, at Kellogg. **Geology:** the larger part of the ore is principally a replacement of the Revett quartzite, in which the replacement is closely connected with fissuring. The principal ore minerals are galena with some pyrite and zinc blende, and in places a little argentite rich in silver. The orebodies are definitely related to a persistent fissure, strike N. 45° W., dip 38° S. W., locally known as the "foot-wall fissure." The zone of fissured quartzite in which the orebodies occur has a maximum width of 300'; ore is found in the hanging-wall of the fissure. The orebodies are very irregular in form and may be several hundred feet in length and depth with width in places as much as 40'. For geology of this district see U. S. G. S. Prof. Paper 62, *Geology and Ore Deposits of the Coeur d'Alene district*.

Development: tunnels and shafts. The Kellogg tunnel, 8x9', in section, and about 2 miles long, is the main working level. It is equipped with electric haulage. Above the tunnel the orebodies have been explored to surface. Below the tunnel at 200' intervals are 5 working levels, Nos. 10, 11, 12, 13 and 14. Development work in 1915 totaled 4,783', costing \$7.32 per ft., as compared with 2,754', costing \$10.77 per ft. in 1914, and 2,203', costing \$8.25 per ft. in 1913.

Ore reserves: Jan. 1, 1916, were 3,573,000 tons. Milling ore averages 9 to 12% lead and 3.7 to 4.5 oz. silver per ton. Shipping ore averages 42 to 50% lead and 17 oz. silver per ton.

Equipment: includes 3 concentrators, power plant, water power, machine shops, saw mill, etc. Replacement value of surface equipment is placed at \$800,000. Mill extraction is about 80% for lead and 70% for silver.

The company has a 25-yr. contract, dated March 20, 1905, to sell all ore, assaying between 30 and 70% lead to the A. S. & R. Co., but friction between the two companies has been constant for the past few years and

the B. H. & S. Co. recently announced its decision to build its own smelter at Kellogg. Initial daily capacity will be 1,000 tons. Power will be obtained from the Washington Water Power Co. of Spokane. Equipment will include Dwight-Lloyd sintering machines and Wedge turret roasters. There will be 3 blast furnaces, bag houses and an electrolytic refinery to desilver the lead bullion. It is thought the plant will be in operation within one year.

Low-grade ore is shipped, at present, to the smelter of the Northport Sm. & Ref. Co., at Northport, Wash., which went into commission March 1, 1916, but this arrangement will not alter the plans for the proposed new smelter.

Production:

	Ore Mined Tons	Cost per Ton	Concts. Tons	Lead Lbs.	Silver. Oz.
1915	452,142	\$1.99	59,901	74,584,741	1,298,284
1914	440,819	1.98	56,163	70,663,236	1,161,324
1913	436,060	2.25	59,471	71,860,773	1,227,076

BURLINGTON-NEVADA COPPER CO.

NEVADA

Address: Yerington, Lyons Co., Nev. Property at Mason Pass, a few miles from Yerington, is developed by a 100' shaft, from which ore was shipped to the Wabuska smelter, 1913. Equipment includes a gasoline hoist.

BURNSIDE GOLD MINES, LTD.

ONTARIO

Kirkland Lake, Ont. Inc. July, 1913, in Ont. **Cap.**, \$3,000,000. Is a subsidiary of the Kirkland Lake Proprietary, Ltd. Owns claims adjoining the Tough-Oakes gold mine at Kirkland Lake.

BURR MINING CO.

ILLINOIS

Connersville, Ind. **Officers:** F. C. Bosler, pres.; Jos. R. Mountain, v. p.; P. H. Kinsler, sec.-treas.; J. H. Billingsly, gen. mgr., Galena, Ill.; preceding officers, J. H. Banghman, directors. F. J. Dewilde, cons. engr. Inc. in Ind. and Wis. **Cap.**, \$30,000; shares \$100 par.

Operating the Triganza lease, 40 acres mineralized land, near Galena, Ill. A 165' shaft develops sheet-ground formation. Company put a new 200-ton mill in commission, Feb., 1916. Output is zinc concentrates.

BURRO MOUNTAIN COPPER CO.

NEW MEXICO

Owned by Phelps, Dodge & Co., Inc.

Office: 99 John St., New York. Mine office: Leopold, Grant Co., N. M. **Officers:** Dr. Jas. Douglas, pres.; Jas. McLean, v. p., A. C. James, c. p.; Geo. Notman, sec.-treas.; E. M. Sawyer, gen. mgr. Inc. 1904, in N. M. **Cap.**, \$50,000, increased 1906 to \$100,000 and Nov. 30th, 1915, to \$8,000,000; shares \$1 par.

Property: 60 claims, 1,000 acres, bought 1906, from Southwestern Copper Co. The Savanna Copper Co.'s holdings of 2,600 acres were added in 1915, bringing the total acreage up to 4,464 acres. Property shows 36 porphyry dikes, carrying 5 orebodies of disseminated ore having 2% to 5% copper.

The old mine, 15 claims, known as the St. Louis, is said to have produced upwards of \$1,000,000 worth of ore, under former ownership, shipping ores ranging 15 to 25% in copper tenor.

Geology: property contains a number of large orebodies of disseminated chalcocite, so-called porphyry ore, that are genetically dependant upon intrusions of monzonite, in pre-Cambrian granite, both rocks being shattered and faulted. The largest orebody is entirely in porphyry, the next largest in a brecciated zone, associated with dikes of aplite and dark felsite (phases of the porphyry), cutting through granite. The Sampson orebody is 100 to 200' in width, about 1,000' in proven length, and of

300' proven depth. The mine has about 5 miles of workings; it is worked largely on the caving system, obviating excessive timber requirements. Actual stoping and milling operations began in March, 1916. The East orebody is mined by milling the ore into 55° chutes going down to the 4,700' Niagara tunnel, where it is loaded directly into standard gauge railway cars. The Breccia orebody is mined through No. 3 shaft, hoisted in 2-ton skips, dumped on an inclined belt conveyor, and discharged on a horizontal conveyor loading by tripping device into railway cars. Company has 5 Star churn drills, one electrically-driven, now at work.

The Burro Mtn. and Chemung mines have been united by the Niagara haulage tunnel, starting at the Tyrone terminus of the Burro Mountain branch of the A. T. & S. Fé railroad; this tunnel, 8x9', was driven to Leopold, a distance of about 1 mile, and serves the double purpose of drainage and haulage. While driving this tunnel the so-called Bison orebody was found.

The old concentrator, built 1905, and twice remodeled, has been dismantled. A standard-gauge 18-mile spur was built in 1913, at a cost of \$350,000, from the main line of the Santa Fé railroad to the mine and mill. A central power plant equipped with two 1,000-h. p. Diesel engines, was built at Tyrone, near the collar of No. 2 shaft. Labor is almost exclusively Mexican, only the bosses being Americans. The new 1,000-ton concentrator, with flotation equipment, at Tyrone, went into operation early in 1916. It consists of two units and is located 3 miles from the portal of the haulage tunnel. It is an all-steel-concrete structure covering 500 sq. ft. There are 5 floors, all equipped with the Kahn ventilation system. With the two units, which can be later raised to four, the estimated cost of the plant was about \$1,000,000. J. T. Hall is supt.

Lands include a town site, improved with waterworks, electric lights and substantial buildings, including a hotel and numerous dwellings.

In 1914-15 work consisted mainly in completing the development, by underground work and churn drilling operations, of orebodies already known. At the end of 1914, thirteen holes, with an aggregate of 11,571', had been drilled. This work continued throughout 1915 and early part of 1916, the holes being rather widely scattered and no effort made to define ore limits, so that estimates of tonnage are not yet possible. An unusual feature is the prospecting of the Mangas Valley where several holes passed through as much as 1,000' of recent Valley gravel before reaching bed rock.

BURTON MINING CO.

MISSOURI

Inc. in Missouri. Cap., \$10,000. Operating two 20-acre tracts of J. I. Walker land in Jasper Co., Mo. Has \$160,000 invested. Developed by 5 shafts, averaging depth 150' and equipped with one 150-ton concentrator. Output is zinc concentrate.

BUSH-BAXTER MINE

ARIZONA

Property: the Baxter Rossi group, formerly worked under lease by Bush & Baxter, is at Twin Buttes, Pima Co., Ariz. Work started May, 1913, from a 10' assessment hole and lessees disclosed ore a few feet below surface, starting shipments almost immediately. Shaft has been sunk several hundred feet and drifting started.

Ore: said to average 7% cu., 2 oz. silver, 33% iron, 3% lime, 25% silica and 15% sulphur. **Production:** in March, 1916, said to average 120 tons of 4% copper ore per day. Bonded late in 1915, to the Amer. Sm. & Ref. Co., for \$450,000.

BUTTE-ALEX SCOTT COPPER CO.

MONTANA

Dissolved. **Property:** 4½ acres at Butte, Mont., sold to Anaconda

Copper Mining Co., for \$750,000 cash, on Feb. 10, 1916. Stockholders received dividend of \$10 a share, and a further small dividend is expected. There were 79,311 shares outstanding and \$80,000 in the treasury. See Copper Handbook Vol. XI.

BUTTE & ANACONDA CONSOLIDATED M. & M. CO. MONTANA

P. O. Box 138, Anaconda, Mont. **Officers:** J. C. Keppler, pres.; L. Winterhalter, v. p.; Andrew Flieger, sec.; John J. Wegener, treas.; with W. R. Allen, directors. **Inc.** 1908, in Montana. **Cap.**, \$1,500,000; shares \$1 par; assessable; 900,015 shares outstanding. Company is a consolidation of the Flint Creek Mining Co. and the Golden Eagle M. & M. Co.

Property: 9 patented quartz claims, 3 unpatented placer claims and 2 millsites, about 240 acres, in Flint Creek Gulch, Granite Co., Mont., 3 miles from a railroad. Claims show quartz veins with gold-silver values in part as tellurides. Average assays said to run \$25 per ton. Developed to depth of 450' by 2 shafts and 2 tunnels, 900' long. Idle, owing to lack of necessary working capital.

BUTTE-ARGENTA COPPER CO.

MONTANA

Idle. Letters neither returned nor answered from Butte or Argenta, Beaverhead Co., Mont. J. P. Oppenheimer, pres.; John F. Cowan, D. F. Walker Bldg., Salt Lake City, mgr. **Inc.** Feb. 12, 1906, in Montana. **Cap.**, \$3,000,000; shares \$10 par. According to statement, Jan. 1, 1914, liabilities were \$53,617.

Property: 12 miles west of Dillon, known as the Iron Mountain mine, has a tunnel and 2 shafts, opened to a depth of 200' on a wide vein of silver-lead and copper ore, having streaks assaying up to 16.5% copper and 30 oz. silver per ton. Upper levels were worked, years ago, for silver-lead, which changed to copper at slight depth. **Equipment:** includes a 125-h. p. hydro-pneumatic power plant, with Pelton wheel, and an 8-drill Ingersoll-Rand air compressor.

BUTTE & ARIZONA COPPER MINING CO.

ARIZONA

Office: 619 Hennessy Block, Butte, Mont. Mine near Hereford, Cochise Co., Ariz. B. H. Dunshee, v. p.; A. S. Nichols, sec.; John C. Adams, treas.; preceding officers, L. O. Evans, Chas. S. Shoemaker, A. P. Henningson, C. B. Mosely, John E. Corette and D. M. Watts, directors. **Cap.**, \$1,250,000, shares \$1 par.

Property: 14 claims, 11 patented, costing considerably over \$60,000, was exchanged for \$450,000 stock. Property is in the Huachuca mountains, 35 miles S. W. of Bisbee, and about the same distance north of Cananea.

Geology: claims show an ochrous gossan of 10 to 300' width, covering a contact vein between syenite and limestone carrying occasional copper oxides, carbonates, pyrite and argentiferous gray copper, and chalcocite of fair tenor, though not in large quantities. **Development:** by a long main tunnel cutting several small veins giving assays up to 18% copper with an average of 4.5% tenor, mine having upwards of 3,900' of workings. Main vein 350' from mouth of tunnel is claimed to show 39' of 6% chalcopyrite, which is an overestimate.

Nearest railroad is 15 miles, with a fair wagon road. Has steam power and an air compressor. Idle since end of 1908. Company has no debts, considerable treasury stock and is being carried by the directors who are advancing the money required to pay taxes and maintain the property.

BUTTE & BACORN MINING CO.

MONTANA

Office: 53 Silver Bow Block, Butte, Mont. Pittsburgh office: Commonwealth Bldg. **Officers:** Chas. Hyde, v. p. and treas.; H. H. Robinson, Fulton Bldg., Pittsburgh, Pa., sec.; E. M. Byers, R. C. Patterson, Chas. Hyde, H. H. Robinson, Chas. W. Brown, J. W. Culbertson, J. B. Eisaman,

directors. H. C. Bacorn, mgr. Inc. Feb. 12, 1906, in Maine. Cap., \$5,000,000; shares \$1 par, fully paid, nonassessable; 4,000,000 issued. Bonded for \$50,000 at 6% of which \$40,000 is issued. Union Trust Co., transfer agent, Pittsburgh, Pa.

Company owns in fee simple 23 claims, 272 acres, in the northeastern part of the Butte district, about 1 mile north of the Black Rock and Badger State mines. Has 1 shaft, the Belinda, 840' deep.

The so-called Calumet ground, consisting of 3 claims, 46 acres, on which there is a 1,000' shaft, was held by the company under contract of purchase; but in 1907, default was made in payments and ground reverted to original owners. It has lately been acquired by interests closely allied to the company, who, in 1913, took a 3-year lease on the entire property of the B. & B. company, the latter receiving 8% royalty on all ore smelted. A plan for reorganization, now underway, includes these claims. The geology is to all appearances identical with that of the producing parts of the Butte district.

BUTTE-BALLAKLAVA COPPER CO.

MONTANA

Office: 510 Sellwood Bldg., Duluth, Minn. **Mine office:** Butte, Mont.

Officers: I. Freimuth, pres.; Gust Carlson, v. p.; R. C. Ogilvie, sec.-treas.; with Millie Bunnell, Frank Bötun and Geo. C. Swallow, directors; C. J. Zachow, asst. sec.-treas.; J. H. Manwaring, supt.

Inc. Mar. 15, 1907, in Ariz. **Cap.**, \$2,500,000, shares \$10 par; nonassessable; fully issued. Bond issue of \$200,000, 7%, dated Jan. 1, 1916, authorized with \$95,200 issued. Listed on Boston and Butte Stock Exchanges. Paid a 50c dividend Aug. 1, 1910. Boston Safe Deposit & Trust Co., transfer agt.; Federal Trust Co., Boston, registrar.

Balance sheet dated April 1, 1916, shows current assets: cash and accounts receivable, \$7,933; mine supplies, \$15,834; unsold bonds, \$106,800; with current liabilities: bills payable, \$50,000; mine acct., \$6,798. Gross earnings for the year ending April 1, 1916, were \$247,648, and operating expenses amounted to \$207,436.

Property: the Burke and Ballaklava claims, about 6½ acres in eastern part of Anaconda hill, adjoining Mountain Chief, Modoc and High Ore mines of the Anaconda Copper Co. Property willed to Bishop Carroll of the Catholic Church, who sold it for \$400,000 cash to this company.

Claims form a narrow tract 1,860' long running with the veins, on the northeastern slope of Butte hill. The Burke vein crosses the claim of that name and has been worked in the Modoc mine. There are 4 veins, but one of which is generally workable. This vein is generally correlated with the Jessie, but complex geologic conditions led to a lawsuit with the Anaconda Co. for ownership of the rich orebody mined on the 800' level. This suit was settled by a division of the orebody, Nov. 28, 1913.

Development: 1,625' three-compartment shaft with 12 levels. The mine has been connected on the 800' level, for ventilation and safety, with the Modoc mine of the Anaconda, and on the 1,200' level with the West Colusa. This crosscut is used for drainage.

The veins on the 100' and 300' levels show ore carrying 5 to 8.5% copper and 45 to 60 oz. silver per ton, from which small shipments were made. The 500' level shows pyrite and a little high-grade silver ore, and the 700' level shows stringers of massive bornite, pyrite, glance and some chalcopyrite, all argentiferous. Principal ore production has come from the 800 to 1,600' levels, inclusive, ore being mainly chalcocite, carrying good silver values. The vein ranges up to 34' in width, carrying rich ore on the 800' level; the 1,200' level shows the vein up to 20' in width, with ore averaging 4 to 4.5% copper, and the 1,400' level carries 9' of chalcocite and bornite of

about 7.5% average copper tenor. This vein has been stoped westward to the workings of the High Ore mine, whose stopes are continuous with those of the Butte-Ballaklava mine.

Development by a drift from the High Ore mine, run by the Anaconda Co., opened up a fine body of commercial ore, but inability to reach it with its own shaft and a crowded capacity at the High Ore has retarded ore extraction. Above the 1,680' level the mine has been practically worked out and the proceeds used to pay off current debts without keeping up development work, with the result that the company must now be content with a smaller production while new ore is opened up.

In April, 1916, company is reported to have made arrangements with the Anaconda Co. whereby that company will mine ore for the Butte-Ballaklava from its High Ore drift at a depth of 2,200', or about 400' below the present bottom of the Ballaklava shaft.

Early in 1916 a winze was sunk from the 1,600' to the 1,800' level and a crosscut run to the vein. It was reported that 24' of 3% copper ore had been found and drifting started.

Electric power is used throughout, an auxiliary steam plant being held in reserve for emergencies. **Equipment:** includes a double-drum Lake Shore hoist, operated in counterbalance, driven by a 300-h. p. General Electric motor, designed to hoist an unbalanced load of 5 tons, at a speed of 800' per minute, from a depth of 3,000'. There also are a 165-h. p. auxiliary double-drum hoist, good for 1,500', and a 10x12" auxiliary steam hoist, 2 Ingersoll-Rand air compressors, with cross-compound air cylinders, each driven by a 100-h. p. General Electric motor, and an electric station pump. The auxiliary steam plant includes a cooling tower for water.

Buildings include an engine house, office with warehouse on the ground floor, carpenter shop, smithy, and steam-heated changing house.

Production: begun April, 1910, was continued until stopped by injunction, granted the Anaconda Copper Co., in Aug., 1910. During this period shipments to the Pittsmtont smelter were about 125 tons daily, of ore assaying about 8% copper and 12 oz. silver per ton, this being the highest average grade of ore produced by any Butte mine for that year. Producing about 250 tons daily, 1916, mainly from 800, 1,000, 1,200 and 1,600' levels.

BUTTE & BOULDER MINE.

MONTANA

Mine near Boulder, Jefferson Co., Mont., comprises 2 claims, formerly held by Butte & Boulder Mining Co. 750' tunnel, expected to cut, at depth of 500', a vein carrying argentiferous and auriferous copper and lead ores. Operated 1916 by Dr. F. A. Ironsides, of Butte, Mont., and reported shipping.

BUTTE BULLWHACKER MINING CO.

MONTANA

John E. Corette, sec.-treas., Hennessy Blk., Butte, Mont.; Wm. F. Love, pres.; Henry Meloy, v. p.; G. A. Lauzier and P. W. Clark, directors. Inc. Oct. 24, 1914, in Wash. Cap., \$1,000,000, \$1 par; assessable; all issued. Annual meeting 2nd Monday in Jan. at Butte. Security Transfer & Registrar Co., New York, transfer agents and registrar. Listed on New York Curb.

Property leased for one year to East Side Mining Co., inc. by I. A. Heilbronner and Patrick Wall, April, 1916. Lease calls for royalty of 25% and shipments of not less than 1,000 tons a month. Controlling stockholders also gave an option on 51% of entire stock at 50c a share, payments in 30 and 90 days and at intervals for 18 months.

Company is a reorganization of the Bullwhacker Copper Co., whose stockholders received share for share in the new company on payment of

15c a share in six months' installments. This wiped out a debt of \$121,200 due the sons of Patrick Clark (Clark Bros. & Klein) and put \$20,000 in the treasury. Mine was profitable when leased, but ran into debt for an experimental leaching plant.

Property: one claim, 20 acres, on the east side of the Butte district, near the Pittsmonth smelter. Easterly part of claim covers a zone of granite impregnated with oxidized copper ores, mined in an enormous open pit 275' across and 75' deep, from which 30,000 tons of 4.07% copper ore were extracted by lessees in 1912-13. It is a highly siliceous ore.

Development: by an old 300' shaft with crosscuts beneath the orebody at that level, also several new shafts, proving an extension of the orebody beyond the open pit.

Equipment: includes hoist, compressor plant and a 75-ton leaching plant, which as yet has not been successfully operated (described in detail by P. E. Peterson in Mining & Engineer's World, Oct. 4, 1913, p. 584).

The orebody is extensive and, though probably not deep, has a large tonnage from which much money should be made. Deep development is expected to show veins carrying sulphide copper ore.

BUTTE-CABLE COPPER & GOLD MINING CO. MONTANA

Louis Feldman, pres.; Nicholas Bossonitz, v. p.; preceding officers, Jas. McMasters, Wm. Henthorne and John Strasser, directors. Inc. Nov. 21, 1906, in Montana. Cap., \$1,000,000, shares \$1 par. **Property:** 6 claims, 4 patented, 15 miles west of Anaconda, near Cable Consolidated Mining Co., show a 3 to 4' vein carrying about 2' of commercial ore, giving assays of 11.9% copper, 156 oz. silver and 0.6 oz. gold per ton. Property closed down. Sullivan & Peterson, of Anaconda, offered stock at 15 cts. a share, Feb., 1913, to raise money for patenting claims.

BUTTE CENTRAL COPPER CO. MONTANA

Austin M. Pinkham, trustee in bankruptcy, 27 State St., Boston, Mass. Holdings sold to Wm. G. Burns and transferred to Butte Central Mng. & Mfg. Co., the operating company for the Butte-Detroit Copper & Zinc Mng. Co., which see. Company was a raw promotion, fully described Vol. XI, Copper Handbook. Property sold to satisfy judgment of D. W. Strong, Butte, Mont., in Feb., 1916.

BUTTE CENTRAL MINING & MILLING CO. MONTANA

See Butte Central Copper Co. and Butte Detroit Copper & Zinc Mining Co.

BUTTE-CHEWELAH COPPER CO. WASHINGTON

J. O. Gillice, pres., Paulson Bldg., Spokane, Wash.; F. M. Bell, v. p.; P. L. Eberhardt, sec.-treas.; preceding officers, G. B. Harrington and R. J. Davis, directors. R. J. Davis, gen. mgr. Inc. March, 1913, in Washington. Cap., \$1,000,000, shares \$1 par; fully paid and nonassessable; 500,000 issued.

Property: 4 claims, 75 acres, in the Valley mining district, Washington. Shows vein in sedimentaries close to a diabase intrusion; average strike N. 25° E., and dip 60°. Ore occurs as mixed sulphides, mainly chalcopyrite and gray copper in a gangue of quartz, calcite and spathic iron. At 100' in depth the vein is said to be 6' wide and the ore to average 2 to 5% copper 1 to 5 oz. in silver and 50 cents to \$1 in gold per ton.

The property is developed by 100' winze, reported all in ore, a 300' shaft and 125' tunnel. Equipment includes a hoist and air compressor, installed in Sept., 1913.

BUTTE-CONCORDIA MINING CO. MONTANA

Inc. Sept. 8, 1915, in Montana. Cap., \$50,000; shares 25 cts. **Directors:** G. F. Pitman, G. W. Deniger, G. Widmer, S. V. Wilking, 615 Phoenix Bldg., Butte; E. C. Schwardner, O. J. Olson, Geo. W. Wall, F. A. Kean and Alfred Pearson, all of Butte, Mont. No further details obtainable.

BUTTE CONSOLIDATED COPPER MINING CO. MONTANA

Mine at Corbin, Mont. Idle and apparently waiting for developments in the Bertha mine of the Boston-Corbin Co. to prove this property. See Vol. XI, Copper Handbook.

BUTTE COPPER CO. MONTANA

Address: care James H. Rowe, pres., 120 West Granite St., Butte, Mont. E. T. Lawlor, v. p., Brookline, Mass.; W. M. Hanson, sec.; preceding officers, R. L. Rhule and B. J. Keenan, M. D., directors. Inc. March 20, 1906, in Montana. **Cap.**, \$1,500,000; shares \$1.50 par; fully paid and non-assessable. Company owns two-third interest in the Robert Emmet claim Nos. 1 and 2; the remaining third being owned by the Anaconda Mining Co. Company also owns approximately one-half of the Anselmo, Anselmo No. 2 and Trifle claims, balance being owned by the Hauswirth family. Property lies directly west of the Gagnon mine and is supposed to carry the extension of the rich veins mined in that property. The group has produced about \$700,000 worth of gold and silver ore, the principal development being the 700' Trifle shaft in which a large vein carrying copper ore was cut at a depth of 375'. The Robert Emmet shaft, 375' deep, is reported to show 7% copper ore.

The company has been dormant for several years and its relations to the Butte Copper Mining Co. and Butte Copper Montana are not fully understood, though the latter company is supposed to control this one through stock ownership. The president reports Feb., 1916, that there is no money in the treasury, and as the Anaconda Co. refuses to sell its equity in the Robert Emmet claim, a reorganization seems impossible.

BUTTE COPPER KING MINING CO. MONTANA

Address: care Beebe Grain Co., Butte, Mont. C. E. Beebe, pres.; D. Dorais, v. p.; A. P. Henningsen, sec.; R. H. Campbell, treas., and Henry Avare, directors, all of Butte. Inc. April 19, 1906, in Montana. **Cap.**, \$1,500,000; shares \$1.50 par. **Property:** 3 fractional claims, 28 acres, known as the Frenchman No. 2, Rare Steak and Missouri Girl, west of the Jennie Dell mine. Idle since organization.

BUTTE COPPER & ZINC CO. MONTANA

Office: 52 Broadway, New York. Mine at Butte, Mont. Control of company is vested for a period of 5 years in the following trustees: A. J. Seligman, Albert Fries, J. Oppenheim. Additional directors, Chas. Wimpfheimer, A. S. Bailey and I. N. Spiegelberg. Inc. 1904 in Me. **Cap.**, \$2,500,000; shares \$5 par; 411,700 outstanding; fully paid and nonassessable. Shares listed on New York Curb.

Property: known as the Emma mine, about 16 acres, is in the Butte district, 1½ miles from the main properties of the Anaconda Copper Mng. Co. Mine was formerly developed to 800' level, but due to low copper and relatively high zinc content of the ore, was idle for several years. Development recently resumed by Anaconda C. M. Co. by virtue of an option and lease, dated July 8, 1915, given to that company. Terms of lease are as follows: the Anaconda Co. acquired an option for 9 months on all or part of the 88,300 shares of Butte Copper & Zinc Co. stock remaining in the treasury of the latter company, at a price of \$1 per share. The A. C. M. Co. takes a lease on the Emma mine for 5 years with privilege of renewal for an additional 5 years, and agrees to install equipment and to unwater mine to the 800' level. For expenditures actually made by the A. C. M. Co. in developing the Emma mine, the Butte Copper & Zinc Co. agrees to make payment in its capital stock in lots of 10,000 shares or fractional parts thereof, but total payment to the A. C. M. Co. for work and equipment shall in no case exceed 50,000 shares of Butte C. & Z. Co. stock. (The A. C. M.

Co. shall have a right to abandon the leased premises if it finds working them impractical, or impossible, in which event all machinery or equipment installed and permanently attached to the Butte property shall belong to that company. Any profits arising from sale of the output of the leased property shall be divided equally between the two companies. Further stipulations are provided in the event of a renewal of the lease.

The A. C. M. Co. has fulfilled the terms of this lease and taken up the shares optioned to April, 1916. An additional option which expired July, 1916, on 100,000 shares, has also been exercised.

Development: aggregates several thousand feet from an 800' shaft with levels at 200', 400', 500' and 800'. The vein for a width of 21' on the 200' level is said to show 11% zinc ore containing fair values in gold, silver and lead. The 400' level has nearly 1,000' of workings. There is a 150' crosscut on the 523' level which does not reach the vein. The so-called 800' level (720' deep) has 795' of work with 465' in ore. The vein is 125' wide and is said to show a 20' width of 18% zinc ore. Two bands of ore were developed by drifting, an 8' band at 60' from the footwall with 185' of drifting, said to show an average of 22% zinc, 8% lead, \$2.20 gold and 12 oz. silver.

It is believed that the Anaconda Co. plans energetic development of the Emma mine and of the adjacent Czaromah claim, bought in 1916. With the completion of a crosscut to the Gagnon 1,800' level and development of the Emma in depth, there is reason to believe it will be a great zinc producer.

BUTTE & CORBIN CONS. COPPER MINING CO. MONTANA

Idle. J. L. Templeman, pres., Lewisohn Block, Butte, Mont.; Lee Williams, v. p.; J. B. Fitzpatrick, sec.-treas., at last accounts. Inc. May 1, 1907, in Montana. Cap., \$700,000; shares \$1 par; nonassessable; issued \$469,000. Annual meeting Feb. 4.

Property: 5 claims, 82 acres, also 10 acres timber lands in the Corbin, or Colorado district, on the eastern side of Valparaiso mountain. The ore is a complex mixture of lead, copper and zinc, occurring in short shoots in fissure veins in granite. Vein reported by company to average 8' 4" in width, and to carry 4% copper, 6% lead, 2% zinc, 8 oz. silver and \$1 gold per ton.

Development: by shaft and the 500' Rarus tunnel, which cut a 10' vein at 165' from the portal, assaying 2.5% copper, with paystreak carrying covellite, averaging 6% copper, 8 oz. silver and \$6 gold per ton. A body of rich ore was reported found in June, 1912, and the Great Northern railroad asked to put a siding on this property. Amount of ore on dump, 7,000 tons of \$10 value, according to Ropes & McIntyre, of Helena, Mont., who reported on property.

BUTTE-CURTIS & MAJORS COPPER MINING CO. MONTANA

Idle. Address: Geo. D. Curtis, 35 W. Granite St., Butte, Mont.

Company organized upon a lease and bond to purchase the surface and mineral rights of the Curtis and Majors addition to the City of Butte, the bond price being \$125,000. The company went bankrupt and still owes about \$700 labor claims. There are no legal assets and having defaulted on bond payment past due, the company has no rights thereunder, save the sentimental courtesy extended by John Curtis and associates who would like to see the company rehabilitated and refinanced.

BUTTE DETROIT COPPER & ZINC MINING CO. MONTANA

Office: Dime Bank Bldg., Detroit, Mich. Is a promotion of Davison Co., 27 State St., Boston, Mass. Officers: J. F. Austin, pres., Detroit; Hon. Sir. Frederick W. Borden, chairman of board of directors; Louis A. Codorette, sec., Montreal; J. S. Pishon, treas., Boston; W. L. Creden,

managing director, Butte, Mont.; other directors, Col. Sir Henry M. Pellatt, Toronto, Can.; Ellery C. Wright, Brockton, Mass., and Chas. A. Wilcox, Federal Trust Co., Boston, transfer agt.; State Street Trust Co., registrar.

Inc. March 7, 1916, in Del. **Cap.**, \$2,500,000; shares \$1 par; with 900,000 shares paid for stock control of the Butte Central M. & M. Co. This stock control, amount not stated, is the only holding of the company. As the Butte Central has a bond issue of \$300,000 outstanding as a prior lien against the Ophir mine, it is easy to see that this one claim must develop ore in large amount and great value to pay off the bonded debt and be worthy of the 900,000 shares of stock paid for control. Should the mine make good, the Butte Central M. & M. Co.'s bonds being convertible will be changed to stock, and if Butte Detroit owned all the remaining stock of its subsidiary, the Butte Central, it would get but 60% of this theoretical profit. In other words, if the Ophir mine should be lucky enough to make the extraordinary profit of \$1,000,000 a year, the owner of a share of stock in the Butte Detroit Co. would get 24 cents.

The subsidiary or operating company is known as the **Butte Central Mining & Milling Co.** W. R. Macdonald, pres., 50 Congress St., Boston, Mass.; W. G. Burns, v. p. and sec.; R. H. Gallagher, treas., 96 Franklin St., Alliston, Mass.; W. L. Creden, mgr., Butte, Mont.

Inc. Aug. 11, 1914, in Del. **Cap.**, \$750,000; shares \$5 par; \$450,000 issued, balance held for conversion of \$300,000 bond issue, all outstanding.

Property: the Ophir claim, 20 acres in Butte, Mont., formerly owned and developed by the Butte Central Copper Co., a rank promotion in which nearly \$700,000 was obtained from the public by near-fraud methods. Possibly one-half of this amount was spent on the property, the mill being financed by separate funds derived from a bond issue.

The Ophir lode is a big quartz and replacement vein, carrying fair silver values for several hundred feet below the surface and irregular, bunched bodies of impure zinc and lead ore at greater depth. Some 40,000 tons of siliceous silver ore said to average \$7 per ton are reported to exist in the upper levels.

Development: by a 3-compartment shaft 1,065' deep on the Ophir with levels at 100', 200', 300' and 500', upon all of which mining has been done and on each of which considerable ore is now blocked out. Company plans to sink the shaft to a depth of 2,500'; a station hoist will be put in at 1,500', and later a new surface hoist will be installed. The company expects zinc as well as copper, as a body of zinc ore running 14% was encountered on the 500' level of the mine. The new owners of the mine hope the Ophir may repeat the performance of the Butte & Superior and the Emma, which latter property is distinctly a zinc mine, located a short distance north of the Ophir, and being developed by the Anaconda company. There are said to be several known veins in the 20 acres of the Ophir claim, including the two main veins known as the north and south veins, and a cross-fissure vein called the Blue vein. The mine is said to have about 3½ miles of workings; on the 300' level two parallel veins have been opened for a combined distance of 1,100', and on the 500' level for 700'. Mine has full equipment, including 150-ton mill, a hoist good for 2,000' depth, a 330-h. p. steam plant and a seven-drill Rand air-compressor. There are seven buildings, including engine house, carpenter shop, smithy and office.

The mill, designed and built by John E. Rothwell, is designed to treat quartz ores by concentration with subsequent cyanidation of the quartz when freed from sulphides.

The mill is regarded as one of the most complete in the West, and with little additional cost its capacity can be doubled. Ore is broken in a

Sullen gyratory crusher, is reduced to 24 mesh in a Chilean mill, passes to 5 Deister concentrating tables, whose tailings go to Atkins classifiers. The resultant sands go to the 5x22' tube mill, grinding to 150 mesh. This product passes to sloughing-off cones, the underflow to 8 Deister slime tables. Tails are dewatered, agitated with cyanide in Atkins-Rothwell continuous agitation tanks for 30 hours and run into Portland continuous slime filters. The filtered solution is treated in zinc boxes.

The new manager, W. L. Creden, whose experience and reputation ensure confidence, will unwater the mine and sink the shaft to the 2,500' level where the full extent of the ground will be explored in hopes of finding large orebodies near the Rarus fault or in the veins cut by it.

BUTTE-DULUTH MINING CO.

MONTANA

Chas. M. Everett, receiver, Lewisohn Block, Butte, Mont. Mine at Butte, Mont. Capt. A. B. Wolvin, pres.; C. M. Everett, sec.-treas.; Meyer Genzberger, Al Green, John W. Neukom, directors.

Inc. in Minn. Cap., \$2,500,000; shares \$10 par; 200,000 issued, balance held for redemption of \$500,000 bond issue, on which interest is overdue since Dec., 1914, and sinking fund provision not fulfilled. Company went into receiver's hands on friendly suit, March 16, 1915. Receiver's report shows \$42,368 liens ahead of bonds and a floating debt of about \$190,833 unsecured. The prior lien is mostly for labor certificates (\$39,000) issued in half payment of wages in 1914. Bankruptcy proceedings instituted in March, 1915, were set aside by the Federal Court, Sept. 29, 1915. In Dec., 1915, an agreement was made with Oscar Rohn, gen. mgr. of the East Butte Mng. Co., to take over the plant. This was agreed to in writing by 95% of the stockholders and bondholders, subject to the Court's approval, but it has fallen through.

In May, 1916, the Court ordered the company's personal property at the mine sold to satisfy labor liens, and the receiver petitioned the court for authority to sell the entire property to satisfy bondholders and other creditors.

Property: Brundy group, at the base of the mountains east of Butte, includes the Macarona, Montgomery and portions of the Altona, Colleen Bawn and Amazon claims. These claims aggregate 67 acres and are crossed by the Columbia Gardens street car line and adjoin the Pittsmtont mine on the southeast.

The ore thus far mined has come from open-cut work on the hillside back of the mill. This ore is an altered granite stained green and impregnated with silicate of copper with carbonate and oxide of copper in nests and bunches. As mined in the cut it has carried a little over 1.5% copper and with a mechanical loader can, it is said, be put in the mill for 15c a ton.

Development: underground is mainly on the Montgomery claim on which there is a tunnel 1,200' long and a 200' shaft, the latter with extensive workings at 100'. The main ore body on Altona hill, to the east of the street car line, has several tunnels, proving the downward extension of the ore on the property. **Equipment:** is electrical throughout and includes a 75-h. p. Nordberg hoist and 750-cu. ft. Nordberg compressor at the Montgomery shaft.

The Butte-Duluth mill is fully described by C. F. Sherwood in the Salt Lake Mining Review, Nov. 30, 1915. Its total cost was \$725,000.

The property has merit, and aside from its leachable ores has a decided prospective value in the veins at depths of 1,000' below the surface.

In bankruptcy proceedings the former supt., Mr. Sherwood, said the mill ran on ore averaging 1.52% copper for 4 months before it was shut

down, and that drill cores to a depth of 202' from the bottom of a 23' pit ran 0.98% to 2.70% copper. With acid at \$12.50 per ton, a saving of 38c per ton could be made in leaching costs.

Production in Feb., 1915, 120,000 lbs. electrolytic copper, 30,000 lbs. cement copper.

BUTTE & ELLISTON GOLD & COPPER MINING CO. MONTANA

Office: 113 Hamilton Block, Butte, Mont. Mine near Elliston, Powell Co., Mont. **Officers:** J. H. McOmney, pres.; D. G. Bertoglio, v. p.; F. H. Cooney, sec.-treas.; preceding officers, J. E. Homple and C. S. Jackman, directors. F. H. Cooney, mgr. Inc. 1906 in Ariz. **Cap.**, \$1,000,000; shares \$1 par; fully paid and non-assessable; issued, 575,000. Dividend of 1% paid 1907, since when company has been inactive.

Property: 1 claim, patented, 17 acres, in the Ontario, or Elliston mining district, known as the Big Dick mine, 6 miles from Elliston on the side of Nigger mountain. Claim shows diorite having 6' fissure vein developed by 280' shaft and 1,000' of workings. **Ore:** said to average 31 oz. gold, 15 oz. silver and 10% lead, with some zinc and copper. A new 1,230' tunnel now being driven will intersect vein 200' below bottom of the shaft.

Equipped with 25-h. p. hoist, compressor, pump and surface buildings. **Production:** by lessees in 1914-15 netted the company \$1,246 in royalties, or a total to date of \$85,000.

Property now under lease and bond to a private company owning the adjoining claims, who are driving the tunnel to connect with the old workings.

BUTTE & ELY COPPER CO.

NEVADA

General office: 1500 Alworth Bldg., Duluth, Minn. **Principal office:** Room 302, O'Rourke Estate Bldg., Butte, Mont. Mine P. O.: Kimberly, White Pine Co., Nev. **Jos. Cotton, pres.;** John D. Pope, v. p.; John W. Neukom, sec. and asst. treas.; Edw. J. Maney, treas.; H. A. Holp, asst. sec.; preceding officers are directors. Inc. July 27, 1905, in Montana. **Cap.**, \$500,000; shares \$1 par; stock was made assessable, 1907. Is a subsidiary of the Consolidated Coppermines Co. Jan. 1, 1915, had \$136,437 in cash and cash assets in treasury. Net income for 1914 was \$3,824. Stock is listed on the Butte Mining Exchange. Annual meeting first Monday in June.

Property: 12 claims, patented, 210 acres, in the Robinson district, lying between the Nevada Consolidated and Giroux, includes a valuable water right, 20 miles distant, said to be capable of supplying 2,000,000 gal. daily; also 80 acres irrigable land near water rights.

Development: 3 shafts, 1 with steam hoist, 310' deep, showing disseminated ore. Mining was suspended late in 1907, but churn drilling was carried on in succeeding years intermittently, developing several bodies of low-grade disseminated ore, said to show an average of 1½% copper. In 1912 a part of the ground adjacent to the Liberty pit of the Nevada Consolidated Co. was leased to that company on a royalty basis and mined.

The sale of control of this mine to the Giroux Co. in 1909, hailed at first as a boon, has been bitterly denounced by many Butte-Ely stockholders. Stock prices went down, development lagged and the sale was said to have been used as a means of securing the cash in the Butte-Ely treasury, it being charged that the Giroux Co. borrowed the money back immediately after paying it. As a matter of fact the Giroux Co. purchased control of the Butte & Ely Co. at a time when there was little or no money in the treasury of the latter company. The Giroux Co. paid into the Butte & Ely treasury something like \$250,000 in cash and did borrow back some of the money, on which it has been paying 6% interest. It is claimed by the Butte & Ely

management that the loan is amply secured and stockholders are in no danger of any loss through it.

In 1913 the Consolidated Coppermines Co. was formed to merge the Butte & Ely with the Giroux and other companies, the Butte & Ely receiving 5% of the capital stock of the new company for its entire holdings, equivalent to 6¼ shares of Butte & Ely for 1 of the Consolidated. Objecting to this merger, certain Butte stockholders began injunction and receivership proceedings, which were decided adversely by the Court. At the present time the Consolidated Coppermines Co. and the Giroux Cons. Mines Co. own all the stock of the Butte & Ely Co. with exception of about 80,000 shares.

BUTTE EXEMPTION COPPER CO.

MONTANA

Idle. P. O. Box 143, Butte, Mont. Inc. May 20, 1906, in Me. Cap., \$2,500,000; \$1 par; supposedly reduced to \$100,000 in 1913. Owned by Spokane capitalists, who sold control to parties represented by Chas. Mattison, attorney, Butte, Mont. Company owns Colleen Bawn, Canyon, Exemption and Mountain Spruce claims on hillside above Bullwhacker and Butte-Duluth properties and crossed by Horse Canyon and street railway to Columbia Gardens, Butte, Mont.

BUTTE & GREAT FALLS MINING CO.

MONTANA

Address: Box 1393, Butte, Mont. Officers: E. Bryant Crump, Bloomington, Ill., pres.; R. M. Green, Butte, v. p. and gen. mgr.; Allen Pierse, sec. treas.; preceding officers, Ira N. Honnold, L. G. Diehl, J. Cohan, Wm. Richardson, J. W. Beckwith, Louis Lauritson, R. M. Sutherland, J. P. Mondloch, Walter A. Kinney and C. F. Murphy, directors. Inc. Nov. 28, 1911, in Mont. Cap., \$500,000; shares \$1 par; assessable; \$400,000 outstanding; \$32,800 was expended on development work during 1914-15.

Is developing the Genevieve group of 8 claims, patented, 134 acres, in the Lost Child mining district, 3½ miles N. E. of the Butte & Superior property, Butte, Mont. Claims show Butte monzonite cut by aplite and traversed by wide, rusty veins carrying tourmaline and occasional specks of chalcopyrite. The Genevieve vein runs S. W.-N. E., with dip of 35° and reported width of 30'. It is mainly decomposed granite with clay and quartz streaks and one 3' band of quartz and tourmaline carrying occasional sulphides. Has a 1½ compartment shaft, 500' deep. The Genevieve is said to have a good showing in a 2' vein on 200' level, but average of assays is small. The Silver King claim has a 200' tunnel. Property reported on by Paul Billingsley, Jesse Cohan & Peterson, 1914.

Equipment: includes electric hoist, good for 1,500', pump, 10-drill compressor, mine buildings and dwellings. Stopping will be started when ore-body is encountered on the 500' level. Property regarded as still a prospect, and management competent.

BUTTE HILL COPPER MINING CO.

MONTANA

Address: Harry A. Frank, sec., Daly Bank Bldg., Butte, Mont. Maurice Eisenberg, pres.; J. W. Murphy, v. p.; preceding officers, J. W. Murphy, Duncan MacRae, W. P. Cary, W. H. Hall, Thos. Driscoll and John S. Davies, directors. Inc. April 18, 1906, in Montana. Cap., \$5,000,000; shares \$5 par; \$2,950,000 issued. Annual meeting, fourth Saturday in January.

Property: 11 claims, 173 acres, in an undeveloped district in granite area, north of Walkerville. Has a 200' shaft, cutting a vein of 40' estimated width, showing stringers and bunches of ore assaying up to 4% copper and 19 oz. silver per ton. Has not been worked for several years and power plant is dismantled. Property is well located, has strong veins and is much nearer developed ground than it was when operating.

BUTTE LODGE EXTENSION MINING CO. MONTANA

Idle. Address: care C. J. Kelly, treas., 805 W. Broadway, Butte, Mont. Chas. S. Warren, v. p.; John M. Murphy, sec. Inc. April 28, 1906, in Mont. Cap., \$500,000; shares \$1 par. Property: 4 claims, known as the St. Angus group, 12 miles N. E. of Butte, has a 150' shaft with a crosscut showing 2 veins.

BUTTE & LONDON COPPER DEVELOPMENT CO. MONTANA

Office: 46 East Broadway, Butte, Silver Bow Co., Mont. Officers: W. W. McDowell, pres.; John D. Haines, v. p.; W. E. Reynolds, sec.; J. W. Wallisch, treas.; preceding officers, Fred Whiteside, Guy W. Stapleton, John P. Reins, J. W. Pratt, H. B. Byrne, E. J. Anderson and T. H. Emery, directors. Inc. Jan., 1906, in Ariz., as Butte & London Copper Co. Cap., \$5,000,000; shares \$5 par; nonassessable; \$2,830,000 outstanding. Annual meeting, third Tuesday in January.

Property: 113 acres, known as the Greendale placer claims, lying immediately north of the Pittsburgh & Montana in the valley of Silver Bow creek, east of Butte. Property claimed by the management to carry the possible extension of the Rainbow lode. Forty acres of the property is said to be valuable for town-site purposes.

Development: 1,350' three-compartment shaft, 2 crosscuts on the 1,100' level cutting 9 veins, none carrying ore of commercial value, except a streak that gave assays of 2% copper, 50 oz. silver and \$2 gold per ton.

The company agreed Dec. 24, 1912, to accept a contract with Thos. F. Cole, for the transfer of all its property to a new company, the Greendale Exploration Co., with a capitalization of \$200,000, to be organized by him. The terms of the contract provide that in consideration of sinking the shaft to 1,600' level, running crosscuts north and south 2,500' the entire width of the property, and doing other stipulated development work, Mr. Cole is to receive 51% of the stock of the new company, one-half to be paid as the work progresses, the balance remaining in escrow until the work is finished. Mr. Cole announced his intention of spending \$300,000 on this development, which was begun the latter part of 1915.

BUTTE MAIN RANGE COPPER MINING CO. MONTANA

Controlled by Tuolumne Copper Co.

Office: Daily Bank Bldg., Butte, Mont. Officers: Edward Hickey, pres.; P. J. Brophy, v. p.; Frank X. Giard, v. p.; Ray J. MacDonald, treas.; Edward Hickey, Jr., sec.; preceding officers, Charles R. Leonard, M. Sellers Largey, Pat. Sheehan, J. J. Harrington and T. E. Murray, directors.

Inc. Aug., 1912, in Mont. Cap., \$1,500,000; shares \$1 par; 750,000 shares issued. Directorate authorized sale of 150,000 shares of treasury stock in April, 1914, to provide necessary working capital, but this has not yet been sold.

In May, 1916, $\frac{2}{3}$ of the stock of the company was optioned to the Tuolumne Copper Co. for \$300,000, to be spent in deep development of the company's property. The company therefore becomes a subsidiary of the Tuolumne, which at the same time takes over 51% of the Colusa Leonard Extension.

Property: 39 acres, include the Sinbad Lode, Tentpeg, Spread Delight, Rory O'More, Kingstella and larger fractional part of the Lillie claim, at the mouth of Horse canyon, Butte, Mont. On the Sinbad claim the vein of this name is said to show an outcrop of altered granite 30' wide, running E. W. and dipping N. On this vein the Largey shaft was sunk 716' deep. On the 400' level, which is only 40' below the bottom of the "wash" of the valley-filling, the crosscut disclosed a 12' vein, containing several bands 4" to 12" thick of partly oxidized copper ore.

On the 700' level, crosscuts north and south each encountered veins. The northern one, having but a short segment in the company's property, was not explored. The Southern vein, 140' south of the shaft, is said to be 35' wide. Drifts were run and crosscuts made, disclosing numerous bands of 3" to 4' of ore. One sample 10' across is reported to carry 3.1% copper and 13.5 oz. silver per ton. A geometric average of 8 samples cut at different points in the vein is 2.6% copper (Corry report). A third vein was cut at the face of the south crosscut when work was stopped in 1902; this is supposed to be the Spread Delight lode, which shows an iron-stained outcrop 30' wide on the claim of this name.

The Lillie lode also shows in various pits as a broad rust-stained outcrop, running across the north part of the Rory O'More, Kingstella and Lillie claims. The largest vein cropping is reported to be on the Lillie claim; it is said to run east to and to be cut and displaced northward by the Bullwhacker-Birtha fault. The intersection and "drag" are supposed to make the big blow-out seen on the Lillie. The south half of the Lillie claim was deeded to the North Butte in 1915, in settlement of all litigation over a division of the claim.

Property has a small acreage and is still a prospect, but the ground has merit and is worthy of development.

BUTTE-MILWAUKEE COPPER CO.

MONTANA

Assets sold 1914 to Butte & New York Mng. Co., a Butte & Superior subsidiary, for \$500,000. Stockholders were obliged to exchange their stock at the rate of 2½ old for 1 new share, or 30c cash per share. Company paid a liquidating dividend of \$0.3278 per share in July, 1914, and is now in course of liquidation. Fully described under Butte & New York Mining Co.

BUTTE MINE EXPLORATION CO.

MONTANA

Clinton C. Clark, pres., 408 West Granite St., Butte, Mont.; C. P. Conolly, sec., at last accounts. Inc. 1901. Cap., \$250,000; shares \$1 par. Is no relation to the company of same title formerly holding the Six O'Clock property, in Butte, or to the Butte Mines Exploration Co., formerly having property at Tecoma, Box Elder Co., Utah. Property is the Pacific quartz lode claim, on which considerable work was done, 1901-02. Company practically defunct, but property reported under option to the North Butte Mng. Co.

BUTTE-MINNESOTA MINING CO.

MONTANA

Peter E. Peterson, pres.; Angus McLeod, Butte, Mont., William Vuoti, J. E. Porthan, A. W. Havela, John Kukko, Emmanuel Autio, John Lampi, Ade Herranen, directors. Mines near Butte and Helena. Inc. June, 1912. Cap., \$750,000; shares \$1 par.

Owens 6 claims, about 1 mile south of Rocker, at the western end of the Butte district. Ground shows well-defined veins, 1 of which is traceable for 3,000' across the surface. The country rock is granite and part of the same mass as that in which the mines of Butte occur.

Development: 400' tunnel on the vein and an incline shaft 35' deep sunk on the vein disclosing well-defined walls, 6' apart, from which ore has been taken carrying 0.5% copper, 8% lead, 12 oz. silver and \$28 gold per ton.

The property is equipped with a gallows frame, boilers and hoist.

Late in June, 1913, the company bought a group of mining claims in the Wolf Creek district, 40 miles east of Helena, Mont. Reports state that development on these claims shows more than 100,000 tons of ore assaying 4 to 25% copper blocked out. A mill was to be built, but company has not reported any recent work.

BUTTE MONITOR TUNNEL MINING CO.

MONTANA

Idle. Address: care C. J. Kelly; Daly Bank & Trust Co., Butte, Mont.

Inc. in Montana. **Cap.**, \$3,750,000; shares \$1 par; 1,013,000 in treasury; 2,736,500 issued. **Lands:** 8 claims, the Monitor, Sunlight East, Fraction, Alta, Emporium, Ironside No. 1 East and Burner patented claims in the eastern section of the Butte district. The usual Butte monzonite is cut by a great quartz porphyry dike on this group; the veins run E.-W. and are of the quartz vein type with wall alteration.

Development: by shafts 30'-50' deep and the 1,412' Monitor tunnel. Tunnel passes for 445' through other property. In the Sunlight claim 2 veins, the No. 1 Sunlight, 5', and No. 2 Sunlight, 4' wide, are cut; the 4' Sunlight discovery vein is cut 250' beyond, while the tunnel face shows presumed wall of So. Monitor vein. A winze on the vein at 700' from the portal showed 12' of ledge matter, and according to John R. Ryan, assays 6% copper and 4.2 oz. silver per ton. At 735' a 6' vein carried, according to Mr. Ryan, a 10" streak of 13% ore.

There is also a 230' crosscut tunnel on the Burner claim cutting a 12' vein, developed by a 30' winze with 45' of drifting at the bottom. This disclosed a 14' vein with a 10" to 20" band of shipping ore, from which 22 tons taken out by lessees and shipped to smelters returned 8% copper and 8½ oz. silver per ton. The remainder of the vein is reported to average 1.5% copper and 1.4 oz. silver per ton. Work was stopped by John R. Ryan, who had a lease, because of the heavy flow of water.

BUTTE & NEW YORK COPPER CO.

MONTANA

Subsidiary of the Butte & Superior Mining Co.

Office: 25 Broad St., New York. **Officers:** M. M. Ferguson, pres.; R. J. Schaefer, v. p.; C. E. Connell, sec.-treas.; preceding officers, A. B. Wolvin, Leo Schlesinger, N. B. MacKelvie, Philip Lawrence, A. P. Ronaghan, J. B. Kremer, G. M. Minzesheimer and T. F. Nelson, directors. A. J. Ronaghan, asst. sec. **Inc.** Oct. 17, 1906, in South Dakota. **Cap.**, \$4,000,000; shares \$5 par; issued, \$2,900,000. **Cap.** increased by 300,000 shares in April, 1915, and par value of stock reduced from \$5 to \$1; \$500,000 10-year 1st mtge. convertible income bonds authorized at the same time, of which \$150,000 were offered to stockholders at par, to furnish necessary working capital. Empire Trust Co., New York, registrar; B. Liddle, transfer agent. Annual meeting second Monday in January.

The properties and assets of the Butte-Milwaukee C. Co. were acquired in June, 1914, for \$500,000. Stock was exchanged at the rate of 1 share Butte & New York for 2½ shares in the old company, or 30c cash per share, and proceeds were distributed among Butte-Milwaukee stockholders.

Holdings consist of 4 claims, patented, known as the Pollock, Colonel Sellers, Florence and Bird, lying immediately north of the Butte & Superior, and 3 lode mining claims in the Argenta district, Beaverhead Co., Mont.

The Colonel Sellers claim has a promising surface showing with strong, persistent quartz veins in granite. The Butte & Superior completed the sinking of the 1,200' Milwaukee shaft on Colonel Sellers claim and connected it by crosscutting with 1,200' level of Black Rock mine. This work was continued beyond the Colonel Sellers shaft so as to open the Mastodon vein on the Florence claim. The Milwaukee shaft is well equipped with power plant and hoist. The Butte & Superior Co. has spent \$24,000 in development work on the Butte-Milwaukee property and in return received 205,000 shares of the capital stock of the Butte & New York Co. Development work in 1916 said to have proved good zinc orebodies.

Surface outcrop on Bird claim is 100' wide and resembles outcroppings of the typical fault veins of the district.

The Pollock mine has 4 veins, 2 more or less developed by a short tunnel and a 730' three-compartment shaft. A silver vein was opened on the 300' level, and mine is said to have produced, years ago, about \$400,000 worth of ore, with values mainly in silver and gold, from above the 200' level. A little ore running 2% copper and 15 oz. silver per ton, with small gold values, was produced, 1906. No work is being done on these claims.

BUTTE & RED EAGLE COPPER CO. MONTANA

Fayette Harrington, pres., Missoula, Mont.; Jas. A. Canty, sec.-treas., Butte, Mont. Inc. May, 1907, in Montana. Cap., \$5,000,000; shares \$5 par. Lands: 7 claims, patented, S. E. of the Butte & Bacorn and N. E. of the Butte and Superior, the Red Eagle claim having a 400' tunnel, showing a little ore. Shut down since 1907, but company still alive.

BUTTE & ROCHER DE BOULE COPPER CO. BRITISH COLUMBIA

Office: 49 East Broadway, Butte, Mont. Branch office: Hazelton, B. C. Samuel McConnell, pres.; C. J. Stone, v. p.; J. W. MacLane, sec.-treas.; preceding officers, Paul Ozanne and P. J. Jennings, directors. Inc. 1912 in Arizona. Cap., \$1,000,000; shares \$1 par; fully issued and nonassessable.

Property: the Highland Boy group adjoining, but 1,000' above the Rocher de Boule mine and covering 400 acres on Juniper basin, Rocher de Boule mountain, Omineca mining district, 3 miles from New Hazelton and 4 miles from the Grand Trunk railroad. Claims show the extension of the Rocher de Boule veins, 2 of which have been opened by tunnels and open-cuts. Ore occurs in fissure veins following intrusive dikes of porphyry in granite. Samples from veins 18" to 5' wide assayed from 1.5% to 5.7% copper, with 0.5 to 0.8 oz. silver and slight gold values.

Idle since June, 1914. Property considered promising and worthy of further development.

BUTTE & SUPERIOR MINING CO. MONTANA

(Butte & Superior Copper Co.)

Office: 25 Broad St., New York. Mine office: Butte, Mont. Officers: N. Bruce MacKelvie, pres.; D. C. Jackling, v. p.-managing director; K. R. Babbitt, v. p.-gen. counsel; A. J. Ronaghan, sec.; C. W. Peters, treas. Directors: N. Bruce MacKelvie, K. R. Babbitt, D. C. Jackling, F. L. Ames and C. L. F. Robinson. J. L. Bruce, mgr.; Angus McLeod, mine supt.; F. G. Janney, mill mgr.; J. T. Shimmin, mill supt.

Inc. Oct., 1906, in Arizona. Cap., originally \$6,000,000; shares \$5 par; reduced Dec. 3, 1910, to \$2,500,000; shares \$10 par; nonassessable; increased Sept., 1912, to \$3,500,000. Outstanding Dec. 31, 1915, \$2,726,970. Outstanding bonds, Dec. 31, 1915, none. Stock listed on Boston, New York and Butte Exchanges and on the Paris Bourse. Name changed May, 1916, and new stock issued.

Controls the North Butte Extension Development Co., through ownership of 80% of the stock; also controls the Butte-New York Copper Co., through ownership of more than 55%. Equitable Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents; Guaranty Trust Co.,

BUTTE & SUPERIOR MINING CO.

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK

87 Milk Street, BOSTON

New York, and National Shawmut Bank, Boston, registrars. Annual meeting 3rd Friday in April, at New York.

Comparative General Balance Sheet: Years ending Dec. 31—

	Assets—Prop.			Total	Liabilities—			Prem. on Sales		Total
	Equip.	Invest's	Current Charges		Cap Stock	Current	Cap. Stock	Profits	Undiv.	
1914.	\$4,170,872	\$338,587	\$1,269,633	\$271,330	\$ 6,073,402	\$2,726,089a	\$111,384	\$1,213,985	\$2,021,944	\$ 6,073,402
1915.	4,458,133	574,295	5,267,080	486,129	10,785,638	2,726,970	606,317	1,214,886	6,287,965	10,785,638

(a) Includes \$5,900 first mortgage bonds.

Dividends: in 1914, \$611,908; in 1915, \$4,908,115, in 4 quarterly payments of 75c each and extra payments of \$15 per share; in 1st half of 1916, \$1.50 per share and \$20 extra.

Property: 27 mining claims, 164.90 acres, about 2 miles N. E. of the business section of Butte, with the exception of 4 claims, Peake, Parker, Prescott and Pardee, which lie about 3 miles N. W. of Butte. In addition, fractional interests equivalent to 8.88 acres are owned in 11 claims, 60.3 acres, and surface rights only for 34.15 acres. The North Butte Extension Development Co. owns 4 claims and a fractional interest in a fifth, amounting in all to an equivalent area of 29.48 acres.

The Butte-New York Copper Co. owns 4 claims and a small unpatented fraction lying to the north of the Butte & Superior group, amounting to 50.77 acres, and in addition 3 claims in Beaverhead county, having a combined area of 52.84 acres.

All operations to the end of 1915 were from Black Rock shaft, and all concentrating operations subsequent to June, 1912, have been conducted in the mill of the company, located upon its property immediately adjoining the mine. The Black Rock shaft is now 1,900' deep, with no developments conducted as yet below the 1,600' level. The ore consists of zinc blende, galena and small quantities of pyrite and chalcopyrite occurring with gangue material, mostly quartz, silicified granite, rhodochrosite and rhodnite as vein replacement of the granite. The ore occurs in parallel or branching ore shoots ranging in thickness from narrow stringers up to orebodies as much as 100' wide within the limits of a broad general zone of mineralization known as the Rainbow Lode. Near the surface the commercial ore consisted principally of silver ore, which was mined in the early days of Butte mining. The commercial zinc ore shoots as developed during recent years occur downward from approximately the 500' level, and as far as disclosed by present development, increase in horizontal area and in importance as greater depth is gained. Ore actually blocked out ready for mining is maintained at about one million tons, greater development than this being inadvisable owing to the difficulty in maintaining developed drifts and crosscuts for any considerable period before actual mining operations are to be conducted.

The ore carries from 10% to 30% zinc, averaging about 18% zinc, 1.25% lead, 0.2% copper, 8 oz. silver and 30c gold. The small amount of iron, lead and copper contents permits of the production of a good grade of zinc concentrates, but the very fine dissemination of the mineral requires fine grinding for efficient concentration, and most of the zinc mineral is afterwards recovered by oil flotation.

The mill has been developed from an originally designed capacity of 1,000 tons per day to the present capacity of 1,800 tons per day, and zinc recoveries range from 93% to 96%, depending upon the tonnage treated and the character and grade of ore and concentrates.

Part of the concentrates are sold under contract to the American Metal Company for treatment at their smelters in the Oklahoma gas fields. The balance of the concentrates are treated in plants of the American Zinc, Lead & Smelting Co. in the Kansas gas fields under a toll basis, though small

quantities have been disposed of by sale to various zinc retort smelters throughout the country or to the Anaconda Copper Mining Co. for treatment at its electrolytic plant at Anaconda, Montana.

Figures for the production of the property prior to 1913 are not available, but the results of operations since that time are as follows:

	Tons Milled	Oper. Cost	Tons Concs.	Assay Concs.	Lbs. Zinc In Concs.	Zinc Rec.	Aver. Price	Net Total	Profit per Share
1916 (a)	164,500	\$5.81	45,121	53.12%	47,938,530	92.86%	16.10c	\$3,544,940	.....
1915	522,300	5.10	158,171	53.61%	165,382,921	93.00%	12.34c	9,125,947	\$38.47
1914	327,210	5.33	101,383	53.16%	108,844,120	88.71%	5.04c	1,417,138	5.31
1913	296,940	5.70	106,443	49.00%	102,997,916	88.43%	5.52c	642,988	8.47

(a) First quarter.

In addition there was contained in the concentrates produced: 3,563,382 oz. silver; 1,792,210 lbs. copper; 11,474,168 lbs. lead; part of this came from 5,274 tons lead concentrates.

The suit against the company over the use of the flotation process of concentration is still in the courts. The apex controversy with the Elm Orlu Mining Co., owned by Hon. W. A. Clark and his son, was decided by the U. S. District Court in the latter's favor, but giving the Butte & Superior Co. all rights to the Rainbow lode east of the point where it enters the Black Rock claim; the company thus loses only the westernmost 301' along the vein claimed by it, but subject to the prior rights of the Pyle vein of the Elm Orlu company below its junction with the Rainbow.

In 1912 the controlling interests of the company passed into the hands of Hayden, Stone & Co., who have been closely identified with the Utah Copper Co., Chino, Ray and other of our greatest and most successful mining companies, thus ensuring ample finances and competent direction.

BUTTE & VIPOND GOLD MINING & MILLING CO. MONTANA

Office: 34 Owsley Bldg., Butte, Mont. Officers: Jas. M. Hinkle, pres.; Thos. P. Manley, v. p.; Wm. Worth, treas.; preceding officers are directors; Wm. E. Carroll, sec. Inc. May 14, 1910, in Mont. Cap., \$600,000; shares \$1 par; outstanding 363,412 shares. Annual meeting 3d Tuesday in May.

Property: 5 claims, unpatented, at Vipond Park, Beaverhead Co., Mont., said to show free milling gold ore in fissure veins 4-7' wide in granite. Ore is said to have an average assay of \$30 per ton.

Development: 200' vertical shaft and 235' tunnel, with total underground workings of 680'. Equipment: includes boiler, hoist and pumps. Little work was done in 1915. Company expects to connect the tunnel with shaft workings. Value of property remains to be proven.

BUTTE & YERINGTON COPPER CO. NEVADA

Office: care W. E. Wright, sec.-treas., 410 Phoenix Bldg., Butte, Mont. Mine at Yerington, Lyon Co., Nev. W. C. Siderfin, pres.; D. C. Bard, v. p.; preceding officers, Dr. Thos. B. Moore, Dr. Donald Campbell, John D. Pope and Wm. Mitchell, directors; L. W. Trankle, supt. Inc. Jan. 29, 1907, in Montana. Cap., \$1,000,000, shares \$1 par, fully paid; issued, 351,520. Annual meeting, third Wednesday in January.

Property: 2 groups of patented claims, one of 14 claims, about 4 miles east of and across the valley from Yerington and south of the Copper Mountain mine. The land has very attractive surface showings, but is without deep development work.

The second group of 9 claims, is in the heart of the camp adjoining the big Mason Valley mine and the Yerington Malachite Co.'s ground. This property is well located and has attractive showings of ore in the tunnels and on the surface outcrops. It has been idle during the past two years.

BUTTE & ZENITH CITY MINING CO. MONTANA

Office and mine address: 30 E. Broadway, Butte, Mont. Officers:

I. Freimuth, pres.; G. T. Paul, v. p.; Sol. Genzburger, sec.; John Killorin, treas.; preceding officers, W. D. Gibson, C. O. Baldwin, and L. S. Loeb, directors. John D. Pope, chief engr.; Wm. D. Gibson, supt. **Inc.** Oct., 1912, in Montana. **Cap.**, 300,000 shares; \$10 par, 157,660 issued. In 1915 50,000 shares of treasury stock were offered for sale at \$3 per share to provide funds for further development work.

Property: 320 acres patented ground and several unpatented claims, all in a compact group in Secs. 18 and 19, T. 3, R. 8 W., about 2 miles west of the developed section of the Butte district and a short distance south of Silver Bow junction, where 4 railroads meet. Ground shows Butte granite and aplite cut by numerous strong and persistent quartz veins and also the later fault veins which in the copper district of the Butte camp have proven so productive.

Development: by shaft, now 670' deep with a crosscut at 460', which was closed down in Oct., 1914, owing to a heavy flow of water from the vein, but reopened and unwatered, Feb., 1916. The veins show occasional values at the surface, but not in commercial quantities. The quartz veins are of the silver type, but the cross veins are similar to the copper veins of Butte. Samples taken from the shaft are said to assay 2% copper and 4 oz. silver. Equipment includes electric hoist, pump and air compressor.

BUTTERS DIVISADERO CO.

SALVADOR, C. A.

Office: 625 Market St., San Francisco, Calif. **Mine office:** Divisadero, Dpto. Morazan, Salvador, C. A. **Officers:** Chas. Butters, pres.; Chas. W. Slack, v. p.; Sidney M. Stone, sec.-treas., with Chauncey S. Goodrich and Sydney A. Cloman, directors. R. R. Leslie, supt. **Inc.** Jan. 23, 1905, in Calif. **Cap.**, \$750,000; shares \$5 par; all issued. Annual meeting 2nd Monday in April. Owns gold-silver mines at Divisadero, Dpto. Morazan, Salvador, C. A.

BUTTERS SALVADOR MINES, LTD.

SALVADOR, C. A.

Office: 61 Commercial Union Bldg., St. James St., Montreal, Que. **Officers:** Chas. Butters, pres.; D. J. Pullinger, v. p.; J. J. Meagher, sec.; with J. Johnston, directors. J. F. Thorn, mgr., Santa Rosa, Salvador. **Inc.** Nov. 9, 1912, in Canada. **Cap.**, \$750,000; shares \$5 par; all issued.

Annual report for fiscal year ending June 30, 1914, published Nov. 15, 1915, showed receipts from ore sales, \$499,911; net profit, \$116,042; surplus balance, \$110,264, after payment of \$92,063 in dividends. Dividends: 17½% in 1914; 15% in 1915; 7½% in Jan., 1916.

Property: 546 acres of gold-bearing land near Santa Rosa, Salvador, C. A.

B. V. N. MINING CO.

NEW MEXICO

Pinos Altos, Grant Co., N. M. **Officers:** Dr. A. M. Torello, pres.; J. W. Bettes, T. B. Fischer, Robt. Noble, Jos. Vinot, H. Bettes and S. D. Bettes, directors. Wm. Donovan, supt. **Inc.** Nov., 1914, in N. M. **Cap.**, \$250,000.

Property: Silver Hill mine, in Pinos Altos district, shows gold-silver-zinc ore in vein, 1' wide, believed to be continuation of rich orebody on adjoining Lankston and Pacific No. 2 claims. **Development:** 3 tunnels, 280', 300' and 400' deep and 260' stope. Little work was done in 1915.

BY-CHANCE COPPER CO.

NEW MEXICO

Office: Brice, via Oro Grande, Otero Co., N. M. Properties optioned July, 1912, under lease and bond to Jarilla Copper Syndicate and company

is inactive at present.

CABABI MINING CO.

ARIZONA

Secretary and address: Wm. H. Kershner, 1021 Hume-Mansur Bldg., Indianapolis, Ind. **Mine P. O.:** Camp Cababi, via Tucson, Pima Co., Ariz.

Officers: Chas. N. Wilson, pres.; Allen W. Conduitt, v. p.; preceding with H. A. Walker, E. B. Peck, E. J. Scoonover, Albert Off, W. H. Kershner and R. A. Wilcox, directors. H. F. Scheerer, gen. mgr., P. O. Box 1116 Tucson Ariz. C. J. Price, mg. engr.; Harry Orndorff, purch. agt.

Inc. 1908, in Arizona. **Cap.**, \$1,500,000; shares \$1 par, nonassessable; issued \$1,250,000. Annual meeting, third Monday in June.

Property: 50 claims, about 1,000 acres, 35 claims patented, also 2 mill sites of 5 acres, situated in the Cababi mountains, 69 miles S. W. of Tucson.

Development: by numerous shallow shafts, and main shaft 450' sunk on the Picacho claim, includes an antigua, reopened about 1860, by Francisco Padrea, and which, years ago, was a small producer of silver-bearing copper and lead ores.

Equipment: includes a steam hoist good for 500', an adobe store building and several frame structures and tents utilized as dwellings.

A full report on the property made, Oct., 1912, by C. J. Price, mg. engr., shows 2,240 tons of ore, valued at \$28,485, on dumps. Manager reports 10,000 tons high-grade ore blocked out April 25, 1913. Mine now idle, but company claims it will be reopened upon completion of E. F. & S. W. R. R.

CABIN BRANCH MINING CO.

VIRGINIA

Office and mine: Dumfries, Prince William Co., Va. Is controlled by the Virginia-Carolina Chemical Co.

Property has a large lenticular body of iron pyrites carrying up to three-fourths of 1% copper recovered as a by-product after roasting.

Development: by shaft, equipment, including a steam hoist and air compressor. Mine employed 50 men at last accounts.

CABLE CONSOLIDATED MINING CO.

MONTANA

Office: 53 Silver Bow Blk., Butte, Mont. Mine office: Cable, Deer Lodge Co., Mont. H. C. Bacorn, supt. **Property:** 700 acres, 15 miles west of Anaconda, include the Cable gold mine, in vicinity of the Southern Cross mine. The Cable mine, worked since 1870, with varying success, has produced about \$4,000,000 worth of ore, with values mainly in gold, but has auriferous copper ore on the tunnel level. **Equipment:** includes steam power, air compressor and a 30-stamp mill. Reopening planned for 1916.

CACTUS CONSOLIDATED MINING CO. MONTANA-CALIFORNIA

Office: 808 Lonsdale Bldg., Duluth, Minn. A. F. Becker, pres.; R. B. Harrington, sec. Inc. 1914, in Delaware. **Cap.**, \$1,000,000; shares \$1 par. Is a reorganization of the Cactus Copper Co., which was a reconstruction of the Cactus Development Co. Both companies fully described in former volumes.

Stockholders in the old company were given until June 10, 1915, to exchange their holdings for shares in the Cactus Cons. at the rate of 2½ for 1 and a payment of 6 cts. per share. In March, 1915, the Mammoth group, consisting of 22 quartz claims, 440 acres, in Kern Co., Calif., was acquired.

Development: by several tunnels, said to show 32' of ore, assaying \$10.40 per ton in silver, and a vein on claim No. 8 is claimed to assay 64-74% pure antimony and to be the richest ore in the district. Company also owns and is operating the Leona gold mine, developed to depth of 150' and said to have several veins, 3-4' wide, averaging from \$12-\$30 per ton. Frank Enzensperger, supt., is credited with an estimate of \$400,000 worth of ore blocked out on the Leona property.

CACTUS COPPER CO.

MONTANA

Reorganized, 1914, as Cactus Cons. Mng. Co., which see.

CACTUS MINE**UTAH**

At Newhouse, Beaver Co., Utah. Owned by Consolidated Nevada-Utah Corporation.

CADENA DE COBRE MINING CO.**MEXICO**

Address: care C. A. McDonald, sec., Bisbee, Ariz. **Mine office:** Sahuaripa, Sonora, Mex. **Officers:** Emil Marks, pres.; C. H. Holz, v. p.; M. Newman, treas.; R. F. Koehler, J. Pennypacker and John Treu, directors; Arthur Houle, cons. engr. **Inc. Jan. 5, 1905. Cap., \$1,000,000; shares \$1 par.** The former directors issued to themselves 550,000 shares of stock, and when this was learned the old board resigned and suit was brought, resulting in the cancellation of the stock so issued, it having been a grab, pure and simple.

Property: 84 hectares, in Los Chinos mountains, on the Yaqui river, shows iron outcrops up to 300' in width. **Development:** by the 96' Bisbee tunnel, showing ore assaying 4 to 25% copper, with small gold and silver values, and 2 shorter tunnels. Idle on account of revolutionary disturbances in Mexico. Property was fully reported on by Arthur Houle, E. M. **CALAMONT COPPER CO. MONTANA**

Idle. Office: 263 Twelfth St., Oakland, Cal. **Mine office:** Norris, Madison Co., Mont. **Officers:** Walter V. Harrington, pres.; Wm. F. Davis, v. p.; Mark E. Davis, managing directors; Hugh J. Leonard, sec.; Thos. F. Hogan, treas.; preceding officers, Jas. Keller and F. G. Crist, directors. **Inc. Nov., 1909, in Arizona. Cap., \$5,000,000; shares \$10 par, non-assessable.** Apparently is connected in management with the Montana-Hecla Mining Co.

Property: 22 claims, 380 acres, include the Old Colony group, adjoining the Montana-Hecla, 5 miles southeast of Norris, carrying auriferous and argentiferous copper ore. **Development:** includes several shallow shafts, with an old 100' two-compartment shaft on the Big Jack claim, and a 160' tunnel, with about 900' of workings. Not regarded favorably by late H. J. Stevens. A report on the property made by Reeves Davis, E. M., Sept., 1911, recommended development of 2 surface outcrops. Mark Davis, former manager, reported to be protecting the property with a view to refinancing the company.

CALAVADA COPPER CO.**NEVADA-CALIFORNIA**

Suite 3249, No. 120 Broadway, New York. **Mine near Luning, Mineral Co., Nev. Officers.** E. B. Bronson, pres.; H. Richardson, v. p.; F. C. Hart, sec.; A. C. Hurt, treas.; H. A. Geisendorfer, Pioche, Nev., mgr.; with M. G. Lane and Geo. D. Hopkins, directors. Frank Breckenridge, Luning, Nev., supt. Kirby Thomas, cons. engr.

Inc. 1913, in Delaware. Cap., \$2,500,000; shares \$5 par; 180,300 shares held in treasury. Security Transfer & Registrar Co., New York, transfer agent.

Property: Copper Mountain Group, known as the Luning Unit, 21 patented and 10 unpatented claims, 500 acres, in Sante Fe mining district, 8 miles E. of Luning, Mineral Co., Nev., on the So. P. R. R., and the Darwin Unit, 9 patented claims, 180 acres at Darwin, Inyo Co., Calif. This group is not being developed at present.

Ore: copper occurring as oxide and carbonate in vein 40' to 150' wide with sulphides at depth, in contact deposit between granite and limestone. Average assays said to run 3 to 10% copper with small precious metal values.

Development: 1,000' shaft, Copper Mtn., 100' Cyclone shaft and prospect tunnels. Underground workings total 3,000'. Crosscutting and drifting on the 700' and 1,000' levels now being done.

Equipment: 60-h. p. hoist, Ingersoll-Rand air compressor, mine and office buildings. Plans deepening the main shaft and shipping ore in 1916.

CALAVERAS COPPER CO. CALIFORNIA

Office: 87 Ames Bldg., Boston, Mass. Mine office: Copperopolis, Calaveras Co., Cal. **Officers:** Chas. M. Hayden, pres.; Herbert Goff, sec.-treas.; preceding with Oliver Ames, F. Lothrop Ames, Samuel Carr, Gilmer Clapp, Wm. J. Maloney, John S. Ames, directors. S. M. Levy, supt. **Inc.** Aug. 31, 1909, in Del. **Cap.**, \$5,000,000; shares \$5 par; reduced, Aug. 24, 1910, to \$2,500,000 common, shares \$5 par; issued, \$1,868,750; \$300,000 preferred, shares \$5 par; none issued. Bonds, \$450,000, 6%, \$90,000 due annually, owned by the Ames estate, which formerly owned the property, and \$75,000 2-year notes, 6%, convertible. State Street Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agt. Stock is listed on the Boston curb. Annual meeting, second Monday in February.

Property: 2,833 acres, including the Union, Keystone and Empire mines, and also including ranch and water power lands, bought Aug. 31, 1909, of Union Copper Co., 14 miles from Milton, the nearest rail point. Mines, opened 1861, were considerable producers, paying fair dividends, 1861-66, and yielded 125,739 tons of ore, said to average 10% copper, 1861-1907.

Geology: ore occurs in amphibolite schists underlying Mariposa slates, near intrusions of granodiorite, the ore-bearing schist ranging 100 to 200' in width. Ore occurs as lenses of about 15' average and 70' maximum width, connected by stringers, reported by company to yield one-fifth smelting ore, of 8% copper tenor, and four-fifths concentrating ore, of 3% tenor, giving an average of about 4%. The alteration zone, about 30' in depth only, carried rich oxides and carbonates and some native copper and is succeeded by chalcopyrite, without gold or silver values, but free from arsenic, antimony, zinc, bismuth and other undesirable elements, blister copper therefrom making good wire bars without electrolytic refining.

Development: the strike of the vein is proven for 8,000' by 20 shafts, mainly old workings of little present value. Principal development is on the Union, Keystone and Empire mines, with about 3 miles of workings.

Equipment: includes a 1,000-h. p. steam plant at the Union mine, with 3 hoists and 15-drill Nordberg and 5-drill Leyner air compressors; company also reports 500 electric h. p. at the mill and same at the smelter.

The company owns about 60 buildings, including office building, boarding houses, bunk houses, 3 warehouses, machine shop, smithy, 3 barns, and about 40 dwellings. The 600-ton mill is connected with the mines by a 4,000' electric tram. A dam, impounding water for the mill has 90,000 gals. storage capacity.

The 300-ton smelter, connected with mill and mines by 4,000' of electric and horse trams, has 2 McDougal calciners, a 150-ton blast furnace and a 150-ton reverberatory furnace. The converter has 2 Allis-Chalmers stands. Smelter fuel was petroleum and coke.

The concentrator was treating about 600 tons of 3-4% ore daily, June, 1913. Total output of copper from all sources at this time was at the rate of about 10,000,000 lbs. per year. The company was hard pressed for funds in 1913; the manager attached the property for \$18,000 unpaid salary, and in June the company ceased active and new work, because of practical operating difficulties and lack of sufficient funds. Arrangements, however, were made with the unsecured creditors and payments were made from time to time with funds loaned to the company by persons largely interested therein.

While the property was closed it was investigated by several experts and as a result of these investigations, made on behalf of various persons, some contemplating the purchase of the property and some contemplating operation under a leasing arrangement, it was finally determined, in October, 1914, to place the property under the charge of Mr. S. M. Levy. Under Mr. Levy's management and with Mr. Frank W. Royer, acting as consulting engineer, operations have been carried on at the mine in a small way for the last year and experiments have been made for the purpose of treating the ore by the oil flotation process. It has been determined that the average grade of the ore is approximately 3% and that under oil flotation a concentrate of at least 16% can be made. There is said to be in sight at the present time ready to mine, 149,000 tons of ore, and it is estimated that the development work now being carried on will show an additional tonnage of 151,000 tons. Mining operations will be commenced upon the installation of new milling machinery which has been ordered and it was estimated that the company should be able, by May, 1916, to treat 200 tons of ore a day. The market manipulation of the stock has been of a flagrant nature, stock selling up to \$11 and afterwards down to \$2.50 during 1910, and again in 1913. The stock has been persistently praised by a prominent New York Curb house, producing an unfavorable impression on conservative investors.

CALEDONIA MINING COMPANY

IDAHO

Office: Wallace, Idaho. **Mine office:** Wardner, Shoshone Co., Idaho. **Officers:** S. A. Easton, pres.; C. F. Kratzer, v. p.; Chas. McKinnis, sec-treas. and mgr. **Inc.** July 9, 1907, in Idaho. **Cap.**, \$2,605,000; shares \$1 par; assessable; all issued. **Dividends:** total \$882,781 to Jan. 1, 1916; has paid \$364,700 to May 6, 1916. Listed on San Francisco and Butte exchanges.

Property: 5 unpatented claims, about 50 acres; adjoining property of the Bunker Hill & Sullivan Mining Co., at Kellogg, Idaho, shows a strong fissure vein with an oreshoot 1,000' long, that is in places 50' wide and carries cupriferous silver-lead ores, averaging 15 to 40 oz. silver, with a little native copper.

Development: by a 500' shaft and 2 tunnels, lower tunnel, 4,000' in length, giving a back of about 1,300'. The 1,000' level is reported to show 7' of shipping ore, though broken faulted ground was encountered. Feb., 1916, reports show a drift being run from Keating level, 75' below the 1,000' level to pick up orebody.

The mine was idle from 1912 to July, 1914, on account of litigation with the Bunker Hill & Sullivan Mining Co. over apex rights. A compromise was effected whereby the capital stock of the Caledonia company was increased from \$1,500,000 to \$2,605,000, the B. H. & S. Co. taking 550,000 shares. The company is virtually a subsidiary of the Bunker Hill company. 150,000 tons of ore reported blocked out, Dec., 1915. Major portion of ore is being taken from between the 500' and 700' levels. Production is at the rate of 1,200 tons monthly, crude ore and concentrates in about equal proportions. Ore is treated at the mill of the B. H. & S. Co. plant. **Equipment:** includes an electric hoist, air-compressor and electric pumps. Company employs about 35 men when active.

Costs per ton for 1915: mining, \$1.88 on 42,628 tons mined; milling, \$0.67 on 35,996 tons concentrates produced; shipping, \$0.23 on 15,561 tons shipped. Net operating profits were \$760,324. Net earnings for Jan., 1916, were \$100,264.

Production:	Copper Lbs.	Lead Lbs.	Silver Oz.	Net Profits
1914(a).....	245,610	6,599,720	537,854	\$761,797
1915.....	659,660	11,142,580	1,212,730	760,324

(a) For 7 mos. after operations were resumed.

Ore reserves: estimated by company as sufficient for almost a year's production, but property is believed to have a possible future of several years more. Management capable and efficient.

CALHOUN CONSOLIDATED MINES CO. COLORADO

Mine office: Central City, Gilpin Co., Colo. **Officers:** A. M. Stearns, pres.; L. D. McCall, v. p.; P. R. Alsdorf, sec.-mgr.; D. H. Coble, treas.; with C. A. Constable, T. E. Green and Geo. Diehl, directors. **Inc.** 1912, in Colorado. **Cap.**, \$1,000,000; shares \$1 par, fully paid and nonassessable; 800,000 issued. Annual meeting 1st Tuesday in October. Company is a reorganization of the Jefferson Calhoun Mng. Co., described in Vol. XI, Copper Handbook.

Property: bought at sheriff's sale, consists of 7 patented claims, 32 acres, on the east slope of Quartz Hill, developed by 5 shafts, deepest 1,400', and by the Newhouse tunnel, shows gold-copper-uranium veins. Average assays run 1.4% copper, 2.20 oz. silver and 0.40 oz. gold per ton. **Equipment:** includes hoists, air-compressor, drills and 8 buildings.

Production in 1913 estimated at \$27,500. Idle since 1914.

CALIF. & MASS. COPPER MINES CO. CALIFORNIA

Inactive. Property, at Red Bluff, Tehama Co., Cal., is leased, for 99 years, to Chicago Copper Refining Co. Described Vol. VIII.

CALLAHAN MINING CO. IDAHO

Property acquired by Interstate Silver Lead Mng. Co., in 1912, and Consolidated Interstate-Callahan Mng. Co., formed, which see. Company dissolved by order of Court, May, 1916.

CALUMET & ALGOMA MINING CO. ONTARIO

Secretary's address: Lucas Hermann, 109 Fifth St., Calumet, Mich. Mine near Massey, Algoma, Ont. Christian Schenck, pres.; Jos. Vertin, v. p.; Lucas Hermann, treas. **Inc.** 1905. **Cap.**, \$1,000,000; shares \$5 par, assessable; issued, \$100,000, paid in, \$1.75. Was a reconstruction of the Copper Queen Mining Co., Ltd. At last accounts had no debts, with \$600 in the treasury.

Property: 957 acres, freehold, shows a 45' fissure vein, traceable about 3 miles, carrying medium-grade chalcopryite ore, more or less auriferous, with occasional bornite and malachite, giving assays of 5 to 25% copper. Has 2 shafts, No. 1 being 138' deep, and 2 tunnels, longest 195'. Lands are heavily timbered and well watered. Idle several years.

CALUMET & ARIZONA MINING CO. ARIZONA

Office: Calumet, Mich. **Mine office:** Warren, Cochise Co., Ariz. **Works office:** Douglas, Cochise Co., Ariz. **Officers:** Chas. Briggs, pres.; Capt. Jas. Hoatson, v. p.; Capt. Thos. Hoatson, second v. p.; Gordon R. Campbell, sec.; Peter Ruppe, treas.; preceding with Thos. F. Cole, Chester A. Congdon, Chas. d'Autremont, Jr., William E. Corey, Henry R. Rea, and Geo. E. Tener, directors; John C. Greenway, gen. mgr.; W. B. Gohring, mine supt.; James Wood, smelter supt.; J. H. Whiteley, engr.; J. B. Rawlings, purch. agt. John Hooper, supt. at Superior, and J. Curley, supt. at Ajo.

Inc. March, 1901, in Arizona. **Cap.**, \$2,500,000; shares \$10 par, increased Feb. 15, 1911, to \$6,500,000; shares \$10 par; issued 617,412 shares; held for exchange, 27,100 shares. The company which already controlled the Superior & Pittsburgh Copper Co., through ownership of 1,494,333 shares out of a total of 1,499,792 shares issued, in Feb., 1916, took over the property. All S. & P. assets were transferred to the C. & A. Co., effective Dec. 31, 1915, basis of exchange being 3½ shares Superior & Pittsburgh for 1 Calumet & Arizona, and a bonus of \$1 per share for quick delivery of

stock. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Stock is listed on the Boston Stock Exchange. Annual meeting, second Monday in April.

Balance sheet of Dec. 31, 1915, gave quick assets of \$7,162,795, including \$2,561,931 cash; copper, silver and gold in process, \$3,688,841; notes and accounts receivable, \$577,748; supplies, \$334,274; with accounts payable of \$224,548, and total surplus, \$30,971,627. Total earnings on copper, gold and silver were \$11,647,415, interest and misc., \$36,308; expenditures were \$6,225,595. Has paid dividends as follows: \$2 in 1903, \$6.50 in 1904; \$8.50 in 1905; \$13 in 1906; \$16.50 in 1907; \$4 in 1908, 1909, 1910, 1911; \$4.25 in 1912; \$5 in 1913; \$3 in 1914, and \$3.25 in 1915.

In 1911 the company took an option on the New Cornelia claims, 243 acres in the Ajo district, 42 miles south of Gila. The C. & A. was to receive treasury stock of the New Cornelia Copper Co. (described under its own title), for all money expended in development work on the property. It exercised its option in 1913 and now owns 918,821 shares, 76.57% of the stock of the subsidiary company. Stock cost C. & A. \$1,617,325, about \$1.76 per share. Recently it subscribed at par for \$3,100,000 bonds of an issue of \$4,000,000, which amount it set aside from earnings over dividends during 1914-15. In Jan. it finished building, jointly with the E. P. & S. W., the 40-mile Tucson, Cornelia and Gila Bend railroad running from Gila Bend to Cornelia. All told C. & A. has about \$6,000,000 in New Cornelia so that dividends during the past two years have necessarily been lower than earnings would warrant if it did not have this extra burden to carry. The New Cornelia Co. will not enter the producing class until late in 1916. Described under its own title.

Property: includes the original claims at Bisbee, claims formerly owned by the Superior & Pittsburgh C. Co., bought Dec. 31, 1915; the American Saginaw group, bought in 1912; the Calumet & Bisbee group and the Higgins group, bought in 1913; total area of about 2,000 acres, patented, within the mineral zone of the Warren district, Ariz.

Side-line agreements with the Copper Queen Cons. Mng. Co., the Denn-Arizona Mng. Co. and the Shattuck Arizona Copper Co., insure freedom from possible litigation, and continuance of the friendly feeling and neighborly co-operation existing from the very inception of this company.

Geology: the mine is opened in limestone, near a porphyry contact, with occasional porphyritic intrusions. The surface gives small indications of values, showing but small and infrequent outcrops, the existence of the original orebodies in the Irish Mag claim, farthest to the north, having been inferred from underground work in the adjoining territory of the Copper Queen, after careful study of the general geological conditions of the district. Ore occurs in highly irregular bodies, the mine having native copper, cuprite, melaconite, azurite, chalcocite and chalcopyrite, usually with a talcose gangue, and with considerable hematite and manganese ores, the latter carrying malachite in small disseminated nodules, frequently averaging 10 to 18% in copper. The ore, which is practically self-fluxing, averages about 2 oz. silver and 0.05 oz. gold per ton, as smelted.

Development: diamond-drill borings to depth of 1,800' have penetrated limestone strata to that depth. The orebodies are extensively developed, but are not largely blocked out, owing to the constant shifting of the ground, caused by the creeping of the mountain above, as is the case at the neighboring Copper Queen mine, requiring very heavy timbering, with frequent bulkheading, and constant care for all openings, which renders it prudent to keep costs down by blocking out ore but a comparatively short time ahead of actual stopping requirements. Timber is secured from

a great distance, and to guard against emergencies, large stocks are carried. The mine, as a whole, is not especially wet. Several small mine fires have caused trouble, but have not done serious damage. New openings in 1915 were 81,284', compared with 70,660' in 1914. Mines have electric traction on 1,150' and 1,350' levels.

The 4-compartment Irish Mag shaft, sunk on a single 20-acre claim, was the original mine, and the shaft is sunk in hard limestone throughout, except where occasional orebodies were cut, rendering it unusually safe from drawing. The Irish Mag has yielded some of the best copper ever mined, including some entire stopes of 30 to 40% copper tenor. The Irish Mag shaft has a 78' steel headgear, a 114' ore bin and a 250-h. p. electric hoist, raising 3-decked cages. The shaft is 1,350' deep. The Oliver shaft, 4 compartments, 1,600' deep, develops both of the Senator and Bucyeye claims, cutting ore at 710'. Sulphide ore averaging about 5% copper, is being mined from orebodies on the 1,250' and 1,350' levels. Development work is now being prosecuted on the 750' level to explore hitherto undeveloped ground. The Oliver has a 600-gal. Nordberg electric pump and is equipped with a powerful Nordberg electric hoist.

The Powell shaft, started Nov., 1908, is on the line between the Hope and Wagner claims, which lie 2,000' S. W. of the Irish Mag shaft. This ground was explored by a crosscut from the Irish Mag that traversed 600' of the Copper Queen ground, stopping about half way across the group, showing nothing of value. This shaft, about 600' deep, has an electric hoist.

The area below the 1,350' and 1,450' levels was diamond drilled, 1911, showing a downward extension of the mineral zone, several hundred feet to the bottom of the limestone, but without disclosing commercial ore.

The Washington, Angel and Old Republic claims lie on the porphyry side of the gulch, and were secured mainly as a possible smelter site, then being considered of little promise for ore.

In 1915, 5,165' of churn drilling on this group developed a substantial tonnage of low-grade disseminated ore in an irregular body from 170' to 450' below the surface.

The Cole shaft handles the output from the southwestern part of the company's holdings. The greater part of the recent production has come from a body of oxide ore of great size between the 800' and 1,000' levels. Smaller bodies have contributed sulphide ore on the 1,000' and 1,100' levels. A small body of lead carbonate ore of good grade is being developed on the 900' level. This shaft has Prescott and Cameron station pumps caring for a flow of 225 gals. of water per minute.

The Congdon shaft, on the Black Bear claim, only 650' from the Mag, is 1,267' deep, but has been out of commission several years, as the territory can be worked to better advantage through the Cole shaft. Surface equipment includes a 300-h. p. steam plant, with a 12x36" double-drum hoist.

The Hoatson shaft, on the Del Norte claim, 2,500' from the Briggs, has 5 compartments, and is 1,530' deep. An appreciable tonnage of both oxide and sulphide ore is being mined from bodies between the 1,200' and 1,400' levels. This ore is taken by electric haulage to the Junction shaft, where it is hoisted. Equipment at the Hoatson shaft includes a steel headgear, double-drum hoist, good for 2,000' depth. Power plant has 6 boilers.

The Junction shaft has 4 compartments and is 1,837' deep, being the deepest by nearly 300' of any shaft in the Bisbee district. Shaft is concreted to bottom level. The Junction is the main hoisting shaft of the Briggs-Hoatson-Junction division and virtually the entire production of the 3 mines, about 2,000 tons daily, is hoisted through it. Ore is hoisted in 5-ton

skips, crushed in Allis-Chalmers gyratory crusher, and loaded by belt conveyor into railroad cars.

Large bodies of both oxide and sulphide ore have been opened up on the 1,300', 1,400' and 1,500' levels. Development of the 1,600', 1,700' and 1,800' levels was started in 1915 and valuable orebodies have since been found. In addition to the ore of shipping grade developed, immense bodies of solid pyrite, carrying between 1% and 2% copper, have been found on the 1,400' and 1,500' levels. The mine is equipped with electric traction on the 1,400' and 1,600' levels.

The Junction shaft drains the entire Calumet & Arizona and Copper Queen group of mines. Water pumped during 1915, exceeded 1,900,000,000 gals., about one-half coming from the 1,800' level, remainder from the 1,500' level.

Pumping plant consists of five 1,000-gal. pumps on the 1,000' level, two 2,250 and one 1,500-gal. pumps on the 1,500' level; one 1,000, one 1,500 and one 1,650-gal. pumps on the 1,800' level.

Surface plant consists of 13 250-h. p. Marine boilers, a 4-cylinder Nordberg, double-reel Main hoist, good for 2,500' depth, and a Sullivan single-drum hoist. used as an auxiliary hoist for handling men and timber.

There is a 5,000' Nordberg compressor having compound air cylinders driven by a four-cylinder triple expansion steam engine. This machine has an attached air pump and condenser. In addition there is a 3,500' Nordberg compressor, having compound air cylinders, driven by a cross compound steam end.

The Briggs shaft, about 3,000' south of the Junction shaft, is 1,550' deep and 3,000' east of the Lowell shaft of the Copper Queen. Large bodies of enriched sulphide ore of much greater horizontal than vertical extent, averaging about 5½% copper, have been developed between the 1,200' and 1,400' levels. A substantial tonnage of oxide ore of slightly lower grade is being mined from the 1,100' to the 1,400' levels from nearly vertical fracture zones. With the exception of about 150 tons of oxide ore, hoisted at the Briggs shaft, the tonnage from this mine is handled by electric haulage on the 1,400' level to the Junction shaft and hoisted.

Equipment at the Briggs shaft includes wood gallows frame. Power plant has 2 boilers of 250-h. p. each, burning crude petroleum, with a powerful hoist.

The Copper Giant group, at Copper Creek, Graham county, Ariz., includes 35 claims, known as the Scanlon or Clark-Scanlon property, 16 miles northeast of Mammoth. This property, bought Sept., 1908, has been extensively tested by diamond drills, giving good cores, and has a 600' two-compartment working shaft, with several levels opened, and considerable medium to high-grade sulphide ore is blocked out. A 15-mile railway will be required to render this property a producer.

Equipment: surface equipment is very complete. The original machinery plant was clustered about the Irish Mag shaft, on a steep hillside, where limited room was secured by grading, but the principal plant is now at the Oliver shaft, including five 280-h. p. marine boilers, burning crude petroleum, with storage tanks.

The principal compressor plant, at the Oliver, has a 35-drill Sullivan Corliss cross-compound 2-stage air compressor, with 17x34" steam cylinder and 20x34" air cylinder, having a piston displacement of 6,600 cu. ft. of free air per minute. There also are 3 Sullivan straight-line air compressors. Much of the ore is so soft that it can be bored with a breast auger, thus reducing requirements in the way of air for power drills. Electricity is used extensively on surface and also for pumping. The electric power

plant at the Oliver shaft has 1,000-k. w., 500-k. w. and 300-k. w. Westinghouse-Parsons 2,200-volt, 60-cycle 3-phase turbo-generators, two 220-k. w. 2,200-volt 60-cycle 3-phase motors, direct-connected with the steam turbine, a 300-k. w. General Electric rotary converter, transforming a 2,200-volt alternating current to a 550-volt direct current, for operating the street-car line to Warren.

The steel-frame machine shop is divided into two 60x48' parts, for the machine shop and smithy. Adjoining is a plate shop, 40x128' of steel frame, with corrugated iron roof and siding. There is a framing mill at the Irish Mag shaft, also a warehouse and office building. A 60x125' administration building is planned to be erected at Warren, the town site adjacent to the Calumet & Arizona. A hospital with an efficient staff is maintained for employees, and a model changing house has hot and cold running water, tub and shower baths and lockers for 500 men. Fire protection is furnished by direct pipe lines to large storage tanks, all hose couplings being made to connect with those of the Bisbee fire department. An automatic telephone system has stations underground and on surface, and is connected with the smelter at Douglas.

The company's smelter is located at Douglas, 25 miles from the mine, receiving ore over the El Paso & Southwestern railway, at a very favorable freight rate. The original smelter was blown in Nov. 15, 1902, and has been twice enlarged, giving the old works a capacity of nearly 3,000 tons daily.

The new smelter, completed 1913 at a cost of about \$2,000,000, was designed by C. H. Repath and built and equipped with the able assistance of Messrs. Greenway and Wood. It is fully described by Richard H. Vail, in the Eng. and Min. Journal, vol. 98, p. 102, July 18, 1914. The works consist of a sampling mill, crushing plant, calcining plant, reverberatory blast furnace and converter departments and 6 mixing beds each of 10,000 tons capacity, together with a 5,000-ton coke storage bed.

The crushing and sampling plant, 40x84' on the ground and 5 stories high, is built of steel and concrete throughout, and is divided into 2 sections, operating independently of each other. Each section has a crushing and sampling department. Ore from the crushers at the receiving bins is delivered over an incline conveyor to the crushing and sampling plant, where the large sizes are screened out for the blast furnaces. The sampling department, equipped with Snyder automatic samplers, cuts the ore 4 times, making a sample weighing 1.6 or 3.2 lbs., as desired, per ton of ore passing through. The plant is flexible and ore may be crushed and screened and discharged at any desired size.

The material from the sampling and crushing plant is passed to mixing beds similar to those in use at the Cananea smelter, there being 3 beds for coarse and 3 for fine ore. The coarse ore mixed with coke is conveyed directly to the coke charge bins over the blast-furnace charge floor, the fine ore going directly to the calciner, or roaster plant.

The roaster plant has twelve 258" Herreshoff roasters, having a capacity of approximately 80 tons of fine ore per day. The plant is equipped with a tile and steel dust chamber, 60x140x70' high, equipped with baffles and wires and roofed with copper, discharging into a brick-lined steel chimney, 20' inside diameter by 279' high.

A 222x460' building, of steel frame, sheathed with iron, covers the blast furnace, reverberatory, converter, and copper-casting departments. The blast-furnace department consists of two 48x40' blast furnaces, and has a steel dust chamber, 60x180x70' high, equipped with suitable baffles and wires. The gases from the converters will also pass through this chamber and be discharged into a brick-lined steel chimney, 25' inside diameter by

305' high. Ore and coke is discharged directly from the bin over the charge floor into cars resting upon platform scales, the charge car being propelled from the scales to the charge doors of the furnace by an electric motor.

The reverberatory department contains 4 reverberatory furnaces, 19x100' in size, with a foundation and building for a fifth furnace in place. Each furnace is equipped with two 712-h. p. Stirling boilers. The furnaces are charged directly from the calcine cars running on a track overhead. Matte is tapped into 20-ton pots, and transferred by cranes to the converters, slag being skimmed directly into 25-ton pots, running on tracks underneath and just in front of the skimming end of the furnaces.

The converter department, having a main converter aisle 55' wide, and two 40-ton electric traveling cranes, has stands for 6 Great Falls type converters. There are also 2 straight-line casting machines and other necessary equipment. The converter slag is poured directly into the reverberatory furnaces.

The power house, formerly 80x160' in size, was increased, 1907, by the building of a transverse section 100x100' in size, the new building being divided through the center by a row of columns into 2 bays, each 50' wide, and each served by a 10-ton hand-power traveling crane. Equipment includes two 14 & 28x36 Allis-Chalmers Tandem Corliss engines, all driving No. 10 Connersville blowers. One 22 & 48 & 52 & 52x48 and one 22 & 42 & 48 & 48x48 Nordberg cross compound Corliss blowing engines, and one 20 & 40 & 44 & 44x48 Allis-Chalmers blowing engines.

There are also a 750-k. w. and a 500-k. w. Allis-Chalmers steam turbines, driving 440-volt, 60-cycle, 3-phase generators and one 165-k. w. and one 200-k. w. motor generator sets for converting alternating current to direct current for cranes and locomotives.

There are also 2 triple expansion steam pumps, size 8 & 12 & 20 & 22x24, and 3 motor-driven centrifugal pumps for water service; also two 14 & 25 & 2-36x24 Prescott beam condensers. Steam is supplied from the boilers over the reverberatory furnaces and the old boiler plant is closed down.

The smelter plant includes a machine shop and smithy, both of steel frame, and a considerable number of dwellings.

Production: since 1912 production and costs of the C. & A. and Sup. & Pgh. have not been published separately. Production of the combined properties, domestic and purchased ores, since 1910 is as follows:

Year	Lbs. Copper	Oz. Silver	Oz. Gold	Net Cost Selling Price	
				Copper (a)	Copper
1911.....	49,945,905	453,947	18,114	7.34 cts.	12.49 cts.
1912.....	53,108,628	594,319	22,881	7.02 cts.	16.25 cts.
1913.....	52,987,383	880,915	18,989	7.65 cts.	15.57 cts.
1914.....	52,667,929	922,143	24,122	8.19 cts.	.....
1915.....	65,268,910	1,381,077	35,264	8.00 cts.	.....

(a) Per pound copper, after crediting gold and silver.

After the outbreak of the European war, in 1914, production was curtailed and did not return to normal for several months. In 1914 C. & A. furnished 12.2%, and Sup. & Pgh. 87.8% of ore treated. During 1915 ore mined amounted to 690,881 tons, dry weight. There was shipped 29,400 tons low grade sulphide ore to El Paso and Miami, where a premium was paid for high iron and sulphur contents.

CALUMET & BISBEE DEVELOPMENT CO.

ARIZONA

Houghton, Mich. Property sold in 1913 for \$60,000, affairs of company wound up and final dividend in distribution of assets paid in 1914. F. W. Nichols and Joseph Bosch, trustees in liquidation. See Vol. XI.

CALUMET & CALIFORNIA MINING CO.**CALIFORNIA**

Office: Calumet, Mich. Mine office: Washington, Nevada Co., Cal. Thos. Rundell, pres.; Wm. Wedlyn, v. p.; Elbert E. Boyd, sec.; Neil Dick, treas. **Inc.** Aug. 3, 1914, in Wyoming. **Cap.**, \$200,000; shares \$1 par; assessable. Property was idle for several years when held by Fairview Mng. Co.; company reorganized 1914 under present title.

Property: 7 claims, 160 acres, 21 miles N. E. of Nevada City, nearest rail point, has 5 to 12' vein with schist hanging and serpentine footwall, capped by an iron-stained schistose gossan. **Development:** by 375' tunnel on the vein, with a back of about 170', showing chalcopryrite, with some gold, in a gangue of quartzite and iron oxide. The ore averages 1.1% copper, 16 cts. silver and \$4 gold per ton. Company has been doing development work since July, 1915. Property is a prospect.

CALUMET COPPER CREEK MINING CO.**ARIZONA**

Succeeded by Copper State Mining Company, which see.

CALUMET-CORBIN MINES CO.**CANADA**

Main office: 35 Congress St., Boston, Mass. Mine office: Gold Lake, Manitoba, Can. Wm. Bracken, pres.; J. K. Heath, v. p.; Erik Huneker, sec.-treas.; preceding officers are the directors.

Inc. Jan. 11, 1915, in Me., as a reorganization of the Calumet-Corbin Mng. Co. **Cap.**, \$2,500,000; shares \$1 par. Paul Revere Trust Co., Boston, registrar. Shares in the old Calumet-Corbin Co. are exchangeable on certain terms for those of the new company. Listed on Boston curb.

Company has a lease on the Gold Seal and Gold Pan claims, 102 acres in Gold Lake mining district, Manitoba, Can. Free gold occurs in a vein of gray quartz, in porphyry and schist. Samples evidently not representative of the quartz as a whole, are reported to show from \$600 to \$4,880 per ton gold with no silver contents. Property is a prospect on which development work is said to have begun 1916.

It appears that the Gold Lake lease covers a swamp in which quartz is found. Such quartz exposures are known at a great many places in Western Canada, but so far as known none of them are now commercially worked.

The New Era mine near Idaho Springs, Colo., taken under lease for \$150,000, was lost through default of semi-annual payments of \$7,500 in 1914, with local debts of \$10,000. The Montana holdings were previously abandoned.

It appears that the company has no real property and its stock represents nothing but paper whose only value is that it is saleable at about 5c per share (May, 1916). The sponsors for the stock are apparently interested in stock dealing, not mining, and Caveat emptor applies to all stock buyers.

CALUMET-CORBIN MINING CO.**MONTANA**

Succeeded by Calumet-Corbin Mines Co., which see.

CALUMET AND HECLA MINING CO.**MICHIGAN**

Address: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Mich. **Officers:** Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; Francis L. Higginson, Robt. F. Herrick and W. Hunnewell, directors. John F. Perkins, sec.-treas.; Chas. A. Hall, asst. treas.; A. J. Garceau, asst. sec.; W. A. Childs, supt.; W. M. Gibson, asst. supt.; E. S. Grierson, chief engr.; E. D. Leavitt, cons. mech. engr.; John Knox, chief mg. capt.; Ocha Potter, chief efficiency engr.; Fred S. Eaton, chief clerk; E. D. Johnson, purch. agt. Mill office: Hubbell, Mich., Henry Fisher, supt.; C. H. Benedict, mill metallurgist. Smelter offices: Hubbell, Mich.; H. D. Conant, supt.

Inc. 1871, in Michigan. Cap., \$2,500,000; shares \$25 par; paid in, \$12. Charter renewed, 1900, for 30 years, and amended, 1905, under the new laws of Michigan, making the corporation a securities-holding company, as well as a mining and smelting company. Was organized as a consolidation of the Hecla, Calumet, Portland and Scott mining companies. Stock is listed on the Boston Stock Exchange, and traded in on the unlisted department of the New York Stock Exchange. Annual meeting, second Thursday in June. Old Colony Trust Co., Boston, transfer office; American Trust Co., registrar of stock.

Balance sheet, of Dec. 31, 1915, gave cash and quick assets of \$9,543,283, with liabilities of \$1,286,837, leaving a balance of quick assets of \$8,256,446, not including notes outstanding at this date, which were \$4,134,000 at 4%, due Feb. 18, 1919. By July 10, 1916, there had been purchased by the company and placed in its sinking fund all but \$1,764,000 of these notes.

Dividends: \$5,000,000 in 1905; \$7,000,000 in 1906; \$6,500,000 in 1907; \$2,000,000 in 1908; \$2,700,000 in 1909; \$2,900,000 in 1910; \$2,400,000 in 1911; \$4,200,000 in 1912; \$3,200,000 in 1913; \$1,000,000 in 1914; \$5,000,000 in 1915; \$3,000,000 1st half of 1916. Total to July 1, 1916, \$132,250,000, or \$1,322.50 per share, being the largest dividends ever paid by any incorporated mining company, and, in addition, the Hecla Mining Co. and Calumet Mining Co. before their amalgamation under the present title, paid dividends aggregating \$950,000. Dividends received from other mining companies amounted to \$3,929,194 in 1915.

Since the change in charter, 1905, permitting the acquisition of stock in other corporations, the Calumet & Hecla has secured control of various other mines and mineral tracts, by organizing subsidiary corporations, and also by acquiring stock in companies previously organized. In 1905 the company bought the following stocks, at a cost of \$8,592,129.99 in cash and notes; 9,600 shares of Osceola; 19,400 shares of Tamarack; 24,796 shares of Ahmeek; 27,507 shares of Isle Royale; 10,316 shares of Seneca; 25,000 shares of Laurium. The attempt to secure physical control of the Osceola Consolidated Mining Co., at the annual meeting March, 1907, was met by determined opposition, which took the fight into the Michigan legislature and the federal courts. After nearly 2 years of strenuous litigation, the Calumet & Hecla secured control of the Osceola and other Lake Superior mining companies formerly under the management of A. S. Bigelow, through a bargain with Mr. Bigelow, by which his entire stock interests were sold to the Calumet & Hecla.

In 1916 Calumet & Hecla offered to purchase the remaining shares of Tamarack Mining Co., but to date the sale has not been accomplished. See Tamarack Mining Co.

The share holdings of the Calumet & Hecla in subsidiary companies were as follows on Dec. 31, 1915: 41,000 shares of Allouez Mining Co.; 41,500 shares of Centennial Copper Mining Co.; 19,400 shares of Cliff Mining Co.; 50,100 shares of Gratiot Mining Co.; 152,977 shares of La Salle Copper Co.; 32,750 shares of Osceola Consolidated Mining Co.; 50,100 shares of Superior Copper Co.; 37,823 shares of Laurium Mining Co.; 11,207 shares of Seneca Mining Co.; 32,910 shares of Isle Royale Copper Co.; 98,048 shares of Ahmeek Mining Co.; 19,400 shares of Tamarack Mining Co.; 34,259 preferred shares and 42,602 common shares of White Pine Copper Co.; 3,000 shares Calumet Transportation Co. The Frontenac, Manitou, Dana and St. Louis companies have been completely absorbed.

Property: the landed holdings of the Calumet & Hecla, including property owned outright, property controlled through subsidiary corporations, mining lands under option, and timber and miscellaneous lands, in Hough-

ton, Keweenaw and Ontonagon counties, Michigan, amounts to approximately 209,051 acres, of which 102,804 acres are in Keweenaw county. The company, with its subsidiaries, has a water front of more than 34 miles, on the shores of Lake Superior, Lac La Belle and Torch Lake, and approximately 60,000 people are supported by the operations of the company and its allied interests.

The Calumet & Hecla mine proper, about 2,750 acres, lies in a compact tract in Secs. 11, 13, 14, 15, 22, 23 and 24, T. 56 N., R. 33 W., in addition to which the company owns considerable tracts, west of the Tamarack mine, carrying the underlay of the Calumet conglomerate at such stupendous depth that opening would require a 2-mile vertical shaft, and it is very doubtful whether these lands ever will become available for mining on the Calumet conglomerate. The lands west of the Tamarack were explored, 1904, by diamond drill, in search of a supposed cupriferous conglomerate, but nothing of promise was found.

The original Calumet & Hecla mine is opened on the Calumet conglomerate bed, and a parallel mine has been developed on the Osceola amygdaloid, while a third parallel mine has been partly developed on the Kearsarge amygdaloidal bed.

The Calumet conglomerate has proven unprofitable both to the north and south of the Calumet & Hecla, though workable at the Tamarack mine, which has developed the underlay by vertical shafts. The conglomerate has an average strike of N. 33° 30' E., with average dip of 37° 30' with the horizon. The bed is of 5' to 26' maximum width, with an average of 13', giving about 2,400 fathoms of stoping ground, or about 43,200 tons of stamp rock, per acre. As a rule, the richer portions of the conglomerate are in the central part of the Calumet & Hecla tract. The walls of the conglomerate carry considerable copper, especially the amygdaloidal footwall, and much of the adhering trap rock formerly rejected is now milled. Pillars of 75' and even up to 150' width, left on either side of every conglomerate shaft, contain stamp rock equivalent to about 18% of the stoping ground available before the robbing of the pillars. The conglomerate mine is opened 6 to 8 years in advance of immediate requirements, and has upwards of 200 miles of shafts, drifts, crosscuts and winzes.

About 18,000,000' of timber, board measure, is used in the mine annually, and to the end of 1914, fully 900,000,000' of timber had gone underground. Iron pillars are used as supports, in crosscuts connecting the Red Jacket shaft with drifts on the bed, and in various incline shafts to support the hanging wall. Iron, mainly scrap material, such as worn out skip rails, cut to 10' lengths and placed above I-beams, is used for lagging, to some extent. The conglomerate bed in the lower workings is not up to its average value above, being wide, but low in copper contents, and it is evident, from the results secured by the deep shafts in the district, that while the cupriferous stratified beds of Lake Superior may descend to tremendous depth, copper values decrease below 4,000'.

The conglomerate mine, which, until a few years ago, was the entire Calumet & Hecla, has a life, at the present rate of production, of between 8 and 12 years, followed by 5 to 10 years of scrambling, with greatly decreased output. The conglomerate is deteriorating rapidly in average copper contents with depth. The mine works normally 175 power drills on the conglomerate, and 125 drills on the amygdaloid.

The Calumet & Hecla has suffered severely from underground fires. The rock carrying native metal cannot burn, like sulphide ore, but the old timbering eventually becomes nearly as inflammable as tinder. The really

serious mine fires, 5 in number, occurred in 1884, July and Nov., 1887, Nov. 30, 1888, and May 27, 1900. All possible precautions are taken against mine fires, these including the partial fire-proofing of all mine timber with zinc chloride solution, regular sprinkling of all shafts, the maintenance of water pipes and hydrants, fire hose, chemical engines, an electric alarm system and 18 telephones at various pump stations, from the 8th to the 51st levels, inclusive, in 5 different shafts, so distributed as to be most readily accessible from all part of the mines. From the first 4 fires the Calumet & Hecla suffered aggregate losses of several millions of dollars, while a number of lives were lost, and 3 valuable shafts were drawn so badly that they were abandoned. The fifth and last fire, in May, 1900, severely tested the mine's fire system, the fire breaking out on Sunday evening, when the mine was deserted by all but a few employees, and gaining great headway before it was discovered. The burning portion of the mine was shut off by closing the fire doors, and the mine was sealed at surface, by covering the mouths of the shafts with heavy timbers, with dirt tamped tightly into the crevices between. Wherever gas escaped through holes in the earth, dirt was tamped in and luted with water. The fire was extinguished in 3 weeks, and the South Hecla portion of the mine continued working without interruption. All fires have been of mysterious origin, and there seem reasons for suspecting incendiarism. Great precautions are taken to prevent unauthorized persons entering the mine, and permission to go underground is given only by the president, in writing, each pass being for a single trip.

Equipment: the conglomerate property of the Calumet & Hecla is worked as 2 separate mines, known as the Hecla and Calumet branches, the South Hecla being a southerly continuation of the Hecla branch, and the Red Jacket vertical shaft a part of the Calumet mine. The Calumet to the north, the Hecla in the center, and the South Hecla at the south, form one continuous mine, developing the Calumet conglomerate by incline shafts, the Red Jacket shaft opening the same bed vertically. The conglomerate, opened for 2 miles along the outcrop, has 11 shafts, 8 being known as single compartments, which means a single hoisting compartment, with 2 shafts having 2 hoisting compartments and 1 vertical shaft having 6 compartments. The blind shaft has an electric hoist and the mine has electric station pumps for forcing water to surface with steam pumps actuated by compressed air for short lifts, but it is planned replacing these latter by electric pumps also.

The conglomerate shafts on the outcrop are as follows, from north to south: Nos. 6 and 5, Calumet, latter a 2-compartment shaft, bottomed at the 57th level, 5,855' from surface. There is a considerable stretch of lean ground from No. 6 shaft to the Centennial boundary.

No. 4 Calumet, with 1 hoisting compartment, has a vertical depth of 4,748' and an actual depth of 7,995' on the incline of 37° 30', with a 200' winze from the bottom, giving a total depth of 8,290' from the collar of the shaft to the bottom of the winze. No. 3 Calumet shaft has been abandoned.

No. 2 Calumet shaft, with 1 compartment, is 6,186' deep, practically at the boundary, and the shaft pillars and arches were removed above the 55th level.

No. 2 Hecla shaft, 4,400' deep, and No. 3 Hecla shaft, 4,000' deep, are bottomed at the Tamarack boundary. Stopes are exhausted and the mine has been robbed by removal of shaft-pillars.

No. 4 Hecla shaft has been abandoned for some years. No. 6 Hecla shaft, with 1 compartment, is 7,875' deep, in good ground, and can be sunk to 8,500' depth. Nos. 7 Hecla and 8 South Hecla shafts of 1 compartment each, are 7,978' and 6,102' deep, respectively. Sinking was permanently dis-

continued at the 630' level in South Hecla No. 8, and in 1915 the shaft was abandoned after removal of shaft pillars and arches.

Nos. 9 and 10 South Hecla, a double shaft with 2 compartments, is 8,132' deep and can be sunk to 8,500' depth. Openings south below the 72nd level have shown a marked improvement.

No. 11 Hecla, 2,400' deep, showed very poor ground at the bottom, and has been robbed by the removal of all pillars from the bottom up.

No. 12 Hecla shaft, at the company's southern line, is 6,700' deep, bottomed in poor ground, disclosing a formation nearly barren of copper at depth. This shaft is practically abandoned.

The Red Jacket vertical shaft, of 1,800 tons daily capacity, permanently bottomed at 4,900' depth, cuts the bed at 3,287'. Rock temperature was 87° F., reduced to about 70° by connection with No. 4 Calumet shaft, exhausted air from the power drills aiding in cooling the mine. The Red Jacket shaft is 14' 6" x 24' 6" within timbers, and is built of brick and cement from collar to the solid rock, and timbered below with Georgia pine. There are 6 compartments, 2 used for hoisting, 2 for water, and 2 for men and supplies. The 2 hoisting compartments, at the eastern end, have cages with 9-ton Kimberly self-dumping skips swung under. The 2 western compartments have double-deck cages for men and material, and the 2 middle compartments have large cylindrical steel bailers, for raising water. Timber for the Red Jacket shaft is lowered through No. 4 Calumet, with which the Red Jacket is connected by a crosscut. The Red Jacket shaft hoists rock from all of the northern shafts below the 56th level, at which point the conglomerate is intersected. There are 9-ton steel storage bins at the various productive levels, which aid in maintaining the uninterrupted hoisting service that is absolutely essential in a shaft of a mile depth. The shaft rock house of the Red Jacket is 100x100' on the ground, and 110' high with 4 crushers, 1 for poor rock.

The "Five Forties" is a tract of 200 acres, a quarter-mile wide and 1¼ miles long, lying between the Tamarack and Tamarack Junior mines, carrying the underlay of the conglomerate at great depth, and, to obviate sinking a deep and costly vertical shaft, this tract is opened by a blind shaft 1,588' deep, starting from the 57th level, 2,750' N. E. of the Red Jacket vertical shaft. The blind shaft is sunk 40' under the footwall, at the same angle as the dip of the conglomerate, thus assuring solidity of walls while saving long and expensive crosscuts to the bed on each level. A footwall lateral on the 57th level parallels the regular drift, at a distance of 40' in the footwall, between the Red Jacket vertical shaft and the blind shaft, offering an avenue for operation that obviates the confusion certain to result were the regular mine drifts given double duty. The blind shaft starts in the footwall drift, under and parallel with the 57th level, and eventually will be about 1 mile in depth, opening 4 of the five 40-acre tracts, leaving the 5th and last to be opened by a sub-shaft from the blind shaft, which doubtless will be sunk on the same system. The necessity for this peculiar method of development arose from the fact that the boundary lines of the property run north and south, while the strike of the bed is N. 33°-30' E., giving a plane of dip of N. 56°-30' W. Owing to the incline shafts being sunk on the dip of the bed, while the blind shaft must follow the section lines, the latter descends diagonally on the dip of the bed, giving the blind shaft an average dip of about 22° only, although the bed dips at 37°-30'. This unusually flat incline permits the hoisting of rock in tram cars, by an electric hoist on the 57th level, cars being hauled through the blind drift and dumped into the steel bins of the Red Jacket shaft for hoisting, thus saving a transfer at the mouth of the blind shaft. The workings of the

"Five Forties" show the conglomerate bed to average about 14', with about 10' carrying stamp rock, the bed as a whole being very lean at this great depth. The abandoned workings of the Tamarack Junior mine of the Osceola Consolidated, which adjoins the "Five Forties," are drained by holes bored by diamond drill from the boundary stopes.

A drainage drift is driven, at depth of about 5,000', measured on the incline. 250' from the conglomerate, with a length of 5,100', extending from No. 10 South Hecla shaft to No. 7 Hecla and from the Tamarack boundary to Nos. 5 and 6 Calumet. This drift will drain water to shafts Nos. 7, 5 and 6, from which it will be lifted to surface by centrifugal electric pumps.

The Amygdaloid mine of the Calumet & Hecla is opened on the Osceola amygdaloidal bed, which outcrops 730' east of the Calumet conglomerate, with parallel strike and average dip of about 38°, underlying the entire main tract of the Calumet & Hecla mine. There are 6 shafts in the Amygdaloid mine, Nos. 13 to 18 inclusive, numbered from south to north. Shafts are duplicate in size, each having 3 compartments, of which 2 are used for hoisting and 1 for pipes and ladderways. The Amygdaloid mine has nearly 35 miles of workings and has frequent connections with the conglomerate by crosscuts. The Amygdaloid mine was closed 1901, and reopened 1904. In this mine the Osceola bed runs about 35' in width, with principal values along the foot and hanging, the middle third being lean, as a rule. Laterals in the Osceola workings are carried as drift stopes of 12' height along the hanging wall. The Calumet & Hecla owns, on its main tract, about 11,000' of the strike of the Osceola bed. Developed ore reserves of the Amygdaloid mine were estimated Jan., 1916, at 6,000,000 tons, and the Osceola bed has been found to carry fair copper values, at a vertical depth of nearly 1 mile, in the Tamarack property.

Depths of Shafts Jan. 1, 1916	Distance Between Shafts
No. 13..... 3,232'	13 to 14..... 2,780'
No. 14..... 2,958'	14 to 15..... 2,400'
No. 15..... 3,002'	15 to 16..... 2,100'
No. 16..... 3,274'	16 to 17..... 1,800'
No. 17..... 1,799'	17 to 18..... 1,600'
No. 18..... 1,460'	

The Kearsarge amygdaloid bed outcrops about 2,200' east of the Osceola amygdaloid and 2,900' east of the Calumet conglomerate, with parallel strike and dip of about 38°, underlying the entire main tract. Work of development was begun Aug., 1903, and there are 3 shafts, numbered from north to south, each having 3 compartments and being practically duplicates of those on the Osceola amygdaloid. The shafts above the ledge are "timbered" with steel, brick and concrete, the hanging wall being lined with 3 arches of brick, laid in 3 to 5 courses, thickness being increased with depth, supported by 2 rows of I-beams, which serve also as dividers for the shaft. The Kearsarge bed, as opened by these shafts, is erratic, though showing stretches of ground that probably will yield 18 to 22 lbs. fine copper per ton, with reasonable selection. No work has been done on this lode since the beginning of the strike, July 23, 1913.

No. 19 shaft, about 1,000' south of the Centennial boundary line, is 1,350' deep, and was closed down Oct., 1907. No. 20 shaft, next south of No. 19, is about 1,350' in depth, and idle also.

No. 21, the southernmost shaft on the Kearsarge bed, is 8,000' south of No. 20, and, at shallow depth, showed well in copper, but deeper workings were not so promising, the rock yielding only about 12 lbs. of copper per ton of rock mined. The shaft is 2,291' deep; not working since July, 1913.

The Calumet amygdaloid, lying between the conglomerate and the

Oscola amygdaloid, has been little opened, but might prove payable, as it shows some good ground in a crosscut on the 900' level.

The shaft rock houses at the conglomerate incline shafts, of uniform pattern, accommodate 40-ton railroad cars. Rock is hoisted to the top of each shaft rock house, passing thence over grizzlies that allow the finer rock to fall through, the larger masses being reduced in 24x36" crushers. Crushed rock falls by gravity into storage bins, whence it is dumped into cars that take it to the mills, railroad tracks running underneath each rock house. The standard equipment includes a 50-h. p. induction motor at each shaft, for driving crushers.

Equipment: on surface at the Calumet & Hecla is probably the most complete installation to be found in the world. With few exceptions everything is duplicated, to prevent possible delay or suspension, by reason of fire or accident.

The power plants at the main mine, on the Calumet conglomerate, include 4 large boiler plants and 6 hoisting plants. The hoists of the conglomerate mine are very powerful, ranging in capacity from 1,000 to 5,600-h. p. each. Miners are carried to and from work, in the incline shafts, by man cars, these being long trucks having tiers of circus seats, replacing skips when needed, being shifted quickly on or off the skip tracks by large cranes. This method has proven the safest, quickest and cheapest for moving men in and out of deep incline shafts.

At No. 4 Calumet shaft there is a group of the most powerful mining machinery in existence. Engine house contains the 2,500-h. p. Corliss engine "Superior," with 40" cylinders and 72" stroke; the auxiliary engines "Baraga" and "Rockland," of 1,000-h. p. and 600-h. p. respectively; 2 Rand air compressors, of 25 and 40-drill capacity, and the engine "Mackinac," a 4,000-h. p. quadruple-cylinder triple-expansion steel giant, operating 4 Nordberg air compressors with a combined capacity of 500 drills. There also are four 35-drill auxiliary compressors. In the old Leavitt compressor, water was injected into the compression cylinders, while the Nordberg machines deliver the compressed and greatly heated air to a cylindrical steel cooler, 12' in diameter and 30' high, into which water is sprayed from above and drawn off at the bottom, this cooling the air to 80° F. Power is supplied by batteries of boilers in 2 boiler houses adjoining. Locomotives haul the coal into the boiler houses, where it is fed to the grates by stokers.

The Hecla engine house, flanked by a large boiler house, contains the 1,200-h. p. compound hoisting engine "Frontenac" and 2 auxiliary engines, of 600 h. p. each, also a 30-drill Rand air compressor and a pair of water-plunger air compressors, with combined capacity of 144 drills, being the largest machines of this type ever constructed.

South of the Hecla plant is the "G. H. & S." engine house, having the "Houghton" and "Seneca" engines, of 1,300-h. p. each. The Hecla boiler house has 5 large boilers and a 200' smokestack, of 9' 6" internal diameter.

The engine house operating Hecla shafts Nos. 7 and 9 contains the engines "Hancock" and "Pewabic," each of 140-h. p., which operate 25' drums by spur gearing, and two 600-h. p. vertical compound engines for man cars. Boiler house has 5 boilers and a 250' smokestack of 12' 6" internal diameter.

The South Hecla engine house at shaft No. 11 has a 1,000-h. p. Lidgerwood hoist.

The Red Jacket shaft has two 2,850-h. p. triple expansion hoists, and in an adjoining building are five 300-h. p. boilers. In raising 10-ton loads perpendicularly from a depth of 1 mile, the weight of the cage and steel cable nearly equals that of the cargo of rock, but with the aid of counter-

balance the engines can hoist 10-ton loads at a speed of 40 miles per hour, the regular hoisting time being about 90 seconds for the vertical distance of nearly a mile, including time taken for starting and stopping, an achievement no locomotive could duplicate on a horizontal plane. The engine operates on a system devised by S. B. Whiting, formerly manager of the company. To overcome the dangerous strain caused by unequal wearing, Walker differential rings are placed on the sheaves, the cables taking 4 complete turns around the driving sheaves.

Equipment at the Amygdaloid shafts on the Osceola bed is practically the same at shafts 13, 14, 15, 16 and 17, the new shaft, No. 18, having a combined engine and boiler house, with a small Lidgerwood hoist. Shafts 13 to 16, inclusive, have Nordberg first-motion double conical-drum hoists, operating $7\frac{1}{2}$ -ton skips in balance, good for 5,000' depth each. Shafts 17 and 18 are equipped with small Lake Shore and Lidgerwood hoists and single 5 and $2\frac{1}{2}$ -ton skips. All the shafts have permanent shaft rock houses, similar to those of the conglomerate workings. No. 15 engine house has an electric air compressor, used as a "booster," bringing the pressure up to 85 lbs. All engine houses have air connections with the main compressor plants at the old mine.

The machine shop has an equipment excelled by only a few of the largest shops in the country, including a 25-ton electric traveling crane and mammoth planers, with electric power throughout. These shops are capable of handling anything and everything in the line of repair work, and also have complete manufacturing facilities for the making of mining, milling and smelting machinery, and have turned out hundreds of Wilfley tables, and other special machinery, under agreement with the owners of the patents.

The foundry has 2 iron cupolas, and a brass foundry, with a 20-ton electric traveling crane. The pattern shop has 2 departments, one for the shop proper and one for storing patterns.

The carpenter shop is equipped with as complete a line of labor-saving machinery as can be found in any general woodworking establishment.

The blacksmith shops are as large as those of the largest manufacturers of machinery, and are fully equipped. The Calumet shop alone sharpens upwards of 50 tons of steel drills daily. The Hecla shop does blacksmithing and forging for the entire mine. The various shops employ upwards of 150 blacksmiths.

The main electric plant of 12,000-h. p. capacity is at the mills, in Lake Linden, with a substation at the mine.

The office building is a large and handsome stone structure, housing the various executive departments and the engineering force of the mine. The company's private telephone system has an exchange with about 220 instruments, including a number of deep underground stations, with local and long-distance connections.

The Calumet & Hecla public library had 42,120 volumes in 1915; ranks third in point of circulation in the state of Michigan, with an attendance, 1915, of 89,284. In addition to books in English, there are works in German, French, Italian, Swedish, Danish, Bohemian, Finnish and Croatian, with periodicals and newspapers in a score of languages, about 30 different nationalities being represented on the company's payroll. There also is a combination branch library and club house at Lake Linden, for employees of the stamp mill and smelters.

The company maintains a hospital, for employees solely, with complete surgical and laboratory apparatus and a dozen physicians.

The company owns about 1,200 dwellings, furnished to employees at **am**

average rental of 6% on actual cost, plus cost of maintenance, and upwards of 1,200 dwellings are owned by employees on lands leased from the company at low yearly rentals. This low rent is equivalent to an increased wage, compared with Western mines.

There are 15 school houses on the lands of the Calumet & Hecla, most of which were built by the company, including a fine manual training school, and a truly magnificent high school building at Calumet.

On Calumet & Hecla lands there are upwards of 30 churches, of a dozen different denominations. All of these sites were donated by the company, and in most cases substantial aid has been given in their erection and maintenance, entirely regardless of creed.

The company built a \$50,000 bath house containing tubs, showers and a 26'x40' swimming pool. A charge of 2½ cts. per bath is made, except in the women's department, which is free to women and children. The charge covers merely the cost of washing the towels and in no way compensates for the operation of the bath house proper.

In 1904 the Calumet & Hecla Mining Co. started a pension fund. Certain employees who had attained the age of sixty years or more and who had been in the company's employ twenty years or more, were retired on a pension proportionate to their length of service and their wages. These pensions have run from \$9 per month to \$38 per month.

The company maintains 3 distinct systems of waterworks, one at the mines in Calumet, one at the mills in Lake Linden, and one on the shore of Lake Superior, 4 miles N. W. of Calumet. The Lake Superior plant pumps water for domestic uses at Calumet against a head of 733', with an electric centrifugal pump of 3,000,000 gals. daily capacity. This plant also furnishes water to the mill and smelter boilers, on Torch lake. At the Calumet dam and mine there are 7 pumps, having a combined daily capacity of upwards of 45,000,000 gals.

The company maintains a fire department, affording protection to the mine buildings and location, and responding to calls from Red Jacket, Laurium and the other towns that go to make up the mining camp of Calumet, with 40,000 population.

The Hecla & Torch Lake standard gauge railroad, owned by the company, connects the mines, mills, smelter and shops by upwards of 20 miles of main tracks, spurs and sidings. Equipped with 150 forty-ton steel rock cars and several locomotives.

The 2 stamp mills, known as Hecla and Calumet, are at Lake Linden, 4 miles from the mine, on a tract of 998 acres, having several miles of frontage on Torch lake.

The mills have steel frames, with concrete foundations, spaced 20" apart, with 2 and 3 tiers driven to bed-rock, and topped with 6x12" square timber, capped by a 4' 6" bed of concrete. The mills have 27 Leavitt heads and 1 Nordberg steeple-compound head; 20 heads treating conglomerate rock and 6 crushing amygdaloid rock. Stamps are actuated by steam power, except the 6 stamps in the Hecla addition, which have independent 25-h. p. motors each, but the other milling machinery is operated electrically. The Leavitt heads have a daily capacity of about 400 tons of conglomerate, 500 tons of Osceola amygdaloid or 550 tons of Kearsarge amygdaloid.

The mill equipment below the stamps, includes Woodbury-Benedict jigs; ten 4-deck Evans-Rawlings round tables, from which slimes are treated by 96 Wilfley tables; Chilean regrinding mills. The 220 Wilfleys effect a considerable saving of the very fine copper formerly lost, and greatly reduce the water consumption.

As the mills stand on the flat western shore of Torch lake, but little

above water level, tailings speedily filled the shallow lake for some distance off shore, and to waste the sand it became necessary to secure a considerable initial elevation, which is gained by sand wheels. The material entering the mills as conglomerate rock leaves as coarse sand to the extent of fully 8,000 tons daily. The sludge is washed through launders to the sand houses, where it is scooped up by the buckets of the wheels and dumped, high above, into launders running on trestles far out into the lake, these spouting forth miniature brick-red Niagaras. There are two wheel houses, one for each mill. The Calumet wheel house has sand wheels of 50' diameter, and the Hecla 50' and 64' diameter. The sand wheel is to all appearances a gigantic bicycle wheel, fitted with spur gearing where the rubber tire should be. The complete wheel weighs 500 tons, and is mounted upon massive concrete masonry. Four 25-ton iron bed plates support the pillars carrying the 21-ton Krupp forged steel axle, which is 27" long and 32" in diameter with a hollow core of 26" diameter. Radiating from axle to rim are 2" steel spokes 32' long. The completed wheel is 10' wide and 64' in diameter, driven by gear and pinion, power being furnished by a 700-h. p. dynamo, and has a capacity of 55,000 gals. per revolution. Nearly 2 years were required to build and adjust this monstrous wheel.

The No. 1 regrinding plant, built 1908-09, and in full commission Jan., 1910, occupies a 195x340' building. The frame is of structural steel, resting on concrete foundations, the floor being of stamp sand, with a concrete capping, no particle of wood entering into the construction of the building. Power is furnished by eight 250-h. p. induction motors, giving about 100% excess capacity, to provide against delays through overhauling and repairing. The plant has cost about \$400,000. Equipment, built almost exclusively in the shops and foundries of the company, consists of 48 Chilean mills, resting on concrete piers, in 2 parallel rows, each pier being a hollow octagon 6' high and 7' in diameter, with a 10" wall, the hollow being filled to a height of 10' with stamp sand, capped by 4' of concrete. All piers are joined by concrete ribs, in which a heavy steel cable is embedded, passing through each pier connection. The Chilean mills are being replaced by Hardinge mills. There are 200 Wilfley tables, each section of the plant having 1 grinder, 18 tables for roughings, 4 tables for middlings, and 12 tables for slimes. Product from each set of 2 grinders goes to a settling tank, from whence the roughings go to the first 3 tables, and the slimes to 2 other tables, the middlings from each 15 tables going to 2 additional tables. The coarse sands from the Calumet mill go to sand wheel No. 2, and waste sands to wheel No. 1, the coarse sand elevated by wheel No. 2 running to the regrinding plant, where the amount going to each mill is regulated by feed gates, an overflow tank at the end of the launder caring for the surplus, in case of stoppage of the mill. A Hardinge conical tube mill, crushing coarse tailings, is 8' in diameter at the larger end, the pulverizing of sands being accomplished by the use of Danish pebbles on a lining of hard brick.

The regrinding mill has traveling cranes, and every piece of machinery is duplicated, so that breakages can be repaired quickly. The mill is fed with tailings from the stamps treating the richer rock in the Calumet mill, sands carrying up to 12 lbs. copper per ton. No slimes go to the regrinding plant, which treats exclusively coarse gravel and sand from the jigs and tables. The product is clean mineral, of good average tenor, which is pumped into bins, and thence loaded into cars for shipment to the smelter. Labor costs are very low, the plant being automatic throughout, and the force is only 12 men and boys per shift.

The management figured on an extraction of about 5 pounds copper per

ton from the tailings reground, at a cost of about 6 cts. per lb., on a basis of about 2,000,000 lbs. yearly production. Production, to end of 1915, from the tailings plant was 12,370,966 lbs. fine copper. Comparative results in No. 1 regrinding plant for several years are as follows:

Year—	Tons Coarse Tailings Crushed	Lbs. Cu. per Ton	Lbs. Cu. Rec.	Lbs. Copper Produced	Cost (a) per Lb.
1911.....	477,794	12.66	4.50	2,152,110	5.01c
1912.....	481,320	12.86	4.48	2,155,292	4.99c
1913.....	388,164	11.92	3.94	1,529,097	5.87c
1914.....	351,929	11.52	3.74"	1,316,704	7.38c
1915.....	337,243	13.14	4.01	1,352,869	6.52c

(a) Exclusive of smelting and refining.

The regrinding plant has proven its ability to treat fresh tailings at a substantial profit. The tailings at the Lake Linden mills are the most extensive in the world, containing about 40,000,000 tons of stamp sand, carrying an average of 8 to 10 lbs. of copper per ton in the newer sands, and 12 to 20 lbs. in the older sands, these tailings carrying about 500,000,000 lbs. of copper—an amount greater than the total production of any but the largest copper mines of the world.

The No. 2 regrinding plant, begun 1912, operations started in 1914, is practically a duplicate of No. 1. The mill is equipped with 64 Hardinge conical mills and will retreat tailings in Torch Lake. These are obtained by means of a specially designed dredge, which will dig to a depth of 100' below the surface of the lake.

Results for 1914 and 1915:

	Tons Coarse Tailings Crushed	Lbs. Cu. per Ton	Lbs. Cu. Rec. per Ton	Lbs. Cu. Produced	Cost (a) per Lb.
1914.....	75,630	11.84	4.59	347,363	5.66c
1915.....	168,461	13.14	4.73	796,858	4.36c

(a) Exclusive of smelting and refining.

A leaching plant will be completed in summer of 1916. It will retreat tailings from the regrinding plants by leaching with an ammoniacal solution, the ammonia being reclaimed, and is expected to take another 4 lbs. of copper from the tailings.

Water for the mills is supplied by 4 pumps, of which the "Michigan" is the most powerful in the world, having a daily capacity of 60,000,000 gals. Auxiliary pumps are the "Huron" and "Ontario," of 20,000,000 gals. capacity each, the "Erie" of 10,000,000 gals., and an I. P. Morris pump of 22,000,000 gals. daily capacity.

The electrification of the Calumet & Hecla was begun in 1904, and eventually will be completed, at mines, mills and smelters, except for some of the big compounded hoists and air compressors at the mine, where a change from steam to electricity would be doubtful economy, as well as necessitating enormous initial outlays.

Machinery at the power plant includes the old engines "Saginaw" and "Gratiot," the former an Allis-Chalmers twin vertical tandem compound-expansion engine having 17x40x48" cylinders, each engine being direct connected to a 1,000-k. w. alternating current generator, and the Leavitt engines "Owego" and "Ontonagon," of 3,000-h. p. each, built originally for hoisting purposes, direct-connected to 2,000-k. w. generators. The electric equipment of the mills includes 15 motors, of 20 to 250-h. p. each.

The boiler house has twenty 500-h. p. Babcock-Willcox tubular boilers. There are coal crushers, feeding an endless link-belt system with 308 steel link buckets, of 60 tons hourly capacity, taking coal to overhead bins, whence it is fed to the grates by Roney automatic stokers. Water require-

ments at the boiler plant are about 750,000 gals. daily, obtained from a 750,000-gal. reservoir, fed from Lake Superior via the Calumet pipe line.

The Torch Lake smelter is at Hubbell, about a mile south of the mills, on a 30-acre site having ample frontage on Torch lake, with deep water in front and 3 railways at the rear. The smelter has 4 stone furnace buildings, and a 50x70' furnace building, both blast furnaces and reverberatories having been rebuilt within the past few years. There are 15 reverberatories, which are top-charged, having platforms above on which the mineral is thoroughly dried before charging. The blast furnace is 40x96" at the tuyeres, its comparatively small size being due to the use of reverberatory furnaces for the bulk of the smelting work. A new steel-frame smelter building houses two 150-ton reverberatory furnaces, of the so-called Jumbo pattern, modeled after the furnaces of the Lake Superior Smelting & Refining Co. The practice of the smelting plant is fully abreast of the times, in all essentials.

The electrolytic plant, 155x270', at Hubbell, has superseded the Buffalo reduction plant, which has been abandoned. It is built of steel and brick, contains four 7½-ton traveling cranes and 512 lead-lined wooden tanks, 3'x11'x3' 9" deep, in 4 sets of 128 tanks. Each set is arranged in 4 sections of 32 tanks, and each section in two tiers. The electric current is furnished by four 125-volt direct current generators driven by alternating current motors operating on current transmitted at 13,000 volts from the power plant at Lake Linden, transformed to 2,300 volts. There is a continuous circulation through the deposition tanks of the electrolyte which contain about 3 to 4% copper and 10 to 12% sulphuric acid. The plant has a capacity of 65,000,000 lbs. copper per year. Company markets its own copper.

There is 1 concentrate or mineral house, with a storage capacity of 18,000 tons, at Hubbell. Calumet & Hecla concentrate, locally called mineral, carries less than 60% copper.

The power plant at the smelter has three 125-h. p. boilers, and each of the two large reverberatory furnaces has a 300-h. p. boiler attached through which the waste gases pass:

The smelting works have an assay office and laboratory, office and large warehouse for supplies.

The dock system of the Calumet & Hecla is extensive, including a series of very large coal sheds at Lake Linden and a series of docks at the mills and smelters on Torch lake. The 750' coal wharf has 11 Hunt hoists, and three 52' movable derricks.

The Calumet & Hecla owns and operates the ship canal connecting Torch lake with the government waterways on Portage lake, this canal being 21' deep and accommodating the largest vessels plying the great lakes. Tolls, ranging from 10 cts. on soft coal to 50 cts. per ton on package freight, are charged by the company, on independent cargoes entering Torch lake through this canal.

A saw mill, at the head of Torch lake, receives logs by rafts, and ships sawed lumber and timber by a branch of the Hecla & Torch Lake railway. The company owns extensive tracts of pine, hemlock and hardwood timber along the southern shore of Lake Superior, this land carrying between 400,000,000' and 500,000,000' of standing timber. The company also has a long-term timber contract with the Keweenaw Association, Ltd., and buys extensively of jobbers, the requirements for underground timbering alone being 25,000,000 to 30,000,000' annually, in addition to the many million feet of timber and lumber used on surface at the mines, mills and smelters.

The conglomerate rock from the old Calumet & Hecla workings has

shown a strongly declining tendency in values for many years past, and a rather alarming decline within the past few years. Net returns were almost 5% or 100 lbs. of fine copper per ton in 1873; 4.75%, or 95 lbs. fine copper per ton, in 1880; 3.012%, or 60.24 lbs. per ton, in 1889; 59.93 lbs. in 1900; 52.44 lbs. in 1902; 39.68 lbs. in 1907; 35.96 lbs. in 1908; 33.14 lbs. in 1909; 30.12 lbs. in 1910; 30.38 lbs. in 1911; 29.73 lbs. in 1912; 27.85 lbs. in 1913; 26.38 lbs. in 1914; and 29.74 lbs. in 1915.

Rock from the Osceola amygdaloid returned 18.45 lbs. per ton in 1907; 17.67 lbs. in 1908; 16.40 lbs. in 1909; 15.82 lbs. in 1910; 15.89 lbs. in 1911; 15.08 lbs. in 1912; 14.31 lbs. in 1913; 13.62 lbs. in 1914; and 13.32 lbs. in 1915.

Average for all rock milled, during the calendar year 1912, was 24.18 lbs. fine copper per ton; 22.11 lbs. in 1913; 20.70 lbs. in 1914; and 22.38 lbs. in 1915.

Detailed figures, by years, of both production and dividends, from the organization of the company, in 1871, may be found in the statistical chapter.

Production has shown a steady decline since 1906, in which year the high mark of 100,023,420 lbs. fine copper was reached, and in 1913 was only 45,016,890 lbs. copper, climbing to 53,691,562 lbs. in 1914 and 71,030,518 lbs. in 1915. Production in 1913 and 1914 was seriously affected by the labor strike, called by the Western Federation of Miners on July 23, 1913, and declared off on April 12, 1914, and by the extraordinary conditions prevailing in the copper market in 1914, due to the European war. The mine was operated on a ¼-time basis from Sept. 1, 1914, until Feb. 1, 1915, when work was resumed on full time.

Production and costs since 1910:

	Tons R'k Treated	Lbs. Cu. per Ton R'k	Mine Cost per Ton Exc. Cons.	Copper Produced Lbs.	Cost per Lb. for Cons.	Net Cost per Lb.	Rec'd Per Lb.
1915...	3,188,583	22.28	\$1.71	71,030,518	0.47c	9.33c	18.11c
1914...	2,592,462	20.70	1.85	53,691,562	1.00c	11.35c	14.01c
1913...	2,035,625	22.11	2.38	45,016,890	1.54c	14.25c	15.77c
1912...	2,806,610	24.18	1.91	67,856,429	0.80c	9.86c	16.65c
1911...	2,909,972	25.47	1.84	74,130,977	0.27c	8.52c	12.82c

Note: Production for first 6 months, 1916, 38,157,582 lbs.

Conglomerate Lode—

1915...	1,739,984	29.74	2.13	51,738,588	....	8.69c	....
1914...	1,439,986	26.38	2.37	37,996,045	....	10.42c	....
1913...	1,175,259	27.85	2.99	32,731,768	....	12.67c	....
1912...	1,746,960	29.73	2.23	51,935,245	....	8.87c	....
1911...	1,924,480	30.38	2.07	58,469,399	....	8.25c	....

Osceola Lode, Amygdaloid—

1915...	1,448,599	13.32	1.07	19,291,930	....	9.71c	....
1914...	1,152,476	13.62	1.19	15,695,517	....	10.20c	....
1913...	842,162	14.31	1.53	12,051,238	....	12.62c	....
1912...	1,040,600	15.08	1.36	15,692,199	....	10.36c	....
1911...	985,492	15.89	1.34	15,661,578	....	9.95c	....

Kearsarge Lode, Amygdaloid—

1913...	18,203	....	....	233,915	....	....	....
1912...	19,050	....	....	228,985	....	....	....

Reviewing the 50 years' career of this company, several features deserve attention. To the investor, the total dividends, \$132,250,000 paid on an investment of \$1,200,000 is not only remarkable for its amount but because dividends have been continuous.

To the technical man this record is particularly noteworthy, when the

mining record is considered. Beginning in 1866, with a small production from the rich native copper ore of the Calumet conglomerate, the company's present daily production of 10,000 tons now comes from 3 separate lodes, mined by 17 shafts, several of them a mile deep. The yearly production of copper is from 65 to 75 million pounds, with a record amount, 100 million, in 1906.

This production comes from very low-grade ore—lower, in fact, than that of the Utah Copper or other great porphyry deposits. The ore originally mined, carried nearly 5% or 100 lbs. of copper per ton, but the grade of ore decreased from year to year as depth was gained until it is now only 1½% or 30 lbs. copper per ton of ore. The maintenance of dividends despite this decrease in value is due to the ability of the management to steadily reduce costs from \$10 per ton to the present cost of \$3 per ton, so that a pound of copper is now produced as cheaply from the lean ore as it was from the richest ore. The company is also producing 5,000,000 lbs. of copper annually by retreating the old waste or tailings made many years ago at its mills and dumped into the lake, and has installed a leaching plant which promises to give a new youth to the entire district, by its treatment of ore carrying flake copper.

In 1906 the company, realizing that the Calumet conglomerate lode, on which the company was started, would eventually be exhausted, began the purchase of other properties and of shares in other Lake Superior companies. Controlling interest in six companies, bought for \$8,592,000 by issue of company notes (since reduced to \$1,764,000), has proven very profitable, these stocks returning \$3,300,000 in dividends, and meanwhile increasing over 25% in market value.

With its White Pine property and its new leaching plant, it looks as if a new era of prosperity was just beginning.

CALUMET & JEROME COPPER CO.

ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. **Officers:** G. W. Avery, pres. and gen. mgr.; Jos. Larson, v. p.; Geo. H. Avery, sec.-treas.; preceding, with J. W. Avery and Chas. F. Avery, directors. **Inc. May, 1907, in Arizona. Cap., \$1,500,000; shares \$1 par; issued 600,000.**

Property: 7 claims, 3 patented, 100 acres, one-half mile south of the United Verde mine, and adjoining the Cleopatra. Lands are traversed by an immense dike, of 600' estimated width. Ore occurs as lenticular deposits in sericitic schist in quartz porphyry, showing iron pyrite and copper glance. Mine has not yet reached the producing stage.

Development: several tunnels, one 115', a new main tunnel now 1,100' long and a shaft 100' deep, planned to connect with main tunnel at depth of about 500'. **Equipment:** 4-h. p. engine and blower. Company a local organization, working but few men. Management plans continuing main tunnel and drifting in 1916.

CALUMET & MONTANA CONSOLIDATED MINING CO. ONTARIO

Office: Cobalt, Ont. **Officers:** H. A. Oswald, Minneapolis, pres.; Jas. A. Patterson, v. p.; John Boyle, sec.-treas.; above, with W. W. Sloan, C. H. Collins, Wm. Weichel, directors. Geo. G. Thomas, gen. mgr.; W. W. Mulholland, supt. **Inc. 1912 in South Dakota. Cap., \$5,000,000; shares \$10 par; outstanding 200,000 shares. Annual meeting second Tuesday in October.**

Company is a reorganization of the Calumet & Montana Mining Co., which see. At last accounts the company had one claim of 51 acres in Coleman Township, Cobalt, Ont., said to show fissure veins in diabase carrying silver ore. Developed by 225' vertical shaft with 500' of underground workings. In June, 1916, operations were reported to be in full swing and ore hoisting to have begun.

CALUMET & MONTANA MINING CO.**MONTANA**

Company went into bankruptcy and affairs in Montana wound up in 1915. See Vol. XI, Copper Handbook. Company reorganized as Calumet & Montana Consolidated Mining Co., which see.

CALUMET-NEW MEXICO MINING CO.**NEW MEXICO**

Office: 154 W. Randolph St., Chicago, Ill. **Mine office:** Magdalena, Socorro Co., N. Mex. **Officers:** Alex. McCallum, pres.; Alpheus McCallum, v. p.-treas.; J. A. Pement, sec.; preceding, with Jacob Ehrenberg, directors. J. A. McCallum, supt. Inc. in New Mexico. **Cap.**, \$1,000,000; shares \$1 par; outstanding 908,609 shares.

Property: 12 claims, 10 patented, 240 acres, in Magdalena mining district, 2 miles from a railroad, and 5 miles from Magdalena, shows ore assaying up to 21.2% copper, 20 oz. silver and \$19.84 gold per ton, with occasional lead and zinc. **Development:** by tunnels with about 3,000' of openings. Company also controls 3 claims in the Pinos Altos mining district, N. M., developed by 570' of shafts and drifts on a fissure vein of ore said to assay 36% zinc, 9% lead, 9 oz. silver and .4 oz. gold. Company is putting in power plant with intention of shipping ore in 1916.

CALUMET-SONORA MINING & MILLING CO.**MEXICO**

Bonds foreclosed, Feb. 13, 1915, and property sold to R. P. Burgan for \$82,000. New company organized as Carnegie Lead & Zinc Co., which see.

CAMAS COPPER MINING & MILLING CO.**MONTANA**

Idle. Property near Camas, Sanders Co., Mont. Fully described Vol X.

CAMBRIA COPPER CO.**NEVADA**

Property near Aurum, White Pine Co., Nev., assessed at \$6,600, was advertised delinquent for taxes, July, 1913. See Vol. XI, Copper Handbook.

CAMERON-JOHNSON GOLD MINING CO.**ALASKA**

Recently reorganized as Valdez Gold Co., J. D. McDougall, supt.

Valdez, Alaska. Owns a group of claims on the right side of Shoup Glacier, N. W. of Valdez, which show fissure veins in graywacke and argillite. **Ore:** free milling gold quartz. About 3% of the ore is said to be sulphides of iron, lead and zinc.

Development: several hundred feet of tunnels. The upper workings are mainly on the Treasury Note vein, said to show from 3" to 36" ore. Lower workings are chiefly on the Mazuma claim, said to have the largest vein, as well as lowest grade on the property. In 1914 over 700' of work was done.

Equipment: includes a 3,850' aerial tram, 5-stamp mill, a 7' Lane mill, concentrator and bunkhouse. Power is supplied by a No. 3 Pelton water wheel operating under a 240' head. Thirty men are employed on the property. Report for 1913 shows an expenditure of \$41,267 with a production of 180 oz. bullion in test runs. See U. S. G. S., Bull. 622, p. 172.

CAMP BIRD, LTD.**COLORADO**

Offices: No. 1 London Wall Bldgs., London, E. C., and Telluride, Colo. H. C. Hoover, chairman, F. W. Baker, L. Clerc, F. A. Govett, F. H. Hamilton, G. de Pass and O. De Rivaud, directors. R. J. Frecheville, J. A. Agnew and L. Chevrillon, technical committee. A. A. Kelsey, sec.; Wm. J. Cox, gen. mgr.; J. B. Glasser, asst. mgr.; Jos. H. Scott, mine supt.; Thos. H. Woods, mill supt.

Registered Sept. 8, 1900, in England. **Cap.**, £1,100,000, increased to £1,350,000 in Dec., 1909, and in July, 1911, to £2,100,000, consisting of 750,000 7% cumulative participating preference shares of £1 each, 649,625 issued, and 1,350,000 ordinary shares of £1 each; 1,100,051 issued. Total dividends to end of 1915: \$9,750,836, averaging almost 20% yearly on outstanding stock.

Accounts for fiscal year ending June 30, 1915, showed a profit of £117,899, making with balance forward a sum of £123,291, of which dividends absorbed £100,476. Balance carried forward was £6,589. An income of £50,710 was derived from Santa Gertrudis shares. Balance sheet June 30, 1915, showed assets of £1,853,844.

Company's holdings in Santa Gertrudis, Ltd., Mexico, are 1,126,901 shares, or 75.13% of the issued capital, and in The Messina (Transvaal) Dev. Co., Ltd., 29,944 shares out of a total of 727,154. Of the latter company the Santa Gertrudis Ltd. holds 33,500 shares. Ore reserves of the Messina Dev. Co., at Messina, Zoutpansberg, Transvaal, estimated June 30, 1915, as 131,700 tons, 6.6% copper, of practically proved ore, and 43,700 tons, 3.7% copper, of prospective ore.

The company was formed in 1900 by F. W. Baker and John Hays Hammond to acquire from Thos. F. Walsh the Camp Bird gold mine, near Telluride, Ouray Co., Colo. Purchase price was \$5,000,000. This property returned handsome profits for 10 years, when the lower levels showed signs of impoverishment. Other properties were then sought with the idea of making the company a mines-investment organization. The Santa Gertrudis silver mine was floated in this way and holdings acquired in the Messina.

The Camp Bird mine is located at an altitude of 11,000' and 8 miles from the railroad, which necessitates hauling supplies and concentrates over a mountain road, making operating costs comparatively high. The Camp Bird orebodies occur in a fissure vein in andesite. The ore has for its base hematite and is associated with iron, zinc and lead sulphides; it occurs in streaks, being less persistent and narrower with depth, and less regular in its relation to the walls. Stopping width is 5 to 8'. Ore reserves: after treating 32,313 tons dry ore, from which a profit of £112,548 was obtained (or 6,604 tons, and £49,000 in excess of both the tonnage and profit estimated June 30, 1914), the reserves June 30, 1915, were estimated as 14,800 tons of broken ore and 1,100 tons of unbroken ore that would yield a profit of \$275,000.

Content and value of ore per ton recovered in 1914-1915 is as follows:

Year—	Gold	Silver	Lead	Copper	Value
1914.....	1.13 oz.	4.27 oz.	1.32%	0.26%	\$26.19
1915.....	1.33 oz.	3.78 oz.	1.05%	0.17%	29.47

Development: shafts and tunnels. Work done in year ending June 30, 1915, amounted to 3,031', which included 102' of sinking shaft No. 3. This shaft, the main working shaft, is 1,003' deep and opens up the 9th level at the 1,000' point.

Equipment: includes a 60-stamp mill, of which 25 stamps only are used at present, and a cyanide plant. An aerial tramway connects the mine and mill.

During the year ending June 30, 1915, the mill treated 32,313 tons of ore, compared with 30,595 tons the previous year, and the cyanide plant treated 20,655 tons of tailing.

Of total value extracted there was obtained by amalgamation 58%, by concentration 37%, by cyanidation 5%. Gold recovery was 96%, with a 94% recovery for combined gold and silver. Exclusive of depreciation the cost per ton was \$9.82, with additional \$1.60 per ton spent on development.

Plans systematic exploration in depth by means of a low-level adit. This adit will be 10,700' long and will cut the lode 450' deeper than any existing workings and 800' below the main ore-bearing ground. In this part of Colorado the sedimentary series is overlain by a great thickness—10,000' maximum—of lava flows and breccias.

It has been proven by experience that the richer veins in breccia cov-

ering do not continue into the sedimentaries, but become impoverished before reaching that horizon. As the adit will be from 1,000 to 2,000' above the sedimentaries, it seems as though there is sufficient margin of safety between it and the limit of possible productivity.

It was thought several years ago that the mine was on the verge of paying its last dividend, but each year has seen it well up on the list of dividend payers, and if present plans of the management are productive of the results they deserve the mine will continue to be a profitable producer for a long time to come.

CAMP BIRD MINING, LEASING & POWER CO. COLORADO

Office: Pitkin, Gunnison Co., Colo. **Officers:** T. R. L. Doughtrey, pres.; F. E. Gilbert, v. p.; O. C. Gilbert, sec.; G. R. Calhoun, treas. Inc. in Aug., 1914, to operate the Camp Bird mine, located between Pitkin and Bowerman. The mine is said to have produced high-grade gold ore. Present management at last accounts was sinking a shaft with intention of cross-cutting 80' to the old mine workings at a depth of 230'. Company refuses to furnish information for publication.

CAMPO SECO MINES. CALIFORNIA

Owned by Penn Mining Co., at Campo Seco, Calaveras Co., Cal.

CANADA COPPER CORPORATION, LTD. (N. P. L.).

BRITISH COLUMBIA AND WASHINGTON

Office: 42 Broadway, New York. **Officers:** Newman Erb, chairman; L. W. Mayer, pres. and cons. engr.; Colgate Hoyt, 1st v. p.; A. J. Ronaghan, 2nd v. p.; R. H. Eggleston, sec.-treas.; preceding officers, with exception of R. H. Eggleston, C. H. Burke, August Heckscher, C. A. Starbuck, C. I. Stralem, directors. Equitable Trust Co., New York, transfer agent; Empire Trust Co., registrar.

Inc. March, 1914, in Virginia. Cap., \$5,000,000; shares \$5 par; outstanding Dec., 1915, 600,200 shares. Authorized \$1,000,000 in 10-year 6% convertible debentures. Assets Dec. 31, 1915, include B. C. Copper Co. stock, \$3,000,000; notes receivable, \$460,000; mining property, \$13,554, and cash, \$49,374.

The corporation is a holding company, organized for the purpose of financing and taking over the British Columbia Copper Co., which needed funds for development work and other obligations; 444,952 shares were exchanged for B. C. Copper Co. shares, which were put in the treasury; balance 155,048 shares and \$155,048 par debentures were taken up by the underwriters. The company loaned \$340,000 to the B. C. Copper Co., December 31, 1914, secured by a first mortgage. These funds are for purchase and development of properties optioned.

In January, 1916, the company refinanced its indebtedness, retiring the outstanding \$600,000 debentures by a conversion of the bonds into stock, the holders receiving 2½ shares of stock for each \$5 par of debentures.

Management, practically the same as the B. C. Copper Co., is able and thoroughly experienced, but more money is needed before the new properties can be worked and the ore milled. See British Columbia Copper Co.

CANADIAN COPPER CO. ONTARIO

Subsidiary of International Nickel Co.

General office: 43 Exchange Place, New York. Mines and smelter office: Copper Cliff, Ontario. Mines in the Sudbury district. **Officers:** A. D. Miles, pres.; F. S. Jordan, 1st v. p.; Andrew Squire, 2nd v. p.; J. L. Ashley, sec.-treas.; A. D. Miles, W. A. Bostwick, F. S. Jordan, Andrew Squire, F. S. Whitcomb, directors; G. E. Sylvester, asst. to the pres.; J. L. Agnew, gen. supt.; J. C. Nicholls, mine supt.; Wm. Kent, smelter supt.;

J. W. Rawlins, metallurgist; Frank Ludlam, gen. pur. agt.; E. Horton Jones, chief eng.

Inc. Jan. 6, 1886, in Ohio. Cap., \$2,500,000; shares \$100 par. Licensed in Canada by special act of Parliament. Controlled through entire stock ownership by International Nickel Co. The Canadian Copper Co. is the world's largest producer of copper nickel ores and copper nickel matte. Ore was discovered 1884, mining commenced 1886 and smelters were started in 1888.

Property: about 18,000 acres, mostly on the south range of the Sudbury nickel belt. The ore consists of a mixture of chalcopyrite, pyrrhotite and pentlandite in a norite gangue. The ore may be massive sulphides, as in the Creighton mine, or disseminated sulphides scattered through the gangue, as in "No. 3" mine. For geology see Eng. & Min. Jour., Vol. 101, No. 19.

The Creighton mine is developed by 2 incline shafts of about 47° and 340' apart, the maximum vertical depth of hoisting at present being 760'. Open pit mining was the principal system until 1912, since which time underground stoping has been almost exclusively carried out, the mine being fully developed to the 10th level. Trimming is done by electric locomotives with 3-ton cars on the main levels. Primary crushing of the ore is carried out underground at two main level stations. The crushers are the jaw type, 42"x36", and are set at 6". The shafts are equipped with electrically driven hoists for handling skips in balance, mechanical appliances being in use for quick loading of skips. The handling of men in the mine is provided for by a separate hoist. Secondary rock crushing and sorting is carried out in two rock houses embodied in the head frame at the shafts, picking belts being provided for hand sorting.

The Creighton mine has 4 air compressors, the largest of 5,000 cu. ft. capacity, the whole equipment being sufficient for operating 100 rock drills. Two more 5,000 cu. ft. compressors have been ordered. An extensive construction program is in progress embracing new 5-compartment incline shaft at 55°, complete with rock house and sorting plant of 500 tons per hour capacity. A 4,000-ton surface storage bin is provided with extensive surface tracks and sidings for ore storage. Main electric hoist operated on the Ilgner system is being installed, handling 9-ton skips at a speed of 2,500' per minute. Warehouse, new workshops and subsidiary buildings are approaching completion. Producing 2,500 tons of ore per day and employing 1,000 men in 1916.

Crean Hill mine, about 2 miles east of Victoria mine, is opened by a 4-compartment shaft, 780' deep, the first 300' at an angle of 57° and the remainder at an angle of 71°. Active exploration by diamond drilling and development has recently proven large additions to ore reserves. The daily production is about 600 tons of sorted ore with stoping in progress down to the 9th level.

Surface equipment consists of rock house for crushing and sorting ore, power house containing compressors, suitable for operating 40 drills, workshops, warehouses and necessary housing facilities for employees.

No. 2 mine, situated at Copper Cliff, is developed to the 11th level at a depth of 860', and produces about 200 tons of sorted ore per day. Surface equipment at No. 2 mine is similar to that at Crean Hill.

A quartz quarry about 15 miles south of Copper Cliff produces the necessary quantity of quartz used for fluxing. This quartz quarry is operated during the summer months, when the output is so arranged as to provide the necessary storage of crushed quartz for the winter's requirements.

All the mines are operated by electric power, which is transformed to

2,200 and 550 voltage. A subsidiary corporation of The International Nickel Co., known as the Huronian Co., has a hydro-electric installation at High Falls, on the Spanish River, about 30 miles from Copper Cliff, utilizing an effective head of 85', which yields about 10,000 k. v. a. The current is transmitted at 35,000 volts.

Ore from the various mines is sent in part to the new roast yards, about 10 miles from Copper Cliff, and in part direct to the smelter. The old roast yard at Copper Cliff was abandoned in 1916. The new yard is about 7,500' long and is served by four tracks. It contains space for 116 roast beds. The ore is reloaded from the beds by steam shovel and taken to the smelter in 50-ton drop-bottom steel cars, from which it is dumped into bins 30'x600'x23' deep.

The blast furnace building contains 7 furnaces, 5 of which are 4' 2"x17', one 4' 2"x21' 3", and one 4' 2"x25' 6". Four of the furnaces are now 18' deep, a 3' 6" jacket having been inserted between the upper and lower tiers to lower the settlers sufficiently to receive molten converter slag. The new settlers are oval, 23' 6"x17' 6"x5' 6", lined with chrome brick.

The jackets, except the top row, are of cast iron with a grid of cooling pipes cast in. The lower jackets are 8' 6" in height and carry 2 tuyeres 6" in diam.; there are 8 jackets on each side, thus making 16 tuyeres on each side of a 17' furnace. The center line of tuyeres is 3' 10" above the sole plate. The upper jackets of steel plate are 6' in height. The furnace building is served by two 50-ton and one 25-ton cranes.

The charge is a mixture of raw and roasted ores which, as a rule, is self-fluxing, but which can be adjusted as required, by the admixture of quartz or limestone. About 11% coke is used on the charge. The slag carries about 32% silica and is sent to the dump in standard gauge slag pots of 225 cu. ft. capacity. Matte from the blast furnace is taken to the converter building, which is parallel to the blast furnace building and 60' away. This matte averages 24% CuNi. Fine ore from the mines is in part smelted in the blast furnace department and in part sent to the reverberatory department.

The reverberatory department contains a fine grinding plant, 4 Wedge roasters and 2 reverberatories, one working. This department is served by a high level track 70' above the main yard and has steel storage bins of 126,000 cu. ft. capacity for ore and fuel. The ore is ground in ball mills and roasted in Wedge furnaces. These are 22' 6" diameter, have 7 roaster hearths and 1 dryer hearth, producing calcines containing about 7% sulphur. The reverberatory charge consists of a mixture of calcines, green ore fines and flue dust. Ore is fed along the side and end walls of the reverberatory from a continuous trough shaped bin, served by a charge car, and drops into the furnace through feed pipes in such a manner that the side walls are continually protected by a blanket of fresh charge. The furnace smelts about 500 tons charge in 24 hours. The furnace burns pulverized coal, which is crushed to pass 200 mesh and is blown in by fan blast; about 100 tons a day is consumed, and has proved entirely satisfactory. The slag is skimmed from the front of the furnace into 225 cu. ft. iron pots. Matte is tapped from the front near the slag skimming door. It averages 23% CuNi.

The matte from both departments goes to the converter building, which is served by two 50-ton cranes of 55' 8" span with 20-ton auxiliary hoist. Matte is charged into 5 basic converters of the horizontal type 37'x10' diam., using about 7,000' free air per min. A mixture of quartz and mine rock which carries a little ore is used for flux. The operation is conducted exactly as in the conversion of copper matte, but is stopped as soon as the iron is eliminated. The final product contains about 25% Cu., 54% Ni. and

0.50% Fe. The slag contains about 27% silica and 4% CuNi, most of which is recovered by passage through blast furnace settlers. The matte is cast into iron moulds, broken up and sent to the refinery at Bayonne, N. J.

A separate refinery for the manufacture of nickel in Canada is planned and will be erected shortly.

Output: of the Canadian Copper Company in 1915 was approximately 49,800 tons of finished matte. Company employs directly about 3,100 men.
CANADIAN EXPLORATION CO. ONTARIO

Offices: 28 Victoria Sq., Montreal, and Naughton, Ont. **Officers:** Geo. E. Drummond, managing director; R. W. Brigstocke, supt. **Property:** Long Lake gold mine, near Naughton, Ont. Orebody consists of an elliptical mass of quartzite, carrying considerable mispickel and pyrite with gold values.

Development: 225' shaft with levels at 80 and 180', and development below the 180' by means of a winze. **Equipment:** 20-stamp mill, daily capacity 120 tons, cyanide plant, and compressor and steam-power. Employs about 100 men.

Production: 5,800 oz. gold in 1913; has been operating since, but production figures not available. Present method of treatment said to have increased profits.

CANADIAN MINING CORPORATION, LTD. ONTARIO

Secretary and office: V. Layman, Balfour House, Finsbury Pavement, London, E. C., England. **Directors:** A. C. Fitz-George, chairman; P. N. Furber, vice-chairman; R. F. Eden, T. W. Inwood, T. Plunkett, H. H. van Cutsem, R. E. G. van Cutsem.

Registered March 12, 1914, in England, to consolidate the several mining companies described under Mining Corporation of Canada, Ltd., which is the Canadian and operating company. Consideration was 1,529,118 fully-paid shares. Cap., £1,660,050; shares, £1 par; 1,529,130 shares issued, credited as fully paid.

For period ending, March 31, 1915, dividends received from the Mining Corporation of Canada, Ltd., amounted to £98,154 and net profit, after deducting general expenses and writing off £1,698, $\frac{1}{3}$ of preliminary expenses, was £92,132; dividends absorbed £76,456 and taxes £1,808, leaving £13,867 carried forward; cash £43,984, preliminary expenses £3,396; creditors £9,328; unclaimed dividends £24,271.

Dividends: $2\frac{1}{2}\%$ Nov. 25, 1914; $2\frac{1}{4}\%$ March 31, 1915; $2\frac{1}{2}\%$, interim, Oct. 14, 1915.

CANADIAN MINING & FINANCE CO., LTD. ONTARIO

Officers: L. H. Timmins, pres.; J. McMartin, v. p.; D. A. Dunlap, treas.; J. B. Holden, sec.; P. A. Robbins, gen. mgr. Company is a privately owned corporation, which has title to and operates the Acme Gold Mines, Ltd., and the Millerton property, at Porcupine, Ont., both adjoining the claims of the Hollinger Gold Mines and acts as general manager for the latter company. Also owns Claim 13,147, adjoining Acme on south and Hollinger on east, and the townsite of Timmins, adjoining the Millerton property on the northwest. The above properties were consolidated in May, 1916, under the name of Hollinger Cons. Mining, Ltd., which see. The company is sinking a six-compartment concrete-lined central shaft on the Acme property, close to the Hollinger line. The shaft has stations at 425', 800' and 1,250' and is equipped with electric haulage and a central crushing plant, capacity 5,000 tons daily. It is expected to have this shaft in operation by the middle of 1916.

A central power plant has been built at the edge of Gillies Lake, to furnish power for the 3 companies. It is equipped with an emergency boiler-

plant, consisting of 4 Wick boilers, 350-h. p. each; 3 electrically-driven air compressors with a capacity of 4,500 cu. ft. free air per min. each; pumps for supplying water to the Hollinger mill, and an emergency fire pump. Entire plant, including distributing pipe lines, cost \$244,273. Up to Jan. 1, 1916, the company had invested in plant and equipment, \$483,695.

CANADIAN SMELTING & REFINING CO. ONTARIO

Office: Orilla, Ont. **Officers:** J. B. Tudhope, pres.; Geo. Hayward, treas.; W. L. Vail, sec.; M. B. Scott, metallurgist; C. Doolittle, supt. Inc., Oct., 1914, in Canada, and took over the assets of the Canada Ref. & Sm. Co. Works at Orillia have been partially rebuilt and an additional blast furnace added. Capacity of the cobalt refining department has been increased to 2 tons of oxide per day. Products shipped are refined silver and arsenic, and the oxides of cobalt and nickel. Company employs 75 men.

CANANEA CONSOLIDATED COPPER CO., S. A. MEXICO

Mines and works: Cananea, Sonora, Mexico. Dr. L. D. Ricketts, pres. and gen. mgr.; C. T. Knapp, v. p.; Geo. Young, sec.-treas.; J. W. Allen, asst. treas.; Casey Stites and W. S. Harper, asst. sec'ys; Geo. Kingdom, gen. supt.; T. Evans, traffic mgr. and purch. agt.; G. W. Prince, smelter supt.; F. J. Strachan, mill supt. **Directors:** L. D. Ricketts, C. T. Knapp, Geo. Young, Casey Stites and M. J. Elsing.

Inc. Sept. 30, 1899, in Mexico. **Cap.**, 20,000 pesos, shares \$1 gold par. Entire stock owned by Greene Consolidated Copper Co., the C. C. C. Co. being merely the operating company, holding direct title and right to operate the property, as is necessary under the laws of Mexico. Description of the property owned by this company is given under the title Greene-Cananea Copper Co., which corporation owns over 95% of the stock of the Greene Consolidated Copper Co.

In addition to the properties owned by the Cananea Consolidated Copper Co. previous to the formation of the Greene-Cananea Copper Co., it now owns an undivided three-fifths interest in the properties formerly owned by the Indiana Sonora Mining Co., and it also owns a controlling interest in the Superior Bonanza Mining Co., which company's properties are located near Imuris, in the state of Sonora, Mexico.

No separate financial statement of the Cananea Cons. Copper Co. is issued, but the combined balance sheet of the Greene Cons. Copper Co. and the Cananea Cons. Copper Co., S. A., as of Dec. 31, is as follows:

Assets:	Prop & Equip.		Copper			Total
		Current	On Hand	Supplies		
1914.....	\$10,010,029	\$4,253,403	\$228,123	\$689,767		\$15,181,322
1915.....	10,055,191	5,188,334	105,662	535,219		15,884,405
Liabilities:	Capital		P. & L.			Total
	Stock	Current Reserves	Miscel.	Surplus		
1914.....	\$10,000,000	\$243,358	\$281,006	\$29,585	\$4,628,373	\$15,181,322
1915.....	10,000,000	270,997	102,906	19,523	5,490,979	15,884,405

Total income in 1915 was \$4,030,905; total expenditures were \$2,668,300. In 1915 there was mined 270,310 tons domestic ore at a total cost of \$2.468 per ton. The yield per ton was 2.307% copper, 1,827 oz. silver, 0.011 oz. gold.

CANANEA-EASTERN MINING CO. MEXICO

Has a lease and bond on the Cananea Eastern claims, acquired from the Charlot Mining & Smelting Co., which in turn had a bond from the Fay-Cananea Copper Co. The Charlot bond is for \$300,000 gold. **Property:** 20 miles east of Cananea, Sonora, Mex., is reported to cover 500 hectares,

or 1,235 acres, containing veins showing chalcopyrite ore and lead ore. Operations have been stopped by revolution.

CANYON MINES CORPORATION**CALIFORNIA**

Office: 33 State St., Boston, Mass. Frank B. Keever, pres.-gen. mgr.; Sharon Bldg., San Francisco, Calif.; Geo. H. Morrill, v. p.; H. A. Makay, sec.-treas.; Jas. J. McCarthy, and Frank G. Hobbs, directors. **Inc. in Me. Cap.** 1,000,000 shares, \$1 par. Company owns the shares of an operating company of same name.

Property: 500 acres, 2½ miles from Gorge on the S. P. R. R., 35 miles west of the Nevada-California line, and 172 miles east of San Francisco. Holdings cover a lode with hanging-wall country of gray Calaveras slate and a diorite dike footwall. This lode, said to vary from 5' to 10' in width at north end to 140' across at south end, consists of a stockwork of quartz stringers and seams.

Development: aggregates 6,188', mostly tunnels, the 1,137' uppermost being 400' deep at face, the 1,862' No. 2 tunnel, 110' lower, while No. 3, 186' below No. 2, is 2,349' long, with a 112' winze below its floor; the 840' Mill tunnel is 700' lower. The superintendent figures reserves to average \$4.91 per ton. Mill runs averaged \$5.15 when mine was worked.

CAPE BRETON COPPER CO., LTD.**NOVA SCOTIA**

Mine near Coxheath, Cape Breton Co., N. S. **Cap.**, \$2,000,000. **Property:** the old Coxheath mine and adjoining lands, 10 miles from Sidney, Cape Breton, shows several cupriferous veins, of which the principal, averaging 10' width, traverses felsite and diorite, carrying argentiferous and auriferous chalcopyrite, in a silicious gangue, ore averaging about 4.5% copper. Deepest shaft, 420'. Idle many years.

CAPE D'OR COPPER DEVELOPMENT CO.**NOVA SCOTIA**

At Cape d'Or, Cumberland Co., N. S. Idle many years.

CAPE NOME COPPER MINING CO.**MONTANA**

Office: 1 Dixon Bldg., Missoula, Mont. Mine office: Clinton, Missoula Co., Mont. Edw. Donlan, pres.; F. H. Woody, v. p.; H. T. Wilkinson, sec.-treas. and gen. mgr.; preceding officers and A. L. Coffey, directors. **Inc. Nov.**, 1906, in Montana. **Cap.**, \$1,000,000, shares \$1 par; issued, \$924,400. Annual meeting, first Monday in June.

Lands: 3 claims, patented, 40 acres, adjoining the Aladdin Mining Co., show 4 fissure veins in granite, 1 of 8' average width, traceable 800', being opened by 4 crosscut and 5 drift tunnels, with 3,750' of workings. **Equipment:** includes two 60-h. p. boilers, a 40-h. p. Lidgerwood hoist and a 12-drill Ingersoll air compressor. There are 6 buildings. Property considered promising, but has been idle for several years.

CAPITAL MINING & TUNNEL CO.**COLORADO**

Georgetown, Clear Creek Co., Colo. Edw. C. Bauman, supt. **Property:** the Aetna mine, developed by 5,200' tunnel, is said to show sulphide ores running up to 18 oz. gold, 35 oz. silver, 55% lead and 5% copper. Has electric as well as steam equipment, Leyner compressor, 200-ton concentrator and employs about 50 men. Company and lessees are working the mine.

CARACAHUI MOUNTAIN COPPER CO., LTD.**MEXICO**

Office: 3222 Jefferson St., Kansas City, Mo. Mine near Llano, Magdalena, Sonora, Mex. M. H. Greene, pres. and gen. mgr.; Chas. M. Howell, v. p.; H. J. Sprink, sec.-treas.; preceding officers, T. McClure, J. C. Brewer, Thos. James and Wm. R. Berryhill, directors. **Inc. May 20, 1907, in Arizona. Cap.**, \$1,500,000; shares \$1 par, nonassessable; issued \$964,000. Annual meeting, first Tuesday in June.

Lands: 2 groups, 50 hectares, 9 miles S. E. of Llano, said to show 20

parallel beds in granite, 8 in a cross section of about 250', reported as 4 to 60' in width, and traceable 1 mile, carrying cuprite, malachite and chalcocite. Ore said to average 10 to 40% copper, 4 to 40 oz. silver and \$2 to \$10 gold per ton. **Development:** by shafts of 50' and 410', and a 195' cross-cut tunnel.

Equipment: includes a 40-h. p. boiler and 8x10" hoist good for 1,000' depth, with smithy, superintendent's house and 6 dwellings for workmen. Idle since 1910, but company has no bonded indebtedness, pays all taxes and expects to resume work as soon as peace is restored in Mexico.

CARAMBOLA; MINA**MEXICO**

Office and mine: care D. Pablo Palacio, owner, Indé, Durango, Mex. **Property:** 18 pertenencias, in 2 groups, opened by La Chusa shaft, shows a 10' vein of gold-copper ore. Average assay values range from 3.5% copper and 300 grams silver, in the silver ore, to 14.5% copper and 100 oz. silver in the silver-copper ore. Idle on account of revolution.

CARBON HILL MINING & MILLING CO.**MONTANA**

F. S. Earnest, Spokane, chief owner. **Property:** 9 claims, in the Grass Valley section, 1 mile north and west of Fort Harrison, Helena, shows a vein for 2,300'. **Development:** by 58' incline shaft showing 5½' of carbonate ore and galena, said to assay \$48 per ton. Value is chiefly in the gold content. A 15' shaft with 20' drift, shows a 9' vein of carbonate ore said to assay from \$23 to \$111 per ton.

Two carload shipments yielded \$23 and \$11 per ton respectively. Employs 3 men. Has a 6-h. p. gasoline hoist. Plans sinking the 56' shaft to 100' level.

CARBONATE CENTER MINING CO.**IDAHO**

Mine office: Mullan, Shoshone Co., Idaho. Archie Gillis, pres.; John H. Foss, v. p.; John E. Sherrard, sec.-treas.; preceding officers, John Erickson and Hans J. Rice, directors. **Inc.** 1912, as successor of Tombstone Mining Co. **Cap.,** \$1,500,000, shares \$1 par, assessable. Last assessment of 1 mill per share called Nov. 5, 1914.

Property: 8 claims, near the Carney mine, on Stevens peak, south of Mullan, shows a promising vein of 8 to 15' surface width, carrying a little silver-lead ore. The mine has a 500' crosscut tunnel, with about 1,000' of workings, showing ore that has given assays up to 15% copper and 2.5 oz. silver per ton. Idle, but plans to resume operations.

CARBONATE HILL MINING CO.**IDAHO**

Mullan, Idaho. **Cap.,** \$1,500,000, shares \$1 par, issued \$1,470,000. Listed in Spokane, Wash. Bonds on stock at 40c per share said to have been given to H. L. Martin, auditor Spokane and Int. R. R. Co. of Spokane; first payment of 5c per share being due Nov. 1, 1916, with equal payments thereafter until whole amount has been paid.

Property: 10 patented, 2 unpatented claims, 200 acres, 1½ miles S. E. of Mullan. **Development:** by adit with 3,500' of workings. Orebody said to have been cut at 900' and drifted on for 200'. Development is said to indicate an ore zone 125' wide in which a footwall orebody shows 24' lead-zinc ore with zinc predominating, in the center 8' of ore, and on the hanging-wall or south side, 27' of milling ore.

CARBONATE LEAD MINES CO.**CALIFORNIA**

John Salsbury, mgr.; H. F. Bruce, supt. **Property:** Carbonate mine, in Carbonate Camp, Death Valley, about 40 miles from Zabriskie, Inyo Co., Calif., shows lead-silver, gold and copper ore in well defined ledges in limestone formation. Ore is said to average \$30 per ton. **Development:** 300' of underground workings in 1915. Shipping 200 tons per month in 1915.

CARDIFF MINING & MILLING CO.**UTAH**

Office: 218 So. Main St., Salt Lake City. **Mine office:** Alta, Salt Lake Co., Utah. Ezra Thompson, pres.-gen. mgr.; Fred N. Price, v. p.; J. D. Murdock, sec.-treas., with L. H. Thompson and T. A. Reamer, directors. R. Barney, supt. Inc. 1906, in Utah. **Cap.**, \$500,000; shares \$1 par; assessable, all issued; last assessment of 1c per share delinquent June 1, 1914. An initial dividend of 25c was paid Oct. 15, 1915. Last dividend, 25 cts. per share, payable June 1, 1916. Stock listed on the Salt Lake Exchange. Annual report July 1, 1915, showed \$44,670 in treasury. Receipts from ore shipments July, 1913-15, amounted to \$62,190.

Property: 14 claims, partly patented, 25 miles from a railway, in the Alta Cottonwood district, Salt Lake county, include the Mountain Chief group. N. W. of the Columbus Cons. Development is by two 300' shafts, 200' of crosscuts, 300' of raises and 4,500' of tunnels.

Geology: ore occurs in a fault fissure on a limestone quartzite contact. A strike in the lower tunnel opened up 5' of solid galena ore, for 180' in length with rich carbonate ore on either side, from all appearances a bedded replacement deposit with bands of galena. The galena is heavily oxidized and mixed with nodules of white and gray quartz. Prospecting at depth is carried on by a winze, driven to connect tunnel workings at 350', said to have disclosed 4' of ore averaging 30% lead, 50 oz. silver and about \$7 gold per ton.

Equipment: includes air compressor, drills, electric power, dwellings, machine and blacksmith shop. A 200-ton concentrator is to be erected. **Production:** was begun in 1910 and to 1913 amounted to 3,339 tons, valued at \$100,549. Recent production was made from the stopes above the 850' level. Shipments in 1915 to the Salt Lake smelter averaged 100 tons daily, returning 38.2% lead, 13.4 oz. silver, 3% copper. Management estimates ore reserves at 100,000 tons of \$30 ore blocked out in the mine, Feb., 1916. Employs about 65 men. Shipments will be materially increased with better transportation facilities.

CARIBOU COBALT MINES CO.**ONTARIO**

Offices: 61 Broadway, New York and Cobalt, Ont. **Officers:** Herman Cook, pres.; F. M. Loper, v. p.; E. H. Westlake, sec.-treas.; with J. H. Susman and Sam A. Lewisohn, directors.

Inc. Sept. 29, 1913, in Maine. **Cap.**, \$1,000,000; shares \$1 par, all outstanding, of which 837,400 shares were owned by the Kerr Lake Mining Co., Aug. 31, 1915. The Caribou Cobalt Mines Co. owns the entire capital stock of Cobalt Comet Mines, Ltd., which is the operating company.

CARIBOU GOLD MINES CO.**IDAHO**

Office: 325 Kearns Bldg., Salt Lake City, and Mount Pisgah, Idaho. **Officers:** John W. Clark, Jr., pres.; J. P. Fanning, v. p. and gen. mgr.; J. W. Stringfellow, sec.-treas.; with C. R. Bates and A. B. Rockhill, directors. Company was formed in 1915 to take over the property of the Idaho Gold Mining Co. **Cap.**, 1,000,000 shares, par value 1c. All outstanding.

Property: 13 claims and a millsite, 2 claims and millsite patented, in Mount Pisgah district, Bonneville County, 42 miles from Soda Springs. The mine was first operated in the early 70's, but was closed down on account of poor management, after an accredited production of \$200,000 from free milling gold ore. Mine has been idle for 15 years, but present company believes it can be made to pay as the ore though low-grade, is said to be in a vein 18 to 30' wide, and capable of being mined cheaply.

Developed by tunnels, main tunnel over 400' long and a 280' shaft. **Equipment:** 10-stamp mill, 100-h. p. engine, air compressor and hoist.

Ore reserves: said to have blocked out 12,000 tons, in 1915, averaging \$6.14 per ton in gold.

CARIBOU MINES & MILLS CO.**COLORADO**

Cardinal, Boulder Co., Colo. **Officers:** F. H. Wickett, Chicago, pres.; Geo. L. Nye, Denver, v. p.; I. A. West, sec.; W. C. Russell, gen. mgr. Inc. in 1916. **Cap.**, \$200,000. Company purchased from the trustee in bankruptcy the holdings of the Cariman Mining & Milling Co., in the Cardinal district of Boulder County.

Property: the Caribou and Poorman groups of claims, former producers. Also the Boulder County tunnel, projected as a great development, drainage and transportation tunnel from Cardinal toward the Caribou workings. The tunnel is now in about one mile. In the 80's the Caribou mine is said to have been considered the best silver producer in Colorado.

Equipment: includes the 100-ton Caribou mill, the 150-ton Cardinal mill and a cyanide plant. The Cardinal mill was built to treat dump ore. **Management** plans installation of flotation plant. Work on tunnel will be deferred.

CARIDAD; COMPANIA MINERA**MEXICO**

Address: Frederick W. Messer, gen. mgr., Silao, Gto., Mex. Owns the Caridad mine near the city of Guanajuato, developed by shallow shaft, sunk, 1913, showing ore carrying 1 to 2% copper with 5 grams gold and 1,377 grams silver per ton.

CARISA GOLD & COPPER MINING CO. OF MAINE**UTAH**

Office: 414 Judge Bldg., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. Col. C. Edw. Loose, pres.; Edward Riggs, mgr. Inc. 1907, in Maine. **Cap.**, \$500,000, increased Jan., 1909, to \$600,000, shares \$1 par; issued, \$545,000. Was a reorganization of the Carisa Gold & Copper Mining Co., which levied assessments of \$30,000 and paid dividends of \$60,000.

Property: the Carisa and Spy mines with 8 claims, patented, 57 acres, adjoining the Centennial-Eureka at Mammoth, Tintic district, Utah. Claims said to show 6 orebodies, occurring as fissures in limestone and as contact deposits between limestone and quartzite, 3 of which, more or less developed, of 4' average width, were said, by former management, to give average returns of 5% copper, 3 oz. silver and \$2 gold per ton, from oxidized ores. Mine, as sampled by Newton A. Dunyon, gave average assays of 4.51% copper, 3.54 oz. silver and 0.037 oz. gold per ton. Mine is very pockety, though occasionally carrying bunches of rich ore, and the estimate, by former management, of 80,000 tons of ore blocked out for stoping, was a gross exaggeration, though considerable concentrating ore is in sight. The ore channel has been opened on every level, but the grade of ore encountered is disappointingly low.

Development: by 3 shafts, including the 350' Cornish shaft and the 800' Spy shaft, and a 7,000' tunnel, with about 5 miles of workings.

Mine is worked by lessees, mining mostly above the 400' level. Producing about 50 tons of shipping copper ore a week at last reports.

CARMAN CONSOLIDATED COPPER CO.**MEXICO**

Mine near Arizpe; Sonora, Mex. Joseph Backus, of Virginia, Minn., pres., reported to have taken over the property for an indebtedness of \$50,000 in 1916 and to be planning organization of new company. Inc. 1906. **Cap.**, \$500,000, increased to \$750,000, shares \$2.50 par. Held title to lands through Compania de Oro y Plata, S. A., inc. in Mexico.

Lands: 351 pertenencias, 877 acres, in 9 groups, in the vicinity of the Pedrazzini and Chispas mines, show several strong veins, with 1,911' of workings. The Carman and Don Placido groups have dumps carrying

about 1,100 tons of ore, claimed to average 4.65% copper, 62.2 oz. silver and 0.21 oz. gold per ton. The Blanca Rosa group gives ore assaying up to 16.8% copper, 77 oz. silver and 0.42 oz. gold per ton. The Maria group has given ore assaying 3% copper, 107 oz. silver and 1.32 oz. gold per ton. Los Toros group has given ore assaying 4.2% copper, 29% lead, 38 oz. silver and 0.03 oz. gold per ton. Shipments to El Paso smelter have given returns ranging from \$82.98 to \$4,575.79 per ton.

CARMAN CREEK MINING CO.**IDAHO**

Salmon City, Lemhi Co., Idaho. J. W. F. Halcombe, pres.-mgr.-sec.; John Harlan, v. p.; Wm. Wallace, treas. Inc., Dec., 1905, in Washington. Cap., \$1,000,000, shares \$1 par; nonassessable; 999,500 issued. Property: 7 claims, about 140 acres, 16 miles from Salmon, said to carry an oreshoot showing gold, silver and copper ore. Assessment work only was done in 1915.

CARMEAN & SQUIRES MINING CO.**MISSOURI**

Office: Webb City, Mo. Inc. in Missouri. Cap., \$2,000. Operates 5 properties in S. W. Missouri, including Gwinn land, 2 tracts, one 20, the other 40 acres of Kelly Land, all located in Jasper Co. Is reported to have bought the old John L. mine, 20 acres, in the north Webb City sheet ground district, for \$30,000, in Nov., 1915. The Gwinn tract has 2 shafts, depth 186', and a 250-ton concentrator. The 20-acre Kelly tract is opened by 200' shaft, and has a 150-ton concentrator; the 40-acre tract is opened by 180' shaft and has a 200-ton concentrator. Production: lead-zinc concentrates, not reported.

CARMEN COPPER CO.**MEXICO**

Idle. Office: 52 Front St., New York. Mine office: Mineral del Carmen, El Oro, Durango, Mex. Thos. B. Bell, pres.; Stephen A. Levy, sec.-treas.; I. Wayne Von Leer, gen. mgr.; F. C. Seley, supt. Inc. in New York. Cap., \$750,000; shares \$50 par. Property: includes El Carmen mine, 160 hectares, and a considerable acreage of miscellaneous lands, 45 miles from Rosario, the nearest rail point. The mine carries silver-bearing copper ores, with considerable development. Mill has 40 stamps, 3 crushers and Frue vanners.

CARMEN-GUANAJUATO GOLD MINING CO.**MEXICO**

See Guanajuato Cons. M. & M. Co.

CARMI MINE**BRITISH COLUMBIA**

Property at Carmi, near Phoenix, B. C., Canada, was operated by Alex Robinson and associates, 1914-15.

Ore: free milling gold-silver in two fissure veins. Equipment: includes a stamp-mill. Employs about 20 men. Produced 1,000 tons of ore when formerly active, but transportation charges made operations unprofitable. The Kettle Valley Railway has since been built and runs through the property. Shipments were made during 1915. See B. C. Annual Rept. for 1914, p. 335.

CARNEGIE COPPER CO.**VIRGINIA**

Address: W. H. McLean, supt., Jeffress, Va. Lands: 176 acres, carry about 2,000,000' of timber, about half fit for sawing and show a vein 64" wide at surface, and 5' at bottom of shaft, with a 12" hanging wall paystreak of rich ore. Test shipment, to the Pennsylvania Lead Works, Pittsburgh, gave returns of 10.5% copper, 6.3 oz. silver and \$10.80 gold per ton. Mine has a 76' shaft. Idle since 1906, but has no debts.

CARNEGIE LEAD & ZINC CO.**MEXICO**

Office: Sherwood Bldg., Duluth, Minn. Mine office: Apto. 265, La Mesa, Cananea, Sonora, Mex. R. P. Burgan, pres.; J. E. Cooley, v. p.;

John A. Percival, sec.-treas.; Carl Zachow, asst. sec.; preceding officers and N. F. Hugo, C. W. Stillson, J. F. Faunce, T. Pasco, directors.

Inc. 1915, in Ariz. Cap., \$500,000; shares \$5 par, 64,700 shares outstanding. Transfer office: 510 Sellwood Bldg., Duluth, Minn. Company is a reorganization of the Calumet-Sonora Mining & Milling Co., described in Vol. XI, which defaulted on payment of interest on the bond issue. Bonds were foreclosed Feb. 13, 1915, and on Feb. 27 the property was sold for \$82,000, to R. P. Burgan, who immediately organized the present company. Shareholders in the Calumet-Sonora Co. were allowed to subscribe for stock in the new company for from 10 to 15% of their holdings in the Calumet-Sonora Company.

Income and expense account for 1915 shows receipts from stock sales \$30,537 and miscellaneous \$152; disbursements include redemption of C. & S. bonds \$18,000, legal expenses \$2,000, mine account \$1,214. Green Cananea C. Co. \$6,613; gen. expense and printing \$990. Cash on hand \$389.

Property: 631 acres, about $2\frac{1}{2}$ miles northwest of Cananea, shows fissure veins cutting both diabase and the more recent volcanic tuffs which form the foothills and table lands of the Cananea mountains. Many of these veins show as mere discolorations, or bleaching of the rock, but in places widen into broad masses of leached, silicified ledge matter, resembling the outcrop of the Duluth Cananea. Three veins have been opened by underground workings.

The Chivera mine has thus far been the chief producer of the company. It has an inclined shaft, 625' deep, with levels at 60', 200', 300', 400', 525' and 625'; developing a well-defined fissure vein in indurated volcanic breccia, or tuff, of varying width that opens out into an orebody 300' long and 150' wide, composed of large and small angular blocks of country rock cemented by argentiferous galena, chalcopyrite and sphalerite, with less abundant tetrahedrite, mixed with quartz. The orebody is in places a glittering mass of galena, but as a whole is a complex mixture of lead, copper and zinc sulphides, the mill feed carrying 4.7% lead, 0.4 to 0.8% copper and 9% zinc. The ore minerals disseminated through the mass of breccia above the 525' level, appear to be concentrating in a narrower ore shoot, 300' long and 50 to 60' wide on this level.

Equipment: includes an electric hoist, a 1,435-cu. ft. electric-driven Rand compressor, General Electric motors for all machinery and a 36x24" Farrel crusher with Robins conveying picking belt and ample storage bins. Machinery is run by electric current supplied by the Cananea Consolidated Copper Co., at $2\frac{1}{2}$ cts. per k. w. hour.

Ore is sorted on the picking belt and hauled over a surface tram to the concentrating mill. Latter is an old mill brought from Missouri and altered for local conditions, but a makeshift at best. In this mill the silver-lead ore is taken out and the middlings containing zinc and copper are sent to the dry, or electrostatic mill. Tailings average 0.21% lead, 0.12% copper and 0.77% zinc. The dry mill contains Huff electrostatic separators, which separate the copper from the zinc. Concentration is 8.5 into 1, being 87.9% of the lead, 74.8% of the zinc and 70% of the copper in the ore; the lead concentrates carry 33 oz. silver per ton, averaging 70% lead. Shipments of zinc concentrates in 1913 averaged 50% and the copper 17%.

In addition to the workings mentioned, there is the No. 2 Catalina shaft, now idle and dismantled, 225' deep, vertical, with levels at 70', 110', 145' and 212', exposing an oreshoot $2\frac{1}{2}$ to 6' wide and as much as 60' long, but cut by cross faults and not continuously minable. The ore shoot has been practically mined out to the 145' level, yielding about 1,800 tons of antimonial copper-lead ore carrying zinc. This ore is higher in value than

that now milled. The vein expands west of the mine into a large outcrop which is the most promising surface exposure seen on the company's property and warrants deep exploration.

The company has a large acreage, at least 2 very promising surface outcrops and a dozen or more fissure veins and should, with proper development, become a large producer of low-grade complex ores. The treatment problem has been solved; total mining and milling costs reduced to \$4.50 per ton and the property splendidly equipped for work. Company plans making the working shaft 3-compartments from surface to the 625' level and putting a raise through from the 625' level to surface for ventilation; also sinking to the 700' level. Sixteen cars of concentrates in transit, March, 1916.

CARNEY COPPER CO., LTD.

IDAHO

Mullan, Shoshone Co., Idaho. J. L. Martin, pres.; A. P. McRae, v. p.; C. D. Miller, sec.-treas.; preceding officers, Henry Bilberg, C. D. Martin, directors. Inc. 1906, in Idaho. Cap., \$1,150,000; shares \$1 par.

Lands: 11 claims, 4 fractional, 175 acres, carrying a good water right, is next north of the Reindeer, on the northern slope of Stevens peak, about 4 miles from Mullan. **Development:** by 2 tunnels, the uppermost showing a body of chalcopryite ore that has not been found in the lower tunnel. The upper, or No. 1 tunnel, is 450' long, with 3 crosscuts, and No. 2, the lower tunnel, 1,500', with 1,000' of crosscuts and drifts. There also are several open cuts and pits, showing ore of about 3% copper tenor. Workings show up to 4' of solid ore, carrying chalcopryite, with some chalcocite and bornite. No. 1 tunnel shows an ore shoot up to 40' width, and about 175' long, averaging about 2% copper, with small values in lead and silver, with a paystreak of 6 to 18" assaying 5 to 35% copper. Litigation with Jos. Carney, former owner of lands, was decided in company's favor June, 1908, giving an absolute title. Development work was done in 1915. Company plans driving No. 3 tunnel for 2,000'.

CARNEY MINING CO.

ARIZONA

P. G. Carney, pres. and business mgr., Mesa, Maricopa Co., Ariz. Homer Davidson, supt. **Property:** the Royal Gorge mine, shows a vein with gold-copper ore. **Development:** by 800' tunnel and 100' shaft. **Equipment:** includes gasoline engine and air compressor. Plans to erect cyanide mill.

CAROLINA COPPER CO.

NORTH CAROLINA

Office: 15 Atwater St., West, Detroit, Mich. Mine near Cullowhee, Jackson Co., N. C. Lewis C. Waldo, pres. and treas.; Thomas A. Cox, v. p. and supt.; Hugh M. McCormick, sec.; preceding officers, Stephen H. Knight, Geo. W. Clark, Thomas W. Newton, Chas. E. Bredin, David E. Thomas and Edwin P. Snider, directors. Inc. Oct. 12, 1901, in Michigan. Cap., \$2,500,000, shares \$25 par; issued, \$1,585,000. **Lands:** 1,450 acres, freehold, including the Wayehutte mine, show 4 veins, of 27' estimated average width, carrying mainly chalcopryite, with estimated average values of 3% copper, 4 oz. silver and \$1 gold per ton, opened by a 55' shaft and a 200' tunnel. Lands also include an undeveloped water power. Regarded as promising if worked under proper direction. Idle.

CARRARA MINING, MILLING & LEASING SYNDICATE NEVADA

Jules V. Baird, supt., Carrara, Nye Co., Nev. Company owns the Shindel and Hampton-Sutton properties and Bull Moose mine, the latter said to have been acquired from the Bull Moose M. & M. Co. in 1915 for \$156,000, in Bullfrog district on Bare Mountain, 2 miles N. of Carrara and near Beatty, Nye Co., Nev.

In the Bull Moose mine, gold ore occurs in stringers of calcite in a belt

of dolomitic-limestone about 100' wide. Values average \$9, with highest values on the footwall. The Shindel orebody, 3' wide, and uncovered for over 40' contains rich pockets and stringers of gold in calcite, claimed to run as high as \$100 per ton.

Development: 130' Shindel tunnel; 2 incline shafts and tunnel on the Bull Moose. **Equipment:** includes compressor and 10-stamp mill. Shipments in 1914 to Western Ore Purchasing Co., netted \$60 per ton after deducting \$21.50 for freight and treatment charges. Employs about 5 men.

CART LAKE SILVER MINES, LTD. ONTARIO

Operated the Gould lease on Cart Lake during 1914 with a production of 150,000 oz. silver. Production for 1915 not available. Ore came from the extension of the Seneca-Superior vein. **Development:** in 1914 amounted to 1,003'. No. 2 shaft is 195' deep with 400' of workings on the 185' level, at last accounts.

CARTER GOLD MINING CO. ARIZONA

Oatman, Ariz. E. A. Shaw, pres.; Henry Lovin, v. p.; W. K. Ridenour, sec.; and H. H. Watkins, treas. Inc. in Arizona. Cap., \$1,000,000; shares \$1 par.

Property: New York, Giant and Gold Cross patented claims, 55 acres, in Tom Reed-Gold Road mining district, near Oatman, Mohave Co., Ariz. Developed by incline shaft, being sunk from the 250 to the 500' level with several hundred feet of workings on the 150 and 250' levels. The vein on the 150' level is said to be 12' wide, but contains small values. On the 250' level management reports that the vein is over 7' wide and averages \$8.60 gold per ton.

CARTER MINING CO. COLORADO

Ohio City, Gunnison Co., Colo. C. M. Carter, mgr., at last accounts. Inc. 1897, in Colorado. Cap., \$750,000; shares \$1 par. Company was originally known as the Ashland Mining Co.

Property: 80 claims, 800 acres, near Ohio City, shows fissure veins in granite. Ore consists of lead and iron sulphides and quartz. **Development:** by tunnels, main working tunnel about 8,000' long with several thousand feet of workings. **Equipment:** includes a 20-stamp mill, daily capacity 100 tons. Output is concentrates and gold bullion. Management planning to develop large low-grade veins said to be on the property.

CARTWRIGHT GOLD FIELDS, LTD. ONTARIO

Property: on the south shore of Painkiller Lake, district of Temiskaming, on lot 8, concession V, Beatty, said to show a small quartz vein containing gold, telluride and pyrite. Developed by a shaft 100' deep in 1915. **Equipment:** includes two 60-h. p. boilers, hoist, air compressor and 10-stamp mill.

CASANEGA-DALY MINING & REDUCTION CO. ARIZONA

Amadoville, Santa Cruz Co., Ariz. A. D. Daly, supt. **Property:** 7 claims, 140 acres, in the Tyndall mining district, Santa Rita Mountains, Santa Cruz Co. Sulphide ore said to contain copper, gold, silver, lead and molybdenum, occurs in orebodies 3 to 8' wide in monzonite. **Development:** by 600' tunnel, said to have blocked out 50,000 tons ore. **Equipment:** includes a 50-ton concentrator, that started operating in Dec., 1915. Twenty men employed. Management plans driving a 1,000' development tunnel and increasing mill equipment.

CASCADIA MINING & DEVELOPMENT CO. WASHINGTON

Mine office: Toledo, Wash. **Officers:** E. A. Sessions, pres., 106 W. 6th St., Vancouver, Wash.; W. A. Gray, v. p.; W. D. Scott, sec.-treas.; J. F. Hartley, asst. sec.; preceding with M. A. Poppleton, J. P. Finley, Geo. S. Reid, W. H. Bennett, directors.

Inc. March 12, 1887, in Washington. **Cap.**, \$6,000,000; shares \$1 par; \$1,164,615 in treasury.

Property: 108 claims, 2,170 acres; 330 patented in St. Helen's mining district on the divide at the head of the Toutle river in Cowlitz, Lewis and Skamania counties, includes the Polar Star and Minnie Lee groups. Properties show fissure veins in grano-diorite, running N. E.-S. W. and dipping 40°-60'. The copper ore which carries gold and silver values, occurs in shoots 2'-12' thick and 20'-100' long. This ore is said to average 17.9% copper, 24.85% iron, 10.75% silica, 4% aluminum, 1.2% lime, 34.5% sulphur, 5.68% antimony, 0.8% zinc and 0.05% nickel.

Development: 5,000' of work including 300' to 700' tunnels with about 1,500' on ore. About 100,000 tons of shipping ore has been mined and put on the dump. Production has been deferred waiting for cheaper transportation. The mines are 16 miles from a railroad over a heavy grade, but a new line 48 miles long to Castle Rock, Wash., is planned for 1916. Property has been under development in a small way for 19 years past. Property has been examined and reported on by Prof. F. L. Barker, State Metallurgist, Eugene, Oregon, Robt. E. Hanley and G. B. Wilson.

CASEY-COBALT MINING CO., LTD.

ONTARIO

Office: Balfour House, Finsbury Pavement, London, E. C., Eng. **Officers:** W. R. P. Parker, pres.; J. P. Watson, v. p.; with G. M. Clark, R. E. G. van Cutsem and Graeme Watson, directors.

Inc. in April, 1907, in England, to acquire 99,995 fully-paid shares of \$1 each, being the entire issued capital, with the exception of 5 shares of the Casey Cobalt Silver Mng. Co., Ltd., of New Liskeard, Ont. Consideration was 199,993 in fully-paid shares, vendors agreeing to provide £15,000 working capital. Company paid total dividends of \$203,249 to end of 1914.

CASEY COBALT SILVER MINING CO., LTD.

ONTARIO

New Liskeard, Casey Township, Ont. **Officers:** W. R. P. Parker, pres.; J. P. Watson, v. p.; with G. M. Clark, R. E. G. van Cutsem and Graeme Watson, directors. John W. Shaw, mine mgr. Company controlled by the Casey Cobalt Mng. Co., Ltd. q. v.

Property: 40 acres in Harris Twp., and the Casey-Cobalt mine in Casey Twp., 9 miles N. E. of New Liskeard. In 1914 development work totaled 5,052'. A shaft has been sunk on the East Casey claim to a depth of 350' with stations at 275' and 335'. **Equipment:** includes a 30-stamp mill.

CASEY JONES MINING CO.

ARIZONA

Oatman, Ariz. **Officers:** H. M. Caswell, pres.; V. S. Rowley, v. p.; J. E. Shank, sec.-treas., with J. J. Casey and Geo. Z. Mellen, directors. **Inc.** in Ariz. **Cap.**, \$100,000; shares 10c par; 600,000 shares in treasury. Listed in San Francisco. Owns the Swallow group, 12 claims, 120 acres, adjoining the Oatman Gold group on the east, said to show 3 veins from 6' to 25' wide and assaying on the surface from \$0.80 to \$2.86 gold per ton. Management plans sinking two 2-compartment shafts; east shaft will be 300', the west shaft 500' deep. In March, 1916, the east shaft was 60' deep. Property in the development stage.

CASH BOY CONSOLIDATED MINING CO.

NEVADA

Tonopah, Nev. A. S. Ross, pres.; M. M. Johnson, v. p.; E. H. Mead, sec.-treas.-mgr., with H. S. Knight, L. A. Blakeslee, directors. **Inc.** March 21, 1914, in Nev. **Cap.**, \$2,000,000; shares \$1 par, all outstanding, assessable; 5th assessment, 1c per share, called Jan. 15, 1916. Annual meeting November 21. Listed on New York Curb and San Francisco Exchange. Company is a reorganization of the Tonopah Cash Boy Cons. Mng. Co., which suspended operations in 1914 with debts of \$3,476 and 76,870 shares

in the treasury. Financial statement of Cash Boy for period Nov. 21, 1914, to March 21, 1916, shows receipts of \$80,694, which includes: assessments, \$80,000; ore shipments \$620; royalties, \$74. Cash on hand, \$9,870.

Property: several fractions, patented, 30 acres, at Tonopah, Nye Co., adjoin the Tonopah Merger on the west, Tonopah Victor on the south, and Tonopah Extension on the north. **Ore:** gold-silver, occurs in narrow stringers, E.-W. course and dip about 35° in rhyolite. Average assays said to be about \$15 per ton.

Development: 1,480' vertical shaft, with most of the recent work on the 1,350' and 1,450' levels, where drifting and crosscutting is being done, but with unsatisfactory results. **Equipment:** includes a 75-h. p. electric hoist and a 3-drill air compressor.

Production: for 1915 amounted to 150 tons ore, said to assay \$15 per ton. There are no ore reserves. Property is a prospect.

CASH MINE

ARIZONA

Prescott, Ariz. **Property:** leased to N. E. Getchell, Maxton, Yavapai Co., Ariz., shows veins with gold-silver-copper-lead ore. Developed by a shaft with extensive workings. **Equipment:** includes a 10-stamp mill. Six men employed. Shipments of concentrates made in 1915.

CASHIER GOLD MINING & REDUCTION CO.

COLORADO

Office: P. O. Drawer 46, Warren, Pa. Mine office: Central City, Gilpin Co., Colo. Wm. Muir, pres.; F. M. Lockwood, sec.; E. E. Allen, treas.-mgr.; with H. P. Stone, M. A. Bliss, J. T. Meals, E. J. Lesser, W. P. Volgamore and F. L. Bensinger, directors. Wm. Auger., supt. **Cap.**, \$1,000,000; shares \$1 par; 555,843 issued. Report issued August 1, 1915, showed monthly earnings of \$3,428. Dividends paid during fiscal year amounted to \$36,696.

Property: includes the Pittsburgh, Meeker and Brooklyn mines, carrying chalcopryrite and tetrahedrite, principal values being in silver, running up to 700 oz. per ton. The Pittsburg mine is developed to depth of 1,000', by shafts, drifts and upraises. Equipped with boiler, pump, hoist and drills. Stopping method is used.

Production: 1,276 tons in 1914 and 1,800 tons in 1915, netting \$40,106. Average assays run 3.64 oz. gold, 7 oz. silver and 6.10% copper. Plan sinking shaft 100' and installing electric power in 1916. Has been a small but steady producer, partly from work of lessees.

CASS COPPER CO.

MICHIGAN

Houghton, Mich. Inc. 1916, by Dr. L. L. Hubbard, John W. Black, Fred Smith, Jas. MacNaughton, John T. Reeder and J. H. Rice of Houghton and Calumet; E. W. Decker, of Minneapolis; W. L. Clements, of Bay City, and J. H. Johnson, of Detroit, to take over the Norwich mine, owned by the Copper Crown Mining Co. **Cap.**, \$3,750,000; shares \$25 par; 40,000 shares were paid for property and 20,000 offered for sale at \$3 per share, to pay for diamond drill campaign.

Property: 1,320 acres, on Ontonagon river, near the Mineral Range railroad, has several well-known lodes crossing the ground. See Copper Crown Mining Co.

CASSIAR CROWN COPPER CO.

BRITISH COLUMBIA

Promoted by Pohlman Investment Co., Empire State Bldg., Spokane, Wash. **Officers:** I. W. Anderson, Tacoma, pres.; R. P. Thimble, Portland, v. p. and gen. mgr.; Cadwalader Jones, Tacoma, sec.-treas., with W. C. Miller, Spokane and J. D. Galloway, Victoria, directors. Inc. early in 1916. **Cap.**, 1,000,000 shares, \$1 par; in treasury, 510,000 shares.

Property: five 50-acre mineral claims, 260 miles east of Prince Rupert,

B. C., 18 miles from Telkwa on the Grand Trunk Pac. R. R. Little development work has been done, a 60' shaft being the deepest working. It is claimed that this shaft shows ore assaying 7.2% copper, 2.4 oz. silver and \$3.40 in gold per ton.

Company was planning to begin work March 15, 1916, on a 500' tunnel to cut the vein 250' below surface. Property is a prospect only.

CASTLE COPPER CO.

ARIZONA

Property: 11 claims, known as the Dunkirk or Mt. Trittle group, 12 miles south of Prescott, on the southern slope of Mt. Trittle, near the head of Slate creek, in the Hassayampa district. Formerly owned by Dunkirk Gold & Silver Mining Co., later by Mt. Trittle Copper Co., and purchased in 1914 by D. M. Clark of Prescott, Ariz. Is an old mine, with tunnels of 150', 160', 170' and 300', driven at vertical intervals of 100', showing copper and lead sulphides, with values in copper, gold and silver, in about the order named.

Equipment: includes steam and gasoline power, air compressor and electric light plant. A 40-ton mill has 4 Nissen stamps, 3 Wilfley tables, 100-ton ore bin and a 10,000-gal. water tank. Oil flotation unit installed 1915, reported to be an unqualified success, saving as high as 98% on assay value of ore. 2,500 tons of ore reported on dump Jan., 1915.

CASTLE DOME DEVELOPMENT CO.

ARIZONA

Mulford Martin, pres., 7 Wall St., New York. Inc. in Maine. Company has bond and lease on the Inspiration Extension Copper Co. (which see) property at Miami, Ariz. Began work, April 15, 1916, on a tunnel, now 400' long, running N. E. into the property, in anticipation of opening a low-grade "porphyry" copper deposit.

CASTREJON; HERMANOS

MEXICO

Office and mine: Huacana, Ario, Michoacan, Mex. **Property:** the China mine, an old and small producer of copper ore, employing about 25 men normally. Presumably idle.

CAVE SPRINGS LEAD & ZINC CO.

MISSOURI

M. Grundler, supt. Operates a lease on 50 acres of land owned by the Kansas-Missouri L. & Z. Co., including the Grass Roots and Cave Springs mines, both old-time producers, at Cave Springs, west of Joplin, Jasper Co., Mo.

Ore: contains zinc and lead as sulphides. Developed by several shafts, deepest 260', with levels at 130' and 240'. This shaft was unwatered to the 240' level in 1915. Ore in Grass Roots mine is taken out by open-pit work. **Equipment:** 100-ton concentrating mill, centrifugal pumps, hoist, electric power and surface buildings.

CAYUGA DEVELOPMENT CO.

MONTANA

Office: 616 Lyceum Bldg., Duluth, Minn. **Mine office:** Divide, Silver Bow Co., Mont. C. T. Fitzsimmons, pres.; Nels Anderson, v. p.; E. J. O'Rourke, sec.; Max P. Shapiro, treas.; John Helehan, gen. mgr.; preceding officers, Jacob Stein and Jas. L. Norman, directors. Inc. April 4, 1910, in Minnesota. Cap., \$150,000; shares \$1 par, nonassessable; issued, \$65,000.

Lands: 4 claims, 80 acres, in the Fleecer district, 15 miles southwest of Butte, near the Oregon Short Line railway. Property shows granite, with dikes of porphyry, aplite and quartzite, carrying veins with a generally E.-W. strike, main vein being estimated to range 50 to 125' in width, traceable for 2,000', carrying cuprite, melaconite, malachite, azurite, chrysocolla, chalcopryrite, chalcocite and bornite. **Development:** by 100' tunnel, and shafts of 45', 125' and 150', showing ore assaying up to 30% copper, and from a trace to 70 oz. silver per ton. The 125' shaft has crosscuts of 150'

and 180', cutting the vein for an apparent width of 30'. The vein at this depth is nearly vertical. Idle, and no work done on property since 1912.

C. B. S. MINING CO.**ARIZONA**

Near Globe, Ariz. Claims show several veins with 62' shaft developing a 6' orebody, assaying 9% copper, \$10 silver and \$3 in gold. Vein dipped out of shaft and bottom of workings show a 10" ore streak of native silver. Owned by same people as the Climax Mining Co., near Prescott, Ariz.

CEDAR TALISMAN CONS. MINES CO.**UTAH**

515 Newhouse Bldg., Salt Lake City and Milford, Beaver Co., Utah. **Officers:** S. S. Pond, pres.; F. B. Sherwood, v. p.; Geo. Baglin, sec.-treas.; with H. M. Chamberlin and Geo. Lynch, directors. Inc. March, 1909, in Utah, as a merger of the Cedar Mining Co. and the Talisman Mining Co.; latter company described in The Copper Handbook, Vol. XI. **Cap.**, \$500,000, shares 50c par, assessable. All outstanding. Stock transferred at company office. Listed in Salt Lake City.

Production in 1915 did not start until after April 1st. Statement covering operations for 1915 shows expenses of \$11,794 with receipts from zinc ore sales, \$8,672; from lead ore sales, \$653; leaving an operating loss of \$2,468. Cash in bank Jan. 1, 1916, \$1,877, with estimated net value of ore in transit, \$2,200.

Property: 13 claims, 8 patented, 250 acres, in the Star mining district, Beaver Co., Utah. **Ore:** carbonate of lead, copper and zinc containing gold-silver values. **Development:** several thousand feet of shafts and underground workings, the lowest on the 1,000' level of the incline, or main working shaft. Recent work has been done from the 200' to the 1,000' level. Previous to the consolidation the two properties are said to have had a total net production of \$130,000, but for years they have not shown a production of any importance. In 1915 considerable development work was done on Talisman Hill. This work is said to have opened up, in addition to some high-grade zinc ore, a large body of 11% zinc ore. It will be necessary for the company to find a method for treating this low-grade ore before it can be realized upon and a 10-ton electrolytic zinc plant has been proposed for the purpose.

Electric power was substituted in 1915 for steam power whereby a monthly saving of \$190 is claimed.

CENTENNIAL COPPER MINING CO.**MICHIGAN**

Subsidiary of Calumet and Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton Co., Mich. **Rodolphe L. Agassiz**, v. p.; **Jas. MacNaughton**, 2nd v. p. and gen. mgr.; preceding officers, **H. F. Fay**, **Dudley S. Dean**, **Benj. Joy** and **E. V. R. Thayer**, directors; **Geo. G. Endicott**, asst. sec.-treas.; **John Pentecost**, mg. capt.

Inc. 1896, in Michigan, as successor of Centennial Mining Co. **Cap.**, \$2,500,000, shares \$25 par; issued, \$2,250,000; paid in, \$19.50. Last assessment, 1905, was \$4. Is controlled, through ownership of 41,500 shares, by Calumet & Hecla Mining Co., and is a borrower therefrom.

Profits were \$6,046 net in 1911, \$50,511 net in 1912, \$31,397 in 1913, \$3,213 deficit in 1914, and \$142,440 in 1915. Balance sheet, Dec. 31, 1915, shows assets of cash and accounts receivable \$275,229; supplies, \$29,841; total, \$305,071. Liabilities for notes and accounts payable, \$31,953; balance, \$273,118. **American Trust Co.**, Boston, transfer agent; **Old Colony Trust Co.**, Boston, registrar. Annual meeting, first Tuesday in April.

Lands: 670 acres, Sec. 12, T. 56 N., R. 33 W., and a triangular patch of about 30 acres, at the S. E. corner of the main tract, bought to secure

the outcrop of the Kearsarge lode, and including about 10 acres, bought 1905, of the Old Colony, for the surface plant. The first work was done, 1863, by the Schoolcraft Mining Co., which failed to open a paying mine, and was reorganized, 1876, as the Centennial Mining Co., and again reorganized, 1896, with present title. Expenditures of upwards of \$1,500,000 were made by the old companies, in unsuccessful efforts to open a paying mine on the northern extension of the Calumet conglomerate. Seven shafts, 3 of considerable depth, were sunk on this bed, No. 3, the deepest, being bottomed at 3,200'. The Centennial lands are in the great mining area of Calumet, and are available for building purposes. Two additions have been platted, and surface rights sold at good prices, mineral rights being reserved.

The present company did a little work, 1897, on the old conglomerate shaft, then turned attention to the Osceola bed, deepening 2 shallow shafts to 1,050' and 1,150' depth, respectively. The Osceola bed, where opened on the Centennial tract, averages about 15' in width, but is lean.

Work on the Kearsarge bed was begun Sept., 1899. Owing to the outcrop of the Kearsarge occurring on the 30-acre tract bought of the Osceola, with only a 100' right-of-way connecting it with the main tract, it was necessary to open the mine on the Kearsarge bed in a peculiar manner, by 2 shafts. These are but 90' apart, on surface, and continue parallel, on the dip of the bed, until the 13th level, when the main tract is reached, after which No. 2 shaft diverges from No. 1 at an angle of 15° on the plane of the bed, 300' being taken by the curve. This method of opening gives short drifts until the shafts enter the main Centennial tract. Each shaft is 17x18' inside of timbers, with 3 compartments, sunk at an angle of 39° with the horizon, through an overburden of about 100' depth. The Kearsarge bed averages about 16' in width, and showed fair copper values in the upper levels, followed by a comparatively barren zone until the 14th level, when there came a gradual improvement, which unfortunately has not been maintained, the mine as a whole proving disappointing. New openings, made during 1915, amounted to 2,366', all contributory to the No. 2 shaft.

No. 1 shaft, 3,821' deep, has been idle since 1910. No. 1 has a steel shaft rock house, with 3,000-ton bins and a 32x72" Nordberg duplex hoist, with double conical drum, good for depth of 6,000', operating 5-ton skips.

No. 2 shaft, 4,293' deep, shows fair ground from the 18th to the 31st levels, inclusive. This shaft shows poor ground to within 50' of the South Kearsarge boundary, where drifts were stopped. The South Kearsarge drifts are in rich ground up to the boundary, which seems strange. **Equipment:** includes a cylindrical steel shaft rock house, with 1,000-ton bins, and a 32x60" Sullivan duplex straight-face hoist, with 2 drums of 14' diameter and 15' 6" winding face, grooved for 1¾" cable. The hoist is fitted with devices to prevent overwinding, and is calculated to raise 5-ton skips at the rate of 4,000' per minute, operating under 150 lbs. steam pressure.

The mine is served by the Copper Range and Mineral Range railroads, and has a private line connecting the shops and shafts.

Rock is stamped by the mill of the Lake Milling, Smelting & Refining Co., which is separately described.

Production was seriously curtailed for a time in 1913 and 1914 by the Western Federation of Miners' strike, called July 23, 1913, and declared off on April 12, 1914. Conditions prevailing in the copper market after the European war started were the cause of the mine operating on three-quarter time from Sept. 1, 1914, to Feb. 1, 1915. In Aug., 1915, the rock-house of No. 1 shaft was gutted by fire and production suffered for a month at that time. Centennial at best is a small producer and this series of misfortunes has worked an extra hardship on it.

Production:		Lbs. Cu. Mine Cost		Lbs.			
Year	Tons R'k Treated	Lbs. Min. Prod.	per Ton R'k Stpd.	per Ton (a)	Copper Produced	Total Cost per Lb.	Rec'd per Lb.
1915	150,191	2,347,500	15.63	\$1.753	2,347,500	12.45c	18.14c
1914	138,136	3,311,780	16.56	1.838	2,287,130	12.56c	12.11c
1913	85,443	2,324,040	18.87	2.179	1,612,262	13.38c	15.36c
1912	106,517	2,567,385	16.36	1.920	1,742,338	13.46c	16.98c
1911	36,543	2,321,200	17.26	1.869	1,493,834	12.69c	12.92c
1910	102,133	2,380,820	15.40	1.948	1,572,566	14.48c	12.62c
1909	196,525	.....	14.15	.....	2,583,793	15.61c	13.28c
1908	169,693	.....	12.94	.....	2,196,377	18.49c	13.39c

Note: Production for first 6 months, 1916, 1,269,697 lbs. copper.

(a) Includes mining, transportation, stamping and taxes.

CENTENNIAL DEVELOPMENT CO.

NEVADA

Ely, White Pine Co., Nev. E. E. Vanderhoef, pres. and gen. mgr.; D. C. McDonald, v. p.; G. F. Boreman, sec. and treas. Inc. April 20, 1911, in Nevada, as successor of the Ely Centennial Copper Co. Cap., \$1,000,000, shares \$1 par; issued 400,000 shares. Total assessments, \$15,198.46 to end of 1912. Annual meeting, first Tuesday in December.

Property: 5 claims, about 75 acres, in the city limits of Ely, between the McDonald-Ely and Ely-Calumet, in the eastern portion of the Robinson district. Mine has two 50' shafts and a 2,000' tunnel shows a 400' zone of crushed silicified limestone with low-grade copper ore. Properly idle for lack of funds, 1912-13. Reported under lease to Edw. Weal, 1915.

CENTENNIAL-EUREKA MINING CO.

UTAH

Office: 55 Congress St., Boston, Mass. Operating office: Newhouse Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. Wm. G. Sharp, pres.; C. G. Rice, 1st v. p.; C. W. Van Law, 2nd v. p.; F. W. Batchelder, sec.-treas.; preceding officers, B. Preston Clark, J. J. Storrow, Sidney W. Winslow, directors. Geo. W. Heintz, gen. mgr. Clarence E. Allen, mgr.; A. P. Mayberry, supt. Inc. 1876, in Utah, and reorganized, 1899, in Maine. Cap., \$5,000,000; shares \$25 par; issued, \$2,500,000. Stock is listed on San Francisco Exchange. Is controlled by United States Sm., Ref. & Mining Co., through ownership of 99,964 shares of the 100,000 shares of issued stock, there being only 4 other shareholders. Dividends: \$7 per share in 1906; \$2.50 in 1907; \$11.50 in 1908; nothing in 1909; \$6 in 1910 and 1911; \$3 in 1912 and 1913, making a total of \$4,050,000 to end of 1914. Last dividend of \$1 per share declared April 1, 1916. Annual meeting, third Wednesday in April.

Property: in the Tintic district, includes the Centennial, Eureka, Tintic, Dove, Swan and Pelican group. Ores carry fair values in gold, silver, copper and lead.

Development: by a 3,260' shaft, and the 2,160' Holden tunnel, completed 1909, connecting with the shaft just below the 500' level. This tunnel permits the ore to be delivered directly to railroad cars, eliminated the rope tramway and handles the water from the mine. During 1914-15 development work was carried on from the 3,100' level. Ores are shipped to the Midvale smelter of the U. S. Smelting Co., at West Jordan, Utah. The mine is timbered with square sets, and formerly was dry, but the lower levels are wet, water being handled by a 500-gal. Sulzer-Winterthur electric pump. About 300 men are employed. Surface equipment includes 40-stamp mill, steam and electric power with necessary engine houses and shops.

Production: in 1915 was 49,530 tons as against 58,461 in 1914; 101,101 in 1913; 117,957 in 1912; 108,275 in 1911; 90,375 in 1910, and 109,430 tons in

1909. An option taken on the property of the King William Mng. Co. was relinquished March, 1915.

CENTENNIAL MINE**COLORADO**

See Kennedy Gold M. & M. Co.

CENTER CREEK MINING CO.**MISSOURI**

Robt. F. Stewart, sec.-treas., Webb City, Mo. Inc. 1889. Cap., \$1,000,000; shares \$10 par. Dividends to 1915 amount to \$520,000. Company does not carry on active mining operations, but leases its land to operators among whom are C. Y. Ramage; C. D. & R. Mng. Co.; Incline Mng. Co., J. R. Wisby; Three C's Mng. Co.; Twin Cities Mng. Co., and the Good Shepherd Mng. Co., receiving royalty on all ore produced.

Property: 200 acres and millsite between Webb City and Carterville, Jasper Co., Mo., developed by 13 shafts from 116' to 165' deep, producing both lead and zinc ore.

Production: valued at \$300,000 to \$400,000, annually. Total output about \$12,500,000 worth of ore.

CENTRAL EUREKA MINING CO.**CALIFORNIA**

Office: 246 Russ Bldg., San Francisco, and Sutter Creek, Amador Co., Cal. **Officers:** John H. Grady, pres.; Morris Brown, v. p.; Wm. A. Van Bokkelen, sec.-treas.; J. E. Davis, supt. **Cap.,** \$400,000; shares \$1; assessable; outstanding \$398,883. Annual meeting 3rd Thursday in April. Results of operations have been a disappointment for many years, but a dividend of 2c per share was paid in Feb., 1915.

Property: adjoining the South Eureka on the north, $\frac{1}{2}$ mile south of Sutter Creek, shows 3 parallel veins which have been developed. The veins are in the form of stringers, with strike N. 20° W., dip 55° to 70° E., and an average width of 6'. The east vein is 20' from the west vein, while the hanging-wall vein is 200' east of the west vein. East and west veins have slate walls; hanging-wall vein has a slate footwall and greenstone hanging-wall. Two series of ore-shoots have been developed, the north shoots being 60', the south shoots 200' long.

Development: 3-compartment shaft 3,170' deep, sunk on 57° incline. Shaft cuts the hanging-wall vein on the 500' level, and is sunk on the vein to the 2,000' level. From the 1,800' to the 3,100' level the new shaft was sunk in the foot-wall. On the 3,000' level the shaft cuts the west vein. Present work is mainly on the 2,800', 3,000' and 3,100' levels, where good grade ore is said to have been developed in the east and west veins.

Equipment: includes an Ingersoll compressor driven by 150-h. p. motor, and two 60-h. p. oil-fired boilers. Ore is hoisted in 2-ton skips and run through a Blake crusher before being trammed to the mill.

Mill: 40 stamps, 20 dropping at present, of 1,150 lbs. each, making 100 drops per minute and crushing $4\frac{1}{4}$ tons per stamp through a 24-mesh screen. Mill is driven by a 75-h. p. motor.

CENTRAL LEAD CO.**MISSOURI**

Entire capital stock owned by American Smelters Securities Co. **Property:** 1,603 acres in Flat River mining district, Saint Francois Co., Mo.

CENTRAL MINING & DEVELOPMENT CO.**ARIZONA**

Winkelman, Pinal Co., Ariz. C. G. Werner, pres., treas. and gen. mgr.; F. G. Angeny, v. p. and sec.; preceding officers, Chas. E. McGee, T. C. Wells and David McClure, directors; F. B. Garden, supt., at last accounts. Inc. July 13, 1906, in Arizona. **Cap.,** \$10,000,000; shares \$1 par. Property was bought for \$6,000 and capitalized at \$10,000,000. The three chief promoters were convicted of fraud in connection with the company's affairs and sentenced to Leavenworth. See Vol. X and XI, Copper Handbook, for full description. Property idle and company probably dead.

CENTURION ARIZONA MINING CO.**ARIZONA**

Dragoon, Cochise Co., Ariz. J. P. Richardson, pres. and gen. mgr.; Samuel Bennett, v. p.; H. A. Morgan, sec.-treas.; preceding officers, S. N. Kemp, J. C. Page, J. W. Angle and H. E. Dunlap, directors. Inc. July 26, 1906, in Arizona. Cap., \$1,000,000; shares \$1 par; nonassessable; issued, \$527,000.

Property: 23 claims, 5 fractional, 240 acres, and a 5-acre mill site, 2 miles N. W. of Dragoon, in the Dragoon mountains, shows a contact deposit between pre-Cambrian limestone and altered schist, averaging about 15' in width, and carrying azurite and malachite, associated with hematite. Ores carry an average of 2.7% copper. Development is by a 650' incline shaft, several shallower shafts ranging from 40 to 100' in depth, and a 3,000' tunnel, with about 5,000' of workings, estimated by management to show 160,000 tons ore in sight. Work on the 600' level said to be in 8.12% ore for 50'.

Equipment includes a 15-h. p. gasoline hoist, good for 800', a small air compressor, a machine shop, smithy and other necessary mine buildings. Large pumps to be installed in 1916. Shipments to smelter in 1915 reported to have netted 22.65% copper per ton. Property considered promising.

CENTURY MINING CO.**MISSOURI**

Property: Century mine, at Neck City, Jasper Co., said to have been one of the most productive mines in Missouri in 1914. Ore is zinc blende; rich orebody on 200' level said to have yielded a recovery of 12% in 60% concentrate. Developed by two 190' shafts. Equipped with 150-ton mill. Produced 2 to 4 carloads of ore weekly in 1914. Output greatly increased in 1915.

CENTURY ZINC CO.**MISSOURI**

Inc. in New York. Cap., \$20,000. Operating on land of Longacre & Chapman, in Jasper Co., Mo. Has 2 shafts 185' deep and a 235-ton concentrator. Product is zinc concentrate.

CERRO DE PASCO COPPER CORPORATION.**PERU**

Office: 15 Broad St., New York. **Officers:** L. T. Haggin, pres.; Edward H. Clark, v. p.; H. Esk Moller, sec.-treas.

Inc. Oct. 28, 1915, in New York, succeeding the Cerro de Pasco Copper Investment Co. Cap., \$1,000,000; shares without par value; 666,666 shares issued; 333,334 in treasury for conversion of \$10,000,000 10-yr. 6% convertible Gold Bonds, dated Nov. 1, 1915; int. payable May and Nov. 1. Bonds convertible at option of holder after 2 years into stock at \$30 per share. Bonds subject to redemption at option of company, on 90 days' notice, on any semi-annual interest date after 2 years at \$105, plus interest. Stock listed on New York Curb.

Dividends: initial quarterly dividend, \$1 per share, was paid March 1, 1916.

Owns 95% of Cerro de Pasco Copper Co. stock and all of the Morococha Mining Co.

COMPANIES CONTROLLED BY CERRO DE PASCO COPPER CORP.**Cerro de Pasco Investment Co.**

Dissolved Dec. 23, 1915.

Cerro de Pasco Mining Co.

Office: No. 15 Broad St., New York. Peruvian general office: Lima, Peru. Mine office: Cerro de Pasco, Junin, Peru. Works office: La Fundición, Tifahuarca, Junin, Peru. **Officers:** L. T. Haggin, pres.; Edward H. Clark, v. p.; H. Esk Moller, sec.-treas.; W. J. Hamilton, gen mgr.; Lima; P. S. Couldrey, mine supt., Cerro de Pasco. Inc. June 6, 1902, in New Jersey. Cap., \$10,000,000, all issued. Owns the entire stock issue of the Cerro de

Pasco Railway Co., and entire stock issue of Sociedad Minera Copaycocha, and entire stock issue, excepting founders' shares, is owned by Cerro de Pasco Copper Co., which in turn is controlled, through stock ownership, by Cerro de Pasco Copper Corp. Estate of J. B. Haggin is said to hold about 40% of the total investment.

Property: over 940 claims, and 70,000 acres miscellaneous lands in the Morococha and Yauli districts and about 400 acres of land that includes three-fourths of the rich Cerro de Pasco district, with a smelter site and extensive coal tracts north of Cerro de Pasco.

Cerro de Pasco lies 14,300' above sea level, rendering physical labor very fatiguing. The population of the town is about 6,000, of whom only a small percentage are white. The region is bleak and all food and supplies must be brought in from considerable distances. The year has but 2 periods, the wet and dry, the former from November to April. Both are said to be bleak and exceedingly disagreeable. Snow and hail fall at any time, summer or winter, but rarely remain on the ground as long as 48 hours, even in winter. The fluctuation between mean summer and winter temperature is about 20° F. only, less than the daily variation.

Silver was discovered at Cerro de Pasco in 1630, and the mines produced, to the close of the nineteenth century, about 450,000,000 oz., from 40,000,000 tons of silver and copper ore, nearly all extracted by hand work and carried 3 to 6 miles on the backs of llamas, to primitive smelters, whence the silver bullion was transported by llamas 200 miles to Lima, until 1870, when a railroad was completed to Oroya. Formerly only the copper ores of 25 to 40% copper were shipped.

Geology: authorities disagree as to the geology of the district, but over an area a mile wide and nearly 2 miles long, nearly every claim carries ore, proving Cerro de Pasco one of the richest mineral fields of the globe. The orebodies outcrop prominently, as crestones, or ridges, and carry gold, silver, copper, lead, zinc and cobalt. The oxidized zone carries considerable gold, running as high as 1 to 2 oz. per ton, occurring in rich but erratic shoots. The high silver values usually extend to about 100' depth only, occasionally running up to thousands of ounces per ton, followed by rich silver-copper ores, which in turn, at a little greater depth, are succeeded by ore low in silver but richer in copper, the copper ores being estimated to have averaged 15 to 35 oz. per ton in the old workings. Primary ores below the water level contain bornite and chalcopyrite, associated with pyrite, tetrahedrite, arsenopyrite and sphalerite, containing little silver and only traces of gold. There are occasional veins of high-grade silver-lead ores, with others carrying up to 8% zinc; practically all the copper ores are bismuthiferous, hence refractory in reduction. The ores carry about 35% silica and 14 to 30% iron, the excess of silica requiring considerable limestone for fluxing.

Development: includes hundreds of old mine workings, some opened to 300' depth, though the majority not over 100' deep. The surface of the property shows scores of tajos, big pits resulting from the caving in of old open cast workings, some of these being 300' deep. The property lies in a basin, and the mines are very wet, especially below a depth of 400'. The Rumiallana drainage tunnel, begun April, 1877, by Henry Meiggs, was completed 1907, by the Compañía Empresa Socavonera del Cerro de Pasco, with which a financial arrangement was made, through a 5% stock interest given in the Cerro de Pasco Copper Co., obviating the payment of the 20% royalty to which the former company was legally entitled.

The present company has disregarded old workings and opened a new mine, by 2 tunnels, of about 2 miles length each, and 5 new shafts. The

Diamante, Peña Blanca, Carmen and Noruega 2-compartment shafts have 4 levels opened, and are bottomed at 410'. The 4-compartment Esperanza shaft is planned to do the hoisting for the entire mine and the shops and power plant are near this shaft. Waste is used for filling, timber being very expensive, and used only for lining shafts and timbering important tunnels. The mines are equipped with powerful pumps. Estimates of ore in sight vary from 2,000,000 to 75,000,000 tons, the latter figure being excessive, and not countenanced by the management. Reserves of ore blocked out are said to be kept 4 years ahead of smelter consumption, these including first-grade ore of 8 to 10% copper tenor, with good silver values, and second grade ore, of uncertain copper tenor, though probably workable in the main.

The reduction works, at La Fundición, near Tifahuarea, 9 miles from the mines, are connected therewith by rail. All buildings are of steel frames, covered with corrugated iron. The plant treats a small quantity of custom ores and has a sampling mill with crushers, rolls and chain-bucket elevators. The works are terraced throughout, permitting the handling of material by gravity, and are built on the unit plan, so that their capacity may be doubled or, if desired, quadrupled at later date.

The furnace building has twelve 2,000-ton flat-bottomed steel ore bins, filled from railroad tracks above, and loading into charging cars run alongside, that are drawn by small locomotives on a narrow-gauge track running on either side of each furnace, 2 cars constituting a charge. There are five 56x180" water-jacketed blast furnaces of about 300 tons actual daily capacity each. Slag is granulated by running water. The smelter building has a steel stack, 220' high and 20' in diameter. There are three 60' reverberatory furnaces and fourteen 18' six-hearth McDougal calcining furnaces. Six Dwight-Lloyd sintering machines were added in 1913.

The converter department, in a separate building, has 4 Pierce-Smith basic lined converters. Product of the converter is 99% blister copper, in cakes, shipped to Baltimore for refining.

The power plant includes a boiler house with sixteen 250-h. p. Babcock & Wilcox boilers, and an engine house, latter having a 600-h. p. Nordberg cross-compound engine, direct-connected to a 440-k. w. Westinghouse generator; two 475-h. p. Nordberg engines, direct-connected to two 250-k. w. generators; a 750-k. w. Westinghouse alternator and dynamo and 2 smaller dynamos furnishing electric power and light. There are 3 No. 11 Connorsville blowers, driven by a Nordberg cross-compound engine, a large Nordberg air compressor for converter blast, and an air compressor for the pneumatic operation of furnace doors, etc. The power plant is practically duplicated, as a precaution against accidents.

A 12,000-h. p. hydro-electric plant was completed in 1913 and will greatly help the company's operations. The plant has a 10½-mile ditch and pipe line with a fall of 750', delivering 200 second-feet of water to 6 Pelton wheels connected in sets of 2 with three 3,000-k. w. dynamos. The transmission line is 70 miles long and will serve both Cerro de Pasco and Morococha. The entire plant cost \$1,000,000.

The adoption of electric power has greatly relieved the fuel situation and made the company practically independent of foreign coke.

The company furnishes its own fuel, owning extensive beds of bituminous coal, of rather indifferent average quality, though with some coal of coking grade. The principal coal mines are at Goyllarisquisca, Quishuarcancha and Vincuscancha. A branch line of the railway to Goyllarisquisca is 21 miles long, to Quishuarcancha 11 miles, the Vincuscancha coal mine being about midway. The coke plant, near the smelter, has seventy 75-ton

beehive ovens, making a satisfactory coke for blast furnace use, no coke being imported. The coal contains 50 to 60% fixed carbon, 20% volatile matter and about 13% ash, with considerable sulphur.

The company's brick plant has proven an important success, as imported brick of all kinds are very costly, and the local plant turns out fire and silica brick of very fine quality, from clays found in the mines, and common building brick are made from a clay pit near the Vincuscancha mine. This plant also makes tile and tile pipe. A limestone quarry, 12 miles from the works, furnishes flux.

The Cerro de Pasco railway, owned by the company and operated under a government concession, has a main line of 83 miles, running from Cerro de Pasco to Oroya, where connection is made with the Central Railway of Peru, which runs thence 130 miles to Callao, the latter line being one of the most notable in the world, having cost \$43,000,000 and gaining nearly 3 miles vertical elevation, reaching the highest altitude of any railroad on the globe, after surmounting almost incredible obstacles, having an average grade of 2.5%, with no less than 57 tunnels, including the Galera tunnel of 1 kilometer length which cuts through a ridge of the Andes. The Cerro de Pasco railway has a branch to the coal fields, and, with all spurs, sidings and yards, has about 135 miles of standard-gauge track, laid with 70-lb. rails. The main line has an average grade of 1.5%, with a maximum grade of 3%, and cost upward of \$2,000,000. Equipment includes 13 locomotives, in addition to 6 light switching engines at the smelter, and 59 steel ore and coal gondolas, with a total of 247 forty-ton cars, rolling stock being of the best American manufacture. The railroad is on a paying basis.

The company has 2 hotels, one for native and one for American labor, and maintains a clubhouse with bowling alley, swimming pool, gymnasium, etc., which is a social center and aids greatly in keeping the American workmen and their families contented. The company also furnishes facilities for riding and hunting. Although the altitude is very high, people of normal good health find no difficulty in living comfortably in the rarified air of Cerro de Pasco. Wages range from \$2.50 to \$4 per day for white labor, and 60 to 75 cts. per day for native common labor, the latter being tractable, and, for some purposes, fairly efficient. Up to \$2, and even \$2.50 per day, is paid the native timberman. The company employs about 2,200 men at the copper mines, 1,500 men at the smelter, 1,000 at the Goylarisquisca coal mine, 400 at the Vincuscancha coal mine, and 200 at the Quishuarcancha coal mine.

Production: 3,389,787 lbs. copper in 1906; 20,258,689 lbs. in 1907; 23,646,921 lbs. in 1908; 30,327,423 lbs. in 1909; 34,713,012 lbs. in 1910; 48,600,926 lbs. in 1911; 45,272,000 lbs. in 1912; 43,856,000 lbs. in 1913; 40,753,000 lbs. in 1914; 60,000,000 (approximately) in 1915; and in 1916, to June, has averaged 6,000,000 lbs. per month. Of the 1915 production practically $\frac{1}{4}$ was furnished by Morococha.

The Cerro de Pasco is undoubtedly the most expensive copper proposition ever developed, the total investment to date being nearly \$25,000,000. Many serious discouragements were met in the earlier days, but overcome, and sufficient progress has been made to justify terming the property a success. The ores are refractory and the great altitude of the smelter, which is 14,300' above sea-level, coupled with inefficient native labor, have given rise to an exceedingly complex and tiresome problem in ore reduction. Estimating cost of production at 8c per lb. and annual output at 70,000,000 lbs., earnings per share of the Cerro de Pasco Copper Corporation would be \$4.20 on a 14c, \$8.40 on a 20c and \$12.60 on a 26c copper market.

Morococha Mining Co.

Office: 15 Broad St., New York, and Morococha, Junín, Peru. **Officers:** E. H. Clark, pres.; L. T. Haggin, v. p.; H. Esk Moller, sec.-treas.; H. Kingsmill, mng. supt. **Inc.** 1908 in New Jersey. **Cap.**, \$10,000,000. Company is a subsidiary, formed by the New York interests of the Cerro de Pasco Co., prior to the settlement of litigation with the Socavon del Cerro de Pasco.

Property: the Gertrudis, San Francisco and San Miguel mines and a one-half interest in the Natividad mine, which is owned jointly with the Backus & Johnston Co.

The Mina Gertrudis, opened 1897, on the Cerro San Marcello, shortly west of Lake Morococha, shows 3 limestone beds with ore impregnations following the bedding planes; vein has strike of N. 51° E. and nearly vertical dip. It averages about 2 meters in width, with a paystreak of 60 cm. to 1 meter, carrying gray copper and chalcocopyrite averaging about 14% copper and 1,000 grams silver per metric ton, balance of vein carrying about 5% copper and 300 grams silver per metric ton. The mine has a 12-meter shaft, but is developed mainly by a tunnel, just above the level of Lake Morococha, mining through winzes sunk from short crosscuts in the hanging. Ore is hand-cobbed at the portal of the tunnel.

The Natividad mine is opened to about 300 meters depth, developing a vein about 4' wide, carrying ore averaging about 14% copper and 14 to 70 oz. silver per ton. A new tunnel, planned to be 750 meters long, is being driven under the old workings.

The Mina San Miguel is developed by the Copaycocha and Vulcano tunnels, lower of about 500 meters length, and ore is mainly enargite, with some tetrahedrite and tennantite, associated with pyrite. Mine was opened 1894, and in 10 years produced from ore averaging about 20% copper and 333 grams silver per metric ton, 6,476,400 kgs. fine copper and 10,794 kgs. fine silver.

The San Francisco is opened by a 4,000' tunnel, completed in March, 1916, known as the Carlos Reynaldo adit.

Production is gradually increasing and the greater part of the ore is sold to and smelted by the Cerro de Pasco Mng. Co. Production is approximately 20,000,000 lbs. per year. In 1915 company furnished $\frac{1}{3}$ of the output of Cerro de Pasco Mng. Co.

CERRO GORDO MINES CO.**CALIFORNIA**

Office: 1011 First Nat'l Bank Bldg., San Francisco, Calif. Mine address: Keeler, Calif. Frank J. Mambly, pres.; L. D. Gordon, v. p. and gen. mgr.; A. L. Dornberger, sec.; F. J. Hagenbarth, treas.; preceding officers and J. E. Richards, directors. J. C. Climo, supt. **Inc.** July 16, 1914, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; 975,000 issued.

Property: the Cerro Gordo mines, 35 claims, 8 miles from Keeler, including the Union mine on Cerro Gordo hill and a water power on Lone Pine creek; formerly belonged to the Four Metals Sm. & Mng. Co.

The Union mine is an antigua, worked by Mexicans in early days and opened to a depth of 1,200'. The principal ores produced are silver-lead mostly carbonates, with some galena and lead sulphate; also zinc carbonate. The zinc ore occurs from the surface to the 900' level, and the silver-lead ore from the surface to the 1,150' level. Ores also contain gold and copper values. See U. S. G. S. Bull. 540, pp. 97-105.

Development: by the 900' Belshaw shaft, with a winze to the 1,150' level, and tunnels. The Tröeger tunnel is now in over 6,000' and cuts the vein system 1,200' below the workings of the Union mine. Underground workings are said to aggregate 20 miles.

Equipment: includes a Joshua Hendie 100-h. p. electric hoist; an

Imperial type 10 Ingersoll-Rand compressor, capacity 600 cu. ft. free air per min., driven by a 75-h. p. constant speed motor. The former steam plant is intact and consists of 70-h. p. steam hoist, 350 cu. ft. Ingersoll-Rand air compressor and 130-h. p. boiler. Electric power, voltage 400, is obtained from the Southern Sierras Power Co.

The Swansea smelter has a 50-ton furnace that was operated for a few months in 1909.

Production:	Tons	Oz.	Oz.	Lbs.	Lbs.	Lbs.
	Ore	Gold	Silver	Lead	Copper	Zinc
1915.....	8,926	126	112,541	748,952	121,510	4,544,666
1914.....	4,367	312	303,085	1,195,006	283,086	58,736

Ore produced in 1915 reported to average 33% zinc, or \$40.00 per ton. Ore is shipped to the United States Smelting Co. at Salt Lake City. Company employs 70 men.

Management plans erecting a concentrator.

CHAINMAN CONSOLIDATED COPPER CO.

NEVADA

Property sold to Consolidated Coppermines Company in Dec., 1913.

CHALCHIHUITES MINING CO., S. A.

MEXICO

Idle. Mine office: Chalchihuites, Sombrerete, Zacatecas, Mex. Milton R. Straight, pres.; Francis E. Agnew, v. p.; Jose de Ranchos, sec. Inc. Oct., 1909, in Mexico. **Property:** includes La Florencia, San Felipe and Ampliacion de Milagros mines, near Chalchihuites, carrying values mainly in silver. Operations suspended by revolution.

CHAMBERS-FERLAND MINING CO., LTD.

ONTARIO

Cobalt, Ont. **Officers:** C. Jorgensen, pres.; C. A. Richardson, v. p.; Alex. Fasken, sec-treas. Inc. 1908 in Ontario. **Cap.**, \$2,500,000; shares \$1 par. fully paid; 2,312,850 shares outstanding. Company controlled through ownership of $\frac{2}{3}$ of stock by Alladin Cobalt Co., Ltd.

Property: adjoins the Nipissing at Cobalt, Ont., and is supposed to have the extension of the Nipissing vein system. Faulting has made necessary a thorough system of crosscutting.

Ore: silver, in veins of calcite. **Property** supposed to have good chances of becoming a large producer, but the output has been comparatively small. Development work on the whole has been disappointing. Late in 1915 a 3" vein of high-grade silver ore was cut in a winze from the 350' level and stoping on this vein on the 426' level has yielded some shipping ore. Up to May, 1916, the vein has been drifted on for over 100'. The winze is 750' from the shaft and 37' from the Nipissing boundary line. Company employs 25 men.

Production: for 1914 amounted to 19,066 oz. silver.

CHAMPION CONSOLIDATED MINING CO.

OREGON

Officers: C. V. Bobb, managing director; H. C. Mahon, sec., Portland, Ore.; Olaus Jeldness, 2029 Second St., Spokane, Wash.; J. S. Lewis, v. p-treas. Inc. June, 1916. **Cap.**, \$300,000; shares 10c par.

Property: 49 claims, 800 acres, near Champion, in the Bohemia district, southern Oregon, including the Champion, Helena and Music mines. The properties discovered 1858 have a reputed gross production of \$2,200,000.

There are three parallel veins averaging 3' in width, which carry oxidized ores down to water level at 300' depth. Two ore-shoots are reported as 400' long and 25' wide and to assay \$3.50 per ton. Also a porphyry dike 150' wide which assays from \$1.60 to \$3.50 per ton in gold.

Development: all three mines are developed down to and have been stoped above the 300' level, with about 2,000' of workings. The most extensive work is at the Champion mine. New company is drifting on 300' level of Champion and Music mines, opening \$40 ore.

Equipment: power plant, hoists, etc., and a 30-stamp mill with concentration plant. Management plans enlargement to 50 stamps and addition of flotation unit.

CHAMPION COPPER CO.**MICHIGAN**

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Painesdale, Houghton Co., Mich. **Mill office:** Redridge, Houghton Co., Mich. **Officers:** Wm. A. Paine, pres.; Chas. J. Paine, Jr., v. p.; Frederic Stanwood, sec.-treas.; Frederick W. Denton, gen. mgr.; preceding, with Samuel L. Smith, Geo. P. Gardner, W. Cameron Forbes and Hon. Richard Olney, directors; H. Schacht, asst. gen. mgr.; John Jolly, underground supt.; Edw. Koepel, mill supt.; M. L. Cunningham, asst. mill supt.; H. F. Mercer, chief engr.; E. W. Kruka, chief clerk; W. J. Richards, master mechanic.

Inc. Dec., 1899, in Michigan. Cap., \$2,500,000, shares \$25 par. Is controlled jointly by Copper Range Consolidated Co. and St. Mary's Mineral Land Co., through equal ownership of stock, and owns \$110,000 stock in the Michigan Smelting Co. Balance sheet of Dec. 31, 1915, showed a net profit of \$3,709,049 and a surplus of \$1,815,868. Receipts from ore sales in 1915 were \$5,814,279. Dividends: \$3 in 1903; \$2 in 1904; \$10 in 1905; \$12 in 1906; \$10 in 1907; \$5 in 1908; \$8 in 1909; \$9 in 1910; \$5 in 1911; \$11 in 1912; \$9 in 1913; \$31 in 1915; \$30.60 in 1916, to Aug.; a total of \$145.60 per share, or \$14,560,000.

Property: 1,240 acres, being the S. $\frac{1}{2}$ of Sec. 30, W. $\frac{1}{2}$ and N. $\frac{1}{2}$ of N. E. $\frac{1}{4}$ and S. W. $\frac{1}{4}$ of N. E. $\frac{1}{4}$ of Sec. 31, T. 54 N., R. 35 W., practically all on the mineral belt. Neighbors are the Copper Range and Trimountain on the north, lands of St. Mary's Co. and Hussey, Howe & Co. on the east; Hussey-Howe lands and the Globe tract on the south, and Copper Range lands on the west. The tract carries 9,047' on the strike of the bed, and, at the present angle of dip, the deepest shaft could go down to the impossible depth of 18,950' before reaching the western boundary.

Geology: development started in 1899, under direction of Dr. L. L. Hubbard, and 3 parallel amygdaloidal beds were uncovered by trenching, one of which, the Baltic, showed phenomenal copper values. The 2 amygdaloids paralleling the Baltic bed showed copper in sufficient quantities to render their future exploration advisable. A fourth amygdaloidal bed, about 15' wide, discovered 1901, east of the Baltic bed, carries heavy copper to an encouraging extent, and there also is a fissure vein of arsenical ore, apparently algodonite (copper arsenide) near "C" shaft. The width of this vein at surface is slight, and mineral contents variable, but on the second level the fissure is 2' wide, and well mineralized.

The dip of the Baltic bed at the Champion is about 70° and strike same as at the Trimountain, not the easterly trend of the Baltic mine. The bed runs 13 to 45' and averages 24' width, carrying more epidote than at the Trimountain and Baltic. The surface of the tract is very hilly, but the overburden is less than is found either to the northward or southward. The stretches of lean ground in the mine are few, and the bed carries heavy copper in profusion, mostly in barrel size, but running up to masses of 10 tons in weight. Only about 60% of the rock broken is hoisted, waste rock being sorted out and used for dry walling, packing itself.

All shafts are connected on numerous levels and about 2 miles of new workings are made yearly. The bed shows so little poor ground that nearly every level will be opened from end to end of the mine, eventually giving the longest average drifts of any Lake Superior property. The only really poor ground found in the mine was shown in "E" shaft, between the 3d and 4th levels, and the mine shows some stopes of phenomenal width and rich-

ness. The ground opened, 1914, was of average value. A large area of good ground was opened between Nos. 2 and 3 shafts in 1915.

Development: by 4 shafts, named from north to south: "B" shaft, the northernmost, 1,835' south of the Trimountain boundary, is 2,356' deep; "C" shaft, 1,050' south of "B," is 2,334' deep; "D" shaft, 1,300' south of "C," is 2,168' deep; "E" shaft, 1,300' south of "B" and 3,900' north of the Globe boundary, is 2,388' deep. The third level of "E" shaft has been driven 3,000' toward the Globe boundary. "F" shaft, started 1,300' south of "B," was abandoned on account of treacherous overburden, but the Baltic bed was located, 1907, by diamond drill at a new site, 1,800' south of "E," and 2,100' north of the Globe boundary.

No shaft sinking was done in 1915, but about 15,000' of drifting, 749' of crosscutting and 5,094' of raises was accomplished.

Equipment: the shafts are practically duplicates in all essential particulars, having 40x50' shaft rock houses, with 90-ton ore bins, enlarged, 1908, by the Wisconsin Bridge & Iron Co. Equipment at each rock house includes a steam hammer for heavy copper, and one 12x15" rock crusher, taking everything hoisted from the mine direct from chutes. The shafts have duplicate first-motion Nordberg hoists with 24x60" duplex cylinders and double conical drums of 14' diameter, with capacity for two 3,000' cables each, hoisting 6-ton skips. The boiler houses have Bradley and Burt boilers, with coal trestles connecting. Water for boilers is furnished from a 12,000-gal dam.

Very extensive use is made of electric power on surface, and there are some underground electric pumps. The electric plant at "F" shaft has a 250-k. w. General Electric generator, direct connected to an Allis-Chalmers cross-compound vertical engine.

The main steel compressor building at "F" shaft has a 100-drill Nordberg quadruple expansion 2-stage air compressor, with capacity to compress 9,120 cu. ft. of free air per minute to a pressure of 70 lbs. per inch. The compressor operates at a steam pressure of 280 lbs., and has a regenerative feed-water system. Power is furnished by three 250-h. p. Geary water-tube boilers. At "B" shaft there is a 40-drill Ingersoll-Sergeant cross-compound 2-stage air compressor with vertical receiver inter-cooler. The electric plant, with a 100-k. w. generator, is in the main compressor building.

Buildings at the mine include a change house, dwellings and machine shop, with traveling crane and trolley rail for its entire length, with a 30-h. p. electric motor.

The stamp mill is at Freda, on Lake Superior, 2 miles west of Redridge. Lower-pressure turbine and accessories were installed in 1915. The mill has 6 Nordberg stamps, there being 4 compound stamps, with 15½" cylinders, each treating about 700 tons daily, and 2 simple stamps, with 28" cylinders, of about 660 tons daily capacity each, giving the mill a total capacity of fully 4,000 tons daily.

The concentration department was remodeled, 1908, and given additional tables and larger settling tanks. The wash for the heads has Hodge graduated adjustable-speed jigs, with plungers working simultaneously or alternately, in pairs, Woodbury jigs and Deister concentrating tables. Raggings are reground by Allis-Chalmers crushing rolls having 1 roll fixed and the other in a spring bearing. The preliminary discharge from the stamp heads is treated on very large jigs, having 30x48" sieves, of punched steel, with one-eighth inch openings, installed in connection with the head. Each head has a V-shaped settling tank, 40' long, 9' deep, 12' wide at the top and 6" wide at the bottom, slimes being drawn from spigots at the bottom. The flow of water through the settling tanks does not exceed 6' per minute.

The mill is heated by hot water from a Green fuel economizer.

The steel boiler house has four 200-h. p. Stirling boilers, 5 Dutch oven Scotch marine boilers and 2 Hawley down-draft furnaces. Coal is brought to the boilers by tram, and reduced to uniform size by a grinder before feeding to the grates, and ashes are washed into the lake through a launder. Exhaust steam passes through dry condensers, thence to a hot well, from which water is fed to the boilers. Power for the mill is supplied by a 500-h. p. Nordberg cross-compound engine, with a 180-h. p. engine in reserve.

The steel pump house, with truss roof and traveling crane, has a 20,000,000-gal. Nordberg triple-expansion pump. Water for the mill and boilers comes from the lake through a 1,020' tunnel, the shore end having a well with bottom 8' lower than the lake level, this being the longest tunnel ever driven under Lake Superior. The intake crib has an area of 45 sq. ft. and, with a second crib, the tunnel could furnish water for 10 stamps. Water cost is less than 1½ cts. per ton of rock stamped. Screens have been installed in the tunnel, obviating the trouble formerly caused by sand and wood pulp in the water. A sand loading plant was erected in 1915. During the year 220,920 cu. yds. of stamp sand were run into the mine for fill.

	Stamped Tons	Produced Pounds	Yield per Ton	per Pound	Price Received	Net Profits
1915.....	923,743	33,407,599	36.17	06.30c	17.40c	3,709,049.02
1914.....	614,854	15,807,206	25.71	09.21c	13.38c	658,175.99
1913.....	421,849	12,080,594	28.64	10.71c	14.89c	504,767.61
1912.....	765,306	17,225,508	22.51	08.88c	16.16c	1,251,619.40
1911.....	734,392	15,639,426	21.29	09.63c	12.54c	454,588.61
1910.....	722,051	19,224,174	26.62	07.85c	12.74c	939,205.03
1909.....	753,908	18,005,071	23.88	08.45c	13.00c	816,637.55
1908.....	794,703	17,786,763	22.38	09.01c	13.39c	777,480.14
1907.....	708,685	16,489,436	23.26	11.76c	17.28c	909,383.88
1906.....	671,785	16,954,986	25.24	09.30c	19.06c	\$1,654,435.23
	7,111,276	182,620,763	25.68	08.78c	15.17c	\$11,675,342.46

The Champion is one of the largest and richest of Lake Superior mines and has been admirably managed.

CHAMPION COPPER CO.

NEW MEXICO

Offices: 7 Government St., Kittery, Me., and 1853 Commonwealth Ave., Boston, Mass. Mine address: Copper Hill Box, Dixon, Taos Co., N. M.
Officers: A. M. Bartlett, pres.; Benj. B. Earle, v. p.; Arthur M. Cripps, sec.-treas.; preceding, with Ralph Thompson, Chas. W. Kokerda, directors. Jas. A. Burton, gen. mgr., Dixon, N. M. Inc. July 7, 1911, in Maine. **Cap.**, \$200,000, shares \$1 par, assessable. Listed Boston Curb. Annual meeting Feb. Commonwealth Tr. Co., Boston, transfer agt.

In report issued March 1, 1916, company reports assets of \$39,185.27 cash, \$136,206.70 in accounts receivable, \$2,622.23 due on assessments, and \$21,985.80 as cost of property, development and expenses to Dec. 31, 1915. Work at the mine was resumed March 6, 1915. In July, 1914, judgment was entered for \$12,500 and property ordered sold to satisfy claim of Champion Copper Co. against another company of same name, which operated property prior to present corporation.

Property: 5 claims, patented, 100 acres, also four 5-acre mill sites and a 40-acre water right, on Copper hill, in the Copper Mountain district of Taos county, 9 miles east of Embudo, the nearest railroad station, and 25

miles N. E. of Taos. Mine is said to have 8 practically parallel veins of 18' to 20' width, between a schist footwall and quartzite hanging wall, carrying cuprite, malachite and chrysocolla, succeeded at depth by chalcocite and gray copper, ore all argentiferous and auriferous, with chalcopyrite beginning to show in lower workings, all with quartz gangue.

Development: includes shallow shafts and surface cuts on several claims, a 160' shaft on the Champion, a 180' shaft sunk on a 4' vein in the Oxide mine, and a 500' tunnel, which has stoping ore and cuts a 45° blanket vein. Company plans sinking Champion shaft to 500' and opening drifts at 100' intervals. **Equipment:** includes a Leyner air compressor, in the mill, with a power house adjoining. A 1,000' ground tram leads from the mouth of the Champion tunnel to ore bins. Improvements include a 15,300' gravity pipe line, of 7" spiral steel-riveted pipe. Was not regarded favorably by the late Horace J. Stevens.

CHAMPION COPPER MINING CO.

IDAHO

Idle. **Office:** 311 Sprague Ave., Spokane, Wash. Mine near Mullan, Shoshone Co., Idaho. **Officers:** Adam O'Donnell, pres.-mgr.; Wm. J. Coates, sec.; J. H. Wourms, treas.; preceding officers, Patrick Sullivan and F. C. Robinson, directors. **Cap.**, \$1,500,000, shares \$1 par, assessable. **Property:** 6 claims, south of the Reindeer mine, 3 miles from a railroad, near the head of Boulder creek, on the southern slope of Stevens peak, 4 miles south of Mullan. Said to show a mineralized zone of 75 to 100' width, with a vein ranging up to 25', carrying chalcopyrite and occasional bornite, said to average about 5%, with quartz and calcite gangue. **Development:** by 2 tunnels, lower of about 900'.

CHAMPION MINING CO.

IDAHO

Idle. R. T. Badger, sec.-treas., Utah National Bank Bldg., Salt Lake City, Utah. Mine office: Mackay, Custer Co., Idaho. **Officers:** Edw. R. Hall, pres.; C. T. Mixer, v. p.; preceding, with O. D. Mallory and J. E. Frick, directors; H. A. Brown, supt. **Inc.** 1905 in Utah. **Cap.**, \$100,000, nonassessable. **Property:** 9 claims, unpatented, in the Alder Creek district, 6 miles from a railroad. Developed by tunnel, with about 1,500' of workings, showing silver, lead and copper ores.

CHAPARRAL MINING CO.

ARIZONA

C. H. Blacker, gen. mgr. Company has a lease on the Little Jessie gold mine, owned by the Ohio Mines Co., at Chaparral, Yavapai Co., Ariz., and described thereunder. Was operating in 1915, but returns not reported.

CHASE CREEK COPPER CO.

ARIZONA

Mine office: Clifton, Greenlee Co., Ariz. Clarence K. McCornick, pres.; H. G. Smith, treas.; S. S. Campbell, mgr.; Isaac N. Stevens, supt. **Cap.**, \$5,000,000. **Property:** 52 claims, 1,040 acres, 8 miles west of Clifton, having a 2,300' tunnel, 6x8', on lands adjoining the Longfellow mine, cutting the Longfellow orebody, of concentrating grade, at a distance of 493', having a back of about 900', showing low-grade sulphide copper ore. Tunnel practically reaches the Coronado railroad, permitting advantageous shipments. Was making small shipments to the Shannon smelter in 1914. Property considered promising.

CHATTANOOGA COPPER CO.

TENNESSEE

Address: J. I. Carter, Chattanooga, Tenn. **Officers:** J. I. Carter, pres.; John Stagmaier, v. p.; G. H. Miller, v. p.; S. E. Whitaker, sec.; P. B. Carter, treas.; with R. B. Davenport, W. S. Palmer, J. C. Vance, R. G. Brock, W. H. Weatherford and A. E. Tucker, directors. **Inc.** 1914 in Tenn. **Cap.**, \$500,000.

Property: 120 acres in northern part of Ducktown copper district, Polk Co., surrounded on 3 sides by the holdings of the Tennessee Copper Co.,

and the Ducktown Copper, Sulphur & Iron Co., adjoins the East Tennessee mine on the east, owned by the last named company. Several diamond drill holes prove that the ore deposits of that mine extend downward on their dip beneath the land of the Chattanooga Copper Co., and that the ore is identical in character, mineral association and occurrence with that of the East Tennessee mine. Ore was found in the drill holes at depths of 685 to 1,050'. Ownership of surface carries ownership of all beneath the surface, as Tennessee does not have an apex law. Diamond drill records would indicate an orebody 290' long, 415' in depth and 30' thick, equal to about 241,000 tons, allowing $\frac{1}{3}$ for waste. Development might add to this figure.

The property is an attractive one, especially when the low operating costs of the Ducktown district are considered.

CHELAN CONSOLIDATED COPPER CO.

WASHINGTON

Michael J. Corcoran, asst. sec.-treas., 180 Broadway, New York. Operating office: 811 Lowman Bldg., Seattle, Wash. Mine office: Leavenworth, Chelan Co., Wash. F. D. Wilsey, v. p.; Thos. J. Higgins, sec.-treas.; preceding officers, Henry D. Bristol, Edw. W. Kuhn, A. T. La Vallette, J. L. Jurey and Louis Arndt Stein, trustees.

Inc. May, 1906, in Wash. Cap., \$12,000,000, shares \$10 par, nonassessable; issued, \$5,779,140. Guaranty Trust Co., New York, registrar. Annual meeting 1st Tuesday in June. Company absorbed the Red Mountain Gold & Reduction Co., the North Star Mng. Co. and a large number of individual mining properties.

Property: 14 claims at Index, Snohomish Co., and 130 claims at Red Mountain, Chelan Co., Wash., 50 miles north of Leavenworth.

Property: the Index mine, between the Ethel and Bunker Hill Sullivan mines, has a 4' vein, opened by tunnels of 600' and 700', with about 2,000' of workings, showing a 6" paystreak of high-grade bornite and chalcopyrite ore.

The Red Mountain lands, unpatented, 4 miles west of Phelps creek, include 67 claims owned outright, and 58 additional claims held through the North Star Mining Co., which is controlled through stock ownership. Development: by 2,000' main tunnel, supplemented by 600' of diamond-drill borings, showing a 5' vein carrying values in copper and gold, and 2 smaller veins. **Equipment:** includes gasoline power and an Ingersoll air compressor, and there are 6 or 7 buildings.

Company is inactive, as ore is too low-grade and in too small quantity to operate profitably.

CHEMUNG COPPER CO.

NEW MEXICO

Bought out, Aug. 18, 1912, by Phelps, Dodge & Co., and dissolved, after paying shareholders \$1,381,072, or \$6.16 per share.

CHEROKEE COPPER CO.

MICHIGAN

Idle. Herman W. Fesing, supt., Houghton, Mich. Mine address: Lake Mine, Ontonagon Co., Mich. **Officers:** W. A. Hodgson, pres.; Linus Stannard, 1st v. p.; Deen L. Robinson, 2nd v. p.; Wm. D. Calverly, sec.-treas.; preceding, with J. H. Rice, B. M. Chynoweth and R. M. Edwards, directors. Inc. April, 1910, in Michigan. Cap., \$2,500,000; shares \$25 par; issued, \$1,750,000, of which 49,000 shares were given for lands, 5,000 shares went to the promoters, and 16,000 shares were sold to the public at \$5.

Property: 800 acres, Sec. 2 and S. E. $\frac{1}{4}$ of Sec. 3, T. 51 N., R. 57 W., lying between the Bohemia and King Philip, 1 to 2 miles S. W. of the latter, formerly were owned by the Penn Mining Co., and later by the ill-starred Belt Mines Co., Ltd. Land, entirely on the mineral belt, formerly included what is now the Lake mine of the Lake Copper Co., and carries upwards

of a mile of the copper-bearing formation, presumably carrying the Evergreen belt. In 1913 diamond drilling began. No. 6 drill hole cut a cupriferous amygdaloidal bed of 32' width, of which 5' carried good copper. Company has about \$40,000 in treasury. Development work, consisting of shaft sinking and crosscuts, will be done in 1916.

CHERRY CREEK MINES CO.

ARIZONA

Mine office: Cherry, Yavapai Co., Ariz. Main shaft, 115', said to show a vein with 3' paystreak giving assays of about 12.5% copper, 4 oz. silver and \$9.60 gold per ton. Drilling operations reported in 1914.

CHESTERFIELD COPPER CO.

ARIZONA

Bankrupt. See Blanche Rose Mng. Co. Fully described Vol. XI.

CHETICAMP COPPER CO., LTD.

NOVA SCOTIA

Idle. Office: 37 Sackville St., Halifax, N. S. Mine office: Cheticamp, Inverness Co., N. S. Edward Staris, pres.; John W. Regan, sec.-treas.; Milton V. Grandin, supt., at last accounts. Inc. May, 1904, in Nova Scotia. Cap., \$3,000,000, shares \$1 par, as a merger of the Eastern National Copper Co., Ltd., and 3 other corporations.

Property: 950 acres, freehold, also a 200-acre mill and smelter site, 1,000 acres timber lands, and 200 acres water frontage, with a government license for exploring and locating mines on 50 sq. miles.

Property shows a mineralized zone, in micaceous schist, of 350' width, traceable 1½ miles, carrying 4 orebodies, of which 3 are developed by a 200' shaft and by tunnels of 25', 35' and 115', claimed by company to show 250,000 tons of exclusively sulphide ore, averaging 2.5 to 3.5% copper, 18% lead, 30 oz. silver and \$2 to \$30 gold per ton. Nearest railroad is 38 miles, but mine is 5 to 6 miles only from tidewater. Property considered promising, though estimates of tonnage and values are excessive.

CHETKO COPPER CO.

OREGON

Idle. Office: Ashland, Ore. Mine near Kerby, Josephine Co., Ore. Officers: C. W. Evans, pres. and gen. mgr.; C. C. Hicks, v. p. and supt.; A. E. Shepard, sec.-treas.; J. M. Keith, mine supt., at last accounts. Inc. Aug. 10, 1905, in Ariz. Cap., \$1,000,000, shares \$1 par; issued, \$730,516.

Property: 36 claims, 720 acres, fairly timbered, and 2 water rights, all in Curry county, Oregon, about 70 miles from Grant's Pass, the nearest railroad point. Said to show 8 orebodies, with 2 under development, 1 reported by company as of 240' average width, traceable 1¼ miles, carrying native copper in schist, also covellite, bornite and chalcocopyrite, claimed by company as of 9% average copper tenor, with \$4.75 gold per ton. **Development:** by shafts of 45', 34' and 80', and by 6 tunnels, of 30 to 230' length, with 969' of workings, estimated by company to show 600,000 tons of ore, with 115,000 tons blocked out for stoping, all of which figures are regarded as excessive.

CHEWELAH COPPER KING MINING CO.

WASHINGTON

Office: 115 Wall St., Spokane, Wash. Mine office: Chewelah, Stevens Co., Wash. Officers: S. P. Domer, pres. and gen. mgr.; H. H. Hebert, v. p.; J. Grier Long, sec.-treas.; preceding, with E. W. Shively and F. M. Jarvis, directors. Inc. 1898 in Washington. Cap., \$100,000, shares 10 cts. par, changed 1909 to \$1,000,000, shares \$1 par, and increased March, 1912, to \$1,250,000; issued 1,136,230 shares. Bonds \$30,000, authorized at 8%; issued, \$10,360. Annual meeting, third Thursday in May.

Property: 4 claims, 1 fractional, 47 acres, patented, and a 3-acre mill site, with 80 acres miscellaneous lands, 6 miles east of Chewelah, shows 4 orebodies, estimated widths of 8 to 56', carrying mainly chalcocopyrite and gray copper, with estimated values of 3 to 5% copper, 2 to 6 oz. silver and

\$1 to \$2 gold per ton. **Development:** 300' shaft, and tunnels of 1,200' and 1,350', estimated by management to show 300,000 tons of ore.

Equipment: includes 100-ton smelter. Operations were suspended for lack of funds and receivership asked by creditors December, 1915.

CHEWELAH GREY COPPER MINING CO. WASHINGTON

Chewelah, Stevens Co., Wash. A. I. Kulzer, pres.; E. D. Germain, sec.-treas.; F. M. Jarvis, supt. Inc. in 1915. Company has taken a bond on the Lookout claim of the Copper Hoard Mining Co. (See Vol. XI), which adjoins the property of the United Copper Co. on the north and is supposed to have the continuation of the orebody mined by that company. Present management is sinking from the 115' tunnel to the 400' level to open up this orebody in Lookout ground.

CHICAGO-BOSTON MINING CO. IDAHO

Wallace, Idaho. C. W. Gossert, supt. Cap., \$1,500,000; shares \$1 par. Stock unlisted and none for sale. Owns 7½ claims on Lake Creek, 2 miles S. W. of Wallace, said to show two ore-bearing veins, one, the Tin Cup, having high-grade gray copper ore, from which shipments have been made. The second vein, the Kill Buck, is said to have 8 to 12' of milling ore, opened by No. 6 tunnel. Developed by 6 tunnels, lowest 1,200' long. Power is furnished by the company's water-power plant.

CHICAGO COPPER MINING CO. NEW MEXICO

Office and mine: Oscuro, Lincoln Co., N. M. **Officers:** E. G. Rafferty, pres., treas. and gen. mgr.; H. H. Miller, v. p.; H. E. Riddle, sec.; preceding, with H. R. Rafferty and M. Loquis, directors. Inc. Jan. 31, 1906, in New Mexico. Cap., \$1,000,000, shares \$100 par, nonassessable. **Property:** 22 claims, unpatented, include Copper Boy and Copper Queen mines, 18 miles from a railway, in the Oscuro mountains, also real estate in Oscuro. Developed by a 60' shaft, and tunnels of 60', 120', 222' and 1,550', with about 3,000' of workings, from which former owners shipped several carloads of ore, said to have returned \$270 per ton. Has steam power and a 2-drill Sullivan air compressor. Reported shipping ore in 1914.

CHICAGO COPPER REFINING CO. CALIFORNIA

Office: Kesner Bldg., Chicago, Ill. **Mine office:** Red Bluff, Tehama Co., Cal. **Officers:** Wm. Wrigley, Jr., pres.; A. G. Cox, v. p.; N. E. Guyot, sec. and supt.; Edw. Dickinson, treas.; preceding, with Chas. P. Whitney, directors. Inc. Aug., 1908, in Wyoming. Cap., \$2,000,000, shares \$5 par, nonassessable. Has no connection with the Chicago Copper Refining Co., of Illinois, now bankrupt.

Has a 99-year lease on the property of the California & Massachusetts Copper Mines Co. **Lands:** 72 claims, 1,600 acres, unpatented, well timbered and watered, on Tom Head mountain, 25 miles west of Red Bluff, known as the Tom Head mine. **Geology:** property shows schists, cut by rhyolite dikes, carrying 3 veins, with gossans of 90 to 300' width, 1 vein, of 30' estimated average width, carrying chalcopryrite, associated with pyrite, estimated to assay 2 to 3% copper, 0.5 oz. silver and \$1.40 gold per ton. Mine formerly was reported to carry bornite and native copper, and No. 3 tunnel is said to have given ore assaying up to 18% copper, with small gold values. Developed by tunnels of 45', 355' and 460', with about 2,000' of workings, estimated by management to show 250,000 tons of ore.

Equipment: includes an 80-h. p. steam plant, with a small hoist and 4-drill Sullivan air compressor. Lands carry undeveloped water power estimated at 3,200-h. p. There is a 4,000' sawmill, and 10 buildings. Management is said to plan experiments with flotation process. Property, though low in grade, gives evidence of having large orebodies. Superin-

tendent reports that "while property is intact and protected, work will not be resumed until Forestry Bureau exactions cease and smoke restrictions are modified so as to permit smelting."

CHICAGO EXPLORATION & DEVELOPMENT CO. MEXICO

Address: Mina Mexico, Sonora, Mex. W. E. Pomeroy, mgr.; Geo. Squire, smelter supt.; Chas. Gercken, mine supt. **Property:** 45 miles N. E. of Tonichi, the end of a branch line of the S. P. de M. R. R., produces silver-copper ore and concentrates.

CHICAGO MINES CO. MISSOURI

Operates 10 acres land owned by the Conner Investment Co. Property in Sec. 28, T. 28, R. 32, Webb City, Jasper county, is opened by two 200' shafts. Equipped with a 200-ton mill.

CHICAGO-NEVADA TUNGSTEN CO. NEVADA

Lovelock, Nevada. **Address:** care H. M. Byllesby & Co., 208 La Salle St., Chicago, Ill. **Property:** the Ragged Top and Besson group, 11 miles from Toulon, a station on the S. P. R. R., shows tungsten deposits. Ore will be treated in a mill planned to be put up at Toulon on the shore of Humboldt sink.

Production: 550 tons in May and June, 1916. The mill will handle custom ores.

CHICHAGOFF MINING CO. ALASKA

Chichagoff Island, Alaska. Controlled by Hugh P. Wallace and W. R. Rust of Tacoma, Wash. James L. Freeburn, supt.; Angus Mackay, cons. engr. **Property:** the Chichagoff mine, better known as the De Groff, 60 miles from Sitka, 125 miles from Juneau, carries high-grade, free milling quartz, said to average better than \$7 per ton. Reported to be shipping over \$50,000 in bullion a month.

Equipment: 30-stamp mill with tube mill section and daily capacity of 110 tons of ore. A flotation unit is planned for 1916. Company has hydro-electric plant with dam at Rust Lake. 125 men employed. See U. S. G. S. Bull. 504, p. 22.

CHIEF CONSOLIDATED MINING CO. UTAH

Office: Houghton, Mich. Wm. P. Seager, sec.-treas. Mine office: Eureka, Juab Co., Utah. **Officers:** Walter Fitch, pres. and gen. mgr.; F. W. Denton, v. p.; Cecil Fitch, supt.; above with J. H. Rice, W. A. Hodgson and D. L. Robinson, directors. Inc. Feb. 9, 1909, in Arizona. **Cap.,** \$1,000,000; shares \$1 par, nonassessable; issued, \$877,046. Houghton National Bank, registrar; Boston Safe Deposit & Trust Co., transfer agent. Has about 1,900 shareholders. Stock is listed on the Boston curb. Annual meeting, third Tuesday in February.

Dividends: Feb., 1913, 10%; Aug., 1913, 10%; Feb., 1914, 5%; Aug., 1914, 5%; Aug., 1915, 5%; in 1916, 15% to July 15; total to date, \$438,822.

Company controls, through ownership of 98% of stock issue, the Eureka City Mining Co. Sixth annual report for fiscal year ending Dec. 31, 1915, shows receipts from ore sales, \$290,907, and cash on hand, \$186,748.

Property: 14 patented claims, 775 acres and 212 unpatented claims, 3,659 acres, in the Tintic and North Tintic mining districts. Company also owns the mineral rights under the city of Eureka.

The Eureka lands carry about 4,000' of the strike of the Victoria ore channel, which has an extreme width of about 400', the Victoria ore channel being on the Mammoth-Grand Central ore zone, and parallel to the Centennial-Eureka zone. The Victoria ore channel has a practically N.-S. strike, the ore occurring in pipes and shoots in nearly vertical lime beds.

Development: by an 1,800' vertical shaft with about 35,000' of workings,

principal development being on the 1,000', 1,200', 1,400', 1,600' and 1,800' levels.

	Ore Tons	Copper Lbs.	Lead Lbs.	Zinc Lbs.	Gold Oz.	Silver Oz.	Value Net
1915	36,142	.....	8,232,606	.....	4,634	403,854	.....
1914	39,629	237,901	5,782,118	71,665	6,291	645,419	\$324,299
1913	51,173	117,328	2,597,091	.....	4,806	1,030,132	381,287
1912	30,038	.....	1,141,222	.....	7,838	969,907	509,420
1911	6,703	.....	825,551	.....	389	306,362	117,583
1910	8,273	.....	800,802	.....	584	531,483	217,059

Average assays for 1914 shipments were, gold, .159 oz.; silver, 16.29 oz.; lead (on lead ores), 12.68%; zinc (on zinc ores), 29.13% per ton. Gross average value ore in 1914, \$14.71 per ton, net \$7.94; in 1915, \$20.55, and \$9.96 respectively.

In 1914 company obtained a two-year lease, option of purchase on the Scotia mine, West Tintic mining district, about 20 miles W. of Eureka, and has been getting good results from development work. Ore obtained from this work is hauled to the railroad by means of a traction engine.

Equipment: the plant has three 150-h. p. boilers, with mechanical stokers, a hoist and 15-drill Nordberg air compressor. The double-cylinder hoist has 6' balanced drums, 1½" steel cable, and operates 2 triple-deck cages in balance, carrying 1-ton cars, to depth of one-half mile. Buildings include a power plant, housing the boilers, hoists and air compressors; a machine shop, carpenter shop, and a smithy, all of steel frame. Property considered valuable and management excellent.

CHIEF GROUP

ARIZONA

Office: care Bracy Curtis, trustee, Nogales, Ariz. **Property:** 13 claims, 260 acres, 1½ miles N. E. of the R. R. R. mine in the Patagonia mining district, shows a sulphide ore in porphyry and lime. Ore occurs in fissures, giving average assays of 40 oz. silver, 30% lead, \$5 gold and 4% copper.

Development: by 200' main shaft and 600' tunnel. **Equipment:** includes steam hoist and Cameron sinker. Management plans sinking to 400' depth, crosscutting and drifting in 1916. In 1915 about \$1,400 was expended on assessment work.

CHIHUAHUA-ESPERANZA GOLD MINING CO.

MEXICO

Subsidiary of the Mines Co. of America, which see.

CHIHUAHUA MINING CO.

MEXICO

Offices: 734 Fifth Ave., New York City, and Chihuahua, Mex. **Officers:** G. B. Schley, pres.; E. B. Schley, v. p.; W. J. Walworth, sec.; C. G. Raynor, treas.; W. J. Quigly, mgr., Chihuahua.

Inc. Jan. 8, 1890, in New York. **Cap.**, \$600,000; shares \$1 par; outstanding, 587,806 shares nearly all of which is owned by El Potosi Mining Co., control of which company was obtained by Howe Sound Co. in Jan., 1916. Stock transferred at company's New York office. Annual meeting, second Monday in Jan. Stock is closely held.

Property: in the Santa Eulalia district, Chihuahua, Mex. **Ore:** lead, silver and zinc. **Development:** by vertical shafts to a depth of 1,800'. Operations have been hampered by the revolution, though shipments of zinc ore were made in 1915.

CHILE COPPER CO.

CHILE

Office: 120 Broadway, New York. **Officers:** Daniel Guggenheim, pres.; Albert C. Burrage, v. p.; Morris Guggenheim, v. p.; preceding with Isaac Guggenheim, S. R. Guggenheim, Simon Guggenheim, Pope, Yeatman, William Loeb, Jr., John N. Steele, Albert C. Burrage, Jr., Russell Burrage,

Chas. D. Burrage, H. F. Guggenheim, E. A. Guggenheim, H. R. Wagner, E. A. C. Smith, directors. C. K. Lipman, sec.; G. F. Hilton, asst. sec.; L. Fredrick, treas. Inc. April 16, 1913, in Delaware. Cap., \$110,000,000; shares \$25 par; issued, 3,800,000; 600,000 shares held in treasury for conversion of \$15,000,000 7% gold bonds. Shares are listed on the New York stock exchange. Company owns the entire issued capital stock of the Chile Exploration Co. of New Jersey.

Chile Exploration Co.

Office: 120 Broadway, New York. Mine office: Chuquicamata, Chile. Same directorate as Chile Copper Co. Inc. Jan. 11, 1912, in New Jersey. Cap., \$1,000,000; shares \$100 par; entire stock issue owned by Chile Copper Co.

Property: the largest copper deposit known in the world, is at Chuquicamata, province of Antofagasta, Chile, at 9,600' elevation, on the crest of a low ridge some distance from the main range of the Andes. Chuquicamata is about 82 miles E. of the Pacific ocean on a branch of the Antofagasta & Bolivia Railway, 163 miles from Antofagasta. The company owns 420 claims, about 6,294 acres, 567 acres mineral land, 1,949 acres comprising the plant site, 628 acres acquired for waste dump purposes and 3,148 acres covering limestone, salt and sulphur deposits.

The outcrop of the orebody is 8,000' long, with an average width of 554'. The maximum length of orebody as proven up to present time, is about 7,000' with a maximum width of 1,800'. Ten holes have been put down to a depth of over 1,000'; one of these, in Aug., 1915, had reached a depth of 1,530', and was in 2.11% ore at that point, and at a depth of 1,685' it was still in commercial ore. Sixty holes put down had an average depth of 681.8'. Small veins of rich ore cut through the mass, but the average of the entire deposit is estimated at 2.23% copper. The copper occurs in the form of brochantite, a mixture of copper sulphate and copper hydrate, known as a subsulphate of copper. There is also a small amount of atacamite and chalcantite, or natural blue vitriol.

The drill holes show that the oxidized ore changes in depth to an altered grano-diorite, carrying disseminated chalcocite, bornite and chalcopyrite. About two-thirds of the ore developed carries brochantite (a basic copper sulphate containing 56% copper) and the balance has copper sulphides.

The underlying sulphide ore, practically all ore below 400' from surface, can be treated in the customary way by water concentration and direct smelting. This will be work of the future. At present the company is devoting its attention to the sulphate part of the orebody. Mining is done by steam shovel and there is practically no overburden to strip.

Reserves: ore developed to date amounts to 303,300,000 tons of 2.23% copper, which has been considered as 2%, according to Pope Yeatman's report and indications are that this will be increased to 400,000,000 tons without limiting still further possibilities.

Equipment: the reduction plant, 2½ miles from the mine, which started operations May 18, 1915, has a capacity of 10,000 tons a day. Copper is recovered by a leaching process, the ore being peculiarly amenable to treatment by this method. Careful study of the problem by E. A. Cappelen Smith showed that the ore gives little or no slime, and is readily soluble in an 8 or 9% solution of cold sulphuric acid. As it contains no arsenic, antimony or bismuth, the solution is not fouled by repeated use. Results obtained in the experimental plant gave a total recovery of 89.6% copper.

The ore is subjected to crushing in gyratory crushers, Symons disk crushers, and Garfield rolls to ¼" size. It is then distributed to concrete

vats, of which there are six, 110' wide, 160' long and 15' high, each with a capacity of 10,000 tons of ore. Tanks are built of reinforced concrete, lined with mastic asphalt $1\frac{1}{2}$ " thick. The extraction process which might be more accurately termed soaking, rather than leaching, takes approximately 6 days for acid treatment and washing, 1 day for filling the tank, 2 days for leaching, 2 days for washing and draining and 1 day for discharging. The pregnant solution is drawn off into solution tanks and the leached residue taken from the vats by clam-shell buckets, operated on a traveling bridge, transferred to conveyor belts and piled on the waste dump. The copper solution before electrolysis, is dechlorinated by passing it through revolving drums, similar to tube mills, where it comes in contact with shot copper and cuprous chloride is formed. From the drums, the solution, containing cuprous chloride in suspension, flows to Dorr thickeners, made of concrete and lined with mastic asphalt. The thickened cuprous chloride, together with about 1% of the original solution, goes to filter-presses and the resulting cakes are smelted and cast into shot copper for use in the dechlorinating drums.

The clear solution overflowing from the Dorr thickeners goes to the electrolytic tank house where it is electrolyzed, using ordinary copper cathode starting sheets and insoluble anodes made of magnetite. The electrolytic refinery consists of 510 electrolytic tanks, 19' long, $3\frac{1}{2}$ ' wide and 4' 10" deep, made of concrete and lined with mastic asphalt. Of the 510 tanks, 30 are used for making cathode starting sheets, and 480 for electrolytic deposition of copper from solution. The solution enters the head tank of the system containing about 5% copper and $2\frac{1}{2}$ %-3% free acid and leaves the last tank containing about 1.5% copper and 8-9% free acid. Capacity of refinery is 120,000,000 lbs. per year.

The power station erected by Siemens & Schuckert, of Germany, for \$2,856,000, is at Tocopilla, on the Pacific coast. Power is generated at a central station by an oil-burning steam plant of four units, with a combined capacity of 40,000 k. w. or approximately 53,600 h. p. Estimated power required at Chuquicamata for a 10,000-ton plant is 24,000 to 27,000 k. w. at the coast. The electric power is transmitted by 3-phase current of 100,000 volts, a distance of 120 miles to the mine. Four turbo-generators, each of 10,000 k. w., are installed at the station, to be reinforced later by a water power plant on the Loa river, near the mine. The power line consists of 2 parallel wires of 3x95 sq. mm. cross-section placed on steel turrets. The first unit of the plant for the sub-station at the mine consists of 4 transformers, each of 10,000 k. v. a. and 5,000 v. with 7 direct-current motor generators of 2,500 k. w. each.

Estimate by Mr. Yeatman of cost per ton of ore, on a basis of 10,000 tons per day of 2% ore is as follows:

Mining and transportation to mill.....	\$0.50
Crushing, leaching and electrolytic precipitation.....	1.086
Transport of copper to port, port charges and ins.....	0.115
Freight to Europe and selling commission.....	0.214
Depreciation and contingencies.....	0.191
Total.....	\$2.106

Production: in Nov., 1915, the plant was treating 5,000 tons per day and has been obtaining an extraction of over 90% copper. In first 6 months, 1916, output was 19,724,385 lbs. copper.

Estimated annual production of copper on a basis of 10,000 tons per day is 120,000,000 lbs. refined copper, but the plant will be increased to 30,000 tons capacity in the future, which should produce 360,000,000 lbs. copper.

The estimated cost of production per pound of refined copper is 6 cts., including delivery in New York, Hamburg, Germany or England.

CHINO COPPER CO.

NEW MEXICO

Office: 25 Broad St., New York. **Mine office:** Hurley, Grant Co., N. M.
Officers: Charles M. MacNeill, pres.; Daniel C. Jackling, v. p. and managing dir.; Charles Hayden, v. p.; A. J. Ronaghan, asst. sec.; A. Chester Beatty, Sherwood Aldrich, W. Hinckle Smith, Mark L. Sperry, directors. K. R. Babbitt, gen. counsel; C. W. Peters, treas.; John M. Sully, mgr.; Horace Moses, mine supt.; W. H. Janney, mill supt.; R. C. Gemmill, cons. mng. engr.

Inc. Aug., 1909, in Maine. Cap., \$3,500,000; shares \$5 par; increased to \$4,000,000, June 30, 1911; and again increased to \$4,500,000 April 2, 1912, of which 100,000 shares are reserved for conversion of bonds and 30,000 shares remain unissued. Bond issue has been retired. Annual meeting, third Friday in April. Paid initial dividend of 75 cts. per quarter, June, 1913, and has paid a total of \$11.25 per share to July, 1916. Listed on New York and Boston Stock Exchanges.

Property: 131 claims, 2,412 acres, patented, at Santa Rita, title to which was derived from the Santa Rita Mining Co., since dissolved; also 22 claims, 322 acres, held by location and 160 acres, patented, agricultural land, making a total at Santa Rita of 2,894 acres. Also owns 18,568 acres at Hurley for mill site and water rights, 13,800 acres being owned outright and the remainder in process of patent.

The property is the old Santa Rita del Cobre mine, which is the oldest copper mine in New Mexico, and the second oldest in the United States, having been opened, 1804, by Spaniards. The property was worked by an American named Pattie, in 1822 and to 1827. It was in possession of a Frenchman from 1828 to 1834, when an American called McKnight, began operations which ceased in 1836. From 1840 to the late fifties, it was in possession of a Spaniard. In 1851 Santa Rita was the headquarters of the American Commissioners, of the Boundary Survey. Some time before 1860 four Americans attempted to operate the property. In 1862 Gen. Sibley, of the Texas Confederate force held the mine. In 1873 M. B. Hayes, acting on behalf of Denver people, succeeded in purchasing the claims, attempting to perfect the title by obtaining U. S. patents, although patents had been refused by the Commissioner of the Land Office in 1870. Hayes' application was turned down in April, 1873. Between that date and the final decision of the Secretary of the Interior in November, 1873, title was obtained by Hayes from the surviving heirs of the original Spanish estate and final U. S. patent was obtained to the claims covering the Santa Rita del Cobre Grant. Title was acquired by the Chino Copper Co. from the Santa Rita Mining Co., since dissolved.

Geology: Santa Rita is situated in the Central mining district, Grant Co., New Mexico, on a branch of the Santa Fe system which connects at Whitewater with the Deming-Rincon division of the same railroad. The

CHINO COPPER COMPANY

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK

87 Milk Street, BOSTON

orebody and town of Santa Rita are located in a distinct basin and the rocks exposed in the district may be roughly divided as follows: 1, sedimentary, 2, intrusive, 3, extrusive. The sedimentary formation, of which there is a large area in comparison with the intrusive exposures, consists of limestones of more or less purity, and belonging to the subcarboniferous and carboniferous series, there also being some isolated exposures of Devonian rocks. These beds vary from nearly pure limestones, through cherty limes and shaly limes, to shales. Through faulting there is also exposed a considerable area of Cretaceous sandstones and shales, the former in the immediate neighborhood of the intrusives appearing as quartzites. The principal intrusive rocks in the Santa Rita basin are granodiorite, a quartz-monzonite porphyry, and another of distinct porphyritic texture which may be classed as andesite. This latter rock intrudes the two general types as also the sedimentaries, in sills, lacoliths and dikes. The boundary forming the S. E. side of the Santa Rita basin is composed of two flows, the principal one being rhyolite and rhyolite tufa overlaying an older flow which is of an andesite nature.

The granodiorite is intrusive into and across the edges of the sedimentary series, which form a syncline dipping to the south from the northerly bordering ridges toward the lowest point of the basin. The area within the basin has been strongly faulted in wide zones and in two general directions. The intersections of the numerous faults have resulted in a roughly circular shear zone that has a diameter of $\frac{3}{4}$ of a mile. This shear zone on the southeastern side of the property has a width of some $\frac{3}{8}$ of a mile. The narrowest part is in the N. W. portion where it is some 400' wide. Generally speaking, the center, or core, is of granodiorite. As a result of the conditions mentioned, there is the center of the basin of granodiorite, surrounded by shear zones which affect it at times as well as the surrounding sedimentaries, the rhyolite tufa and quartz monzonite porphyry, the two latter rocks being on the S. E., E. and S. W. This shear zone has been the depository of the valuable copper minerals, chalcocite, cuprite and native copper. Bornite, chalcopyrite and cupriferous pyrites are also found, but to a much lesser extent than the previously named. There also occurs in small restricted areas, malachite and azurite with a very limited amount of chrysocolla.

The old workings, which are very extensive, have been practically eliminated by the steam shovel operations. Some 530 holes, making a total of 214,142', have been drilled to January, 1916, and mine was estimated to have 90,000,000 tons of ore developed, averaging 1.75% copper. Of the above total number of holes there are a number of scout holes which indicate a considerable extension of the orebodies as now outlined.

Equipment: consists of 10 steam shovels, 21 locomotives, 124 dump cars, of 6-20 cu. yd. capacity. Company operates about 24 miles of track, giving access to the pits. There is also a primary crushing plant, equipped with 48"x60" jay crusher, together with bins for handling and breaking up coarse material loaded by shovels.

The concentrating mill at Hurley, 9 miles from the mine, on the Santa Rita branch of the Santa Fe railway, has a nominal capacity of 5,000 tons per day. The first unit went into operation in Oct., 1911, and ore was running through the 5th and last section on Nov. 28, 1912.

Ore is delivered to bin of 18,000 tons capacity. In conjunction with this coarse ore bin is a coarse crushing plant, consisting of 2 sets gyratory crushers, 2 sets 72"x20" Garfield rolls. From here material is delivered into the fine ore bins at maximum size of $\frac{3}{4}$ ". Mill is equipped with 6 sets 16"x42" rolls for preliminary grinding, 9 Garfield Chilean mills for final

grinding. Roughing treatment consists of Garfield tables, followed by Wilfleys and full equipment of Richards-Janney classifiers and Isbell van-ners. Concentration is 15 to 1 with recovery of 66.6%, or 28.697 lbs. cop- per per ton of ore.

Power plant includes twelve 445-h. p. Heine boilers, three 1,250-k. w. generators, direct-driven by Nordberg Corliss engines, and one 2,000-k. w. Allis-Chalmers turbo-generator set. Primary water is secured from the Apache Tejo Spring, 3½ miles south of Hurley, from underflow of White- water draw, Cameron Creek draw and Whiskey Creek draw. There is also in use a storage reservoir below the mill, the dam forming this reservoir having been built out of mill tailings and having storage area of nearly 3,000 acre feet.

Settlement at Hurley includes in addition to mill and accessory build- ings, office building, store, school, shops and dwellings, town having popu- lation of about 3,500 people. Town of Santa Rita, on company ground, has population of over 4,000.

Production:

Year.	Tons		Cost per Ton		% Cu.	% Rec.	Ratio	% Cu.	Lbs.	Cu.	Net Cost	Rec'd
	Treated.	Produced.	Ore.	Waste.									per Ton	per Ton	Conc.	Rec.	per Lb.	per Lb.
1912	1,120,875				2.077	61.63	18.6:1	21.20	24.79	27,776,088	7.69	
1913	1,942,700	23.13	16.11	61.08	2.033	67.31	10.6:1	14.52	27.37	50,511,661	8.787	15.489
1914	1,907,300	22.13	16.12	55.01	2.115	67.86	12.9:1	16.50	28.70	53,999,928	7.60	13.325
1915	2,379,800	19.47	16.51	54.19	2.155	66.59	15.0:1	21.55	28.70	64,837,788	7.12	17.42

Note: net cost per pound copper includes all charges except bond inter- est and depreciation, but does not credit miscellaneous income, equal to 0.37c per lb. copper in 1915. Gold produced in 1915 amounted to 3,991 oz., 3.35c per ton ore, or a credit of .12c per lb. copper as compared with 2.71c per ton ore, or a credit of 0.1c per lb. copper produced in 1914.

Both property and management are regarded as exceptionally good, and the stock as a very high-grade investment.

CHISNA CONSOLIDATED MINES CO.

ALASKA

Letters returned, 1916, from Chicago address. **Mine office:** Landlock, Alaska. **Officers:** E. Meers, pres.; Jos. Kreis, v. p. and gen. mgr.; Chas. Kreis, sec.-treas.; Dr. E. T. Griffith, supt.; preceding with J. F. Quinn, Jas. Shaka and A. B. L. Gellermann, directors. **Inc.** April, 1906, in Washing- ton, as successor Central Alaska Gold & Copper Co. **Cap.**, \$5,000,000; shares \$1 par, nonassessable; issued, \$3,500,000, in 1911.

Property: 42 claims, patented, in 4 groups, on Landlock bay, near Valdez. The Steinmetz group has a 50' shaft, claimed to be in a vein 225' wide, 4,500' long, carrying chalcopryite averaging 5% copper, 4 oz. silver and \$1.66 gold per ton, which figures are considered exaggerated. Ore is highly silicious, and development is mainly opencast.

Equipment: includes a Pelton wheel, direct-connected to a 60-h. p. dynamo, and a small hoist, several buildings and a small sawmill. Com- pany, 1913, reported out of funds and outlook gloomy, but property is not without promise. Only assessment work done in recent years.

CHISOS MINING CO. (Quicksilver).

TEXAS

Wayne Cartledge, gen. mgr., Terlingua, Brewster Co., Tex. Property is at Terlingua, 108 miles S. E. of Marfa on the S. P. R. R. Cinnabar ore occurs as replacement deposits in limestone and shale. In the lower lime- stones the ores are generally in nearly vertical calcite veins, or in lodes of friction breccia. For geology see Texas Bull. 405, 1909.

Development: by shafts. The mine, which is the only operator in the district, had a record-breaking year in 1915. **Production:** 1,200 flasks of mer- cury in Nov. and Dec., 1915, yearly output not available. **Equipment:** includes an 18-ton shaft furnace. Employs 150 men.

CHOIX CONSOLIDATED MINING CO., LTD.**MEXICO**

Office: 516 Grant Bldg., Los Angeles, Cal. **Mine office:** Choix, Sinaloa, Mex. **Officers:** R. A. Thomas, pres.; A. E. Pomeroy, 1st v. p.; C. J. Heyler, 2nd v. p.; J. R. Thomas, sec.; A. M. McDermott, supt.; preceding with Leslie F. Gay, W. W. Thomas and W. B. Simmons, directors. **Inc. May, 1902, in Arizona. Cap., \$5,000,000; shares \$1 par, nonassessable; issued, \$3,155,534. Is protocolized under laws of Mexico. Owns 45% of the stock issue of Los Platanos Development Co. Annual meeting, first Monday in October.**

Property: 453 hectares, and a 500-acre smelter site, some distance from a railway, on both sides of the Rio Fuerte, in El Fuerte district of Sinaloa and Urique district of Chihuahua. Orebodies are claimed to measure 50 to 300' in width, occurring as contact deposits between diorite and limestone, with fissure veins in granite and quartzite carrying gold and silver. Property includes several antiguas.

Shipments of 1,062 tons of ore, to the Aguascalientes smelter, gave returns of 19.5 to 28% copper, with gross values of \$127,915.44 and net values of \$47,940.61.

A 100-ton smelting plant, purchased 1911, has been received, but not installed, owing to revolutionary disturbances in Mexico. Company awaiting peaceful conditions before resuming operations.

CHOSEN GOLD MINES, LTD.**KOREA**

Sec. and office: H. R. S. Aldon, Caxton House, Westminster, London, S. W., Eng. **American representative:** H. E. Collbran, 1002 First Natl. Bank Bldg., Denver, Colo. **Korean representative:** H. W. Davidson, Seoul, Chosen (Korea). **Directors:** H. Collbran, chairman, F. B. Lawson, E. T. McCarthy, M. P. Sayce, A. H. Collbran and H. E. Collbran. **A. R. Weigall, cons. engr.; H. S. Weigall, gen. mgr.; D. C. McEwen, metallurgist. Annual report for fiscal year ending June 30, 1915, shows: bullion in transit, £2,325; cash, £757; debtors, £150; debit, £759; acc'ts payable, £8,411. Inc. Feb. 28, 1912, in Great Britain. Cap., £74,400; shares £5 par; £62,310 issued.**

Property: a concession over 750 acres including the Kok Kang Kol Mine at Chung An, Chosen, Province of North Chung-Chung, Southern Korea. A royalty of 1% upon the gross value of the output is payable to the Korean government, also an annual mining land tax of about 30c an acre for acreage actually in use.

Ore reserves: Dec. 31, 1915, estimated at 20,800 tons of \$6 ore, \$124,800.

Equipment: includes stamp-mill and cyanide addition with 50 tons daily capacity.

CHRISTMAS GOLD MINING CO.**COLORADO**

See Vindicator Consolidated Gold Mining Co.

CHURCHILL MILLING CO.**NEVADA**

Office: 572 Bullitt Bldg., Philadelphia, Pa. **E. E. Carpenter, supt. Is a subsidiary of the Nevada Wonder Mining Co., with same directorate. Operates a 100-ton mill at Wonder, Churchill Co., Nev. Treated 58,124 tons of ore of \$812,118 gross value, showing a 95.3% recovery of the gold contents, 93.68% of the silver contents and 94.11% of the total value, or 9,801 oz. gold and 1,123,398 oz. silver. Total cost per ton was \$2,268, compared with \$2,743 in 1913-14.**

Annual report for fiscal year ending Sept. 30, 1915, showed: assets, \$709,360, which include property, \$105,336; accounts receivable \$30,337; stored silver, \$527,316, and liabilities \$420,081, leaving a surplus of \$129,278. Net income for the year was \$18,495. See Nevada Wonder Mining Co.

CIENEGUITA CONSOLIDATED MINES**MEXICO**

Office: 25 Broad St., New York. Is a reorganization of the Cieneguita Copper and Cieneguita Securities companies. **Officers:** James F. Whitney, pres.; August Gauch, v. p.; R. C. Davenport, sec.; preceding with Theodore Martin, Geo. D. Christy, C. Trumbull and F. W. Hunt, directors.

Property: 1,100 hectares, about 40 miles S. W. of Sahuaripa, Sonora, is covered by rhyolitic rocks, mostly fragmental and cut by a diabase dike. The Chipiona and the Cargona groups lie close together and the Ostimuri-Tayapa group about 2 miles to the S. E. The rocks are cut by vertical veins, 1 reported to be from 3 to 50' wide, traceable 3 miles and to carry ore shoots averaging about 2½% copper and 40 oz. in silver.

Development: mainly by tunnels, one of 1,200' with 2 shallow shafts and a total of about 3 miles of workings. These workings are not sufficient to block out any large amount of ore, but show that the property has merit and may develop into a large mine.

Equipment: includes 100-h. p. steam plant, a 6-drill compressor and all necessary mine buildings and houses for employes.

A small smelter has Blake crushers and rolls, a 75-ton calcining furnace and two 50-ton reverberatory furnaces, burning wood. Smelting plant inadequate and poorly adapted for the ore. Idle, pending restoration of peace in Mexico.

CITY ROCKS MINING CO.**UTAH**

Office: Leopold Bldg., Houghton, Mich. **Officers:** N. W. Haire, pres.; John Edwards, v. p.; Jas. P. Edwards, sec.-treas.; W. S. Zehring and Jos. Bosch, directors. **Inc.** 1906, in Utah. **Cap.**, \$1,000,000; shares \$5 par. Has an issue of convertible bonds. Property consists of shareholdings in the Michigan-Utah Mining Co., received for lands sold in 1912.

C. K. & N. MINING CO.**COLORADO**

Cripple Creek, Colo. G. A. Macdermid, gen. mgr.; H. Christiansen, supt. **Property:** the C. K. & N. mine, 5.3 acres, on Beacon Hill, Cripple Creek, shows veins 3-4' wide. Ore occurs in shoots, and is said to average \$20 to \$30 gold per ton. **Development:** by 860' shaft. **Production:** amounts to about 550 tons of ore monthly. Mine worked by lessees in 1915, has been a steady producer for many years and is credited with a total output of \$1,350,000.

CLARA CONS. GOLD & COPPER MG. CO.**ARIZONA**

Declared bankrupt, Jan. 27, 1912. Reorganized as the Swansea Consolidated Gold & Copper Mining Co., receiving 1,500,000 shares of the total of 4,000,000 shares for the transfer of the property with its indebtedness and liabilities. A suit was filed against the Clara Consolidated in Oct., 1912, by George Mitchell, former president, for \$75,000, and by Mary Mitchell for ejectment from several mining claims valued at \$25,000 and the recovery of \$200 a month rental therefrom. At last accounts, this suit had not been settled. The Swansea Cons. is also bankrupt; property leased in 1915 and reported shipping 3 carloads of ore weekly to the Humboldt smelter.

CLARINDA COPPER MINING CO.**IDAHO**

Temporary officers: Judge John E. White, Clark Fork, Idaho, pres.-treas.; John P. Delaney, v. p.-sec.; with Jas. E. White, Russell Guest and Thos. Compton, directors. **Inc.** April 1, 1916, in Ariz. **Cap.**, \$1,500,000; shares \$1 par. U. S. Corporation Co., New York, registrar and transfer agents.

Property: 2 claims, 40 acres, in Coeur d'Alene district, 3 miles from Clark Fork, Bonner Co., Idaho, show gold-silver-copper-iron ore in vein, said to be 6' wide at slight depth. Developed by 2 short tunnels and a main working tunnel, 124' long, May, 1916. A prospect.

CLARISSA MINING & MILLING CO.**ARIZONA**

Gold Road, Mohave Co., Ariz. E. M. Rabb, pres.; A. W. Sydnor, v. p.-treas.; F. T. Bragonier, sec. Inc. 1915, in Ariz. **Cap.**, \$1,000,000; shares \$1 par, nonassessable; 550,000 shares in treasury. Owns 7 claims, 80 acres, adjoining the United Western on the north, at Oatman, Ariz. Company is sinking a shaft, 80' deep, Mar., 1916. Cut 4' of quartz vein matter at 65'.

CLARK MINE**MICHIGAN**

Idle. **Office:** care Dr. Léon Estivant, owner, 47 Ave. de l'Alma, Paris, France. **Mine office:** Copper Falls, Keweenaw Co., Mich. Fred W. Nichols, agt. **Property:** 2,433 acres, includes mines formerly known as the Clark, Bell and Montreal, about 3 miles south of Copper Harbor, between Lake Fannie Hooe on the north and Breakfast lake on the south, including Lake Manganese. Mine, opened 1858, for copper, also carries a promising 2' vein of pyrolusite, average of assays, 1900, by Duparc, of Geneva, giving 55.73% manganese and 1.36% copper. Has shipped about 1,200 tons of high-grade manganese ore. Was tested, 1905, and again, 1910, by diamond drills. Was under option, 1910, to United States Smelting, Refining & Mining Co. Fully described Vol. II.

CLARK MINING CO.**MISSOURI**

Property: on Pierson Creek, 5 miles S. E. of Springfield, Greene Co., Mo. Ore occurs mixed with "gumbo" clay in limestone and also as sheet ore in the roof rock above the ore horizon. Orebodies are mined at the 150' level. The sphalerite concentrates carry 62% zinc while the galena concentrates average about 82% lead. **Production:** in 1914, 1,898 tons sphalerite and 256 tons galena, more than tripled that of 1913.

CLARK MONTANA REALTY CO.

Address: 20 Exchange Place, New York City. Is a close corporation, controlled by Hon. W. A. Clark, as a holding company for the Ophir mine, Utah; ½ interest in the Elm Orlu mine, Butte; ½ interest in the Timber Butte Milling Co., Butte, Mont.; Sunset mine, Wallace, Idaho, and in general all the Clark properties in the northwestern States.

CLAYTON MINING & SMELTING CO.**IDAHO**

Clayton, Custer Co., Idaho. **Lands:** 18 claims, showing argentiferous copper and lead ores. Has water power and a smelter rated at 50 tons. Reported sold to Idaho Smelting & Mining Co., in 1914.

CLEARWATER GOLD & COPPER MINING CO.**IDAHO**

Mine office: Clearwater, Shoshone Co., Idaho. **Officers:** Samuel Seidenfeld, pres.-mgr., 1027 W. 10th Ave., Spokane, Wash.; Herman A. Bush, v. p.; J. H. Wourms, sec.-treas.; Dennis Reardon, supt. Inc. 1907, in Idaho. **Cap.**, \$2,500,000; shares \$5 par, assessable; 489,000 outstanding.

Lands: 16 claims, including the Cunningham group, on the north fork of the Clearwater river, 20 miles south of Wallace, nearest rail point, with a wagon road connecting. Property shows a vein said to be traceable 5 miles, 1 mile on company's lands, carrying oxidized ores near surface, with chalcopyrite and chalcocite at depth, giving assays of 5% copper, \$1.50 gold, and 1 to 2 oz. silver per ton.

Development: by 3 tunnels, lower tunnel, 1,400' long, cutting the ledge 1,500' below surface. Management estimates 18,000 tons of ore on dumps, June, 1915, and total reserves at 400,000 tons, averaging 4½% copper.

Equipment: includes hoist and air compressor. \$250,000 bond issue contemplated to provide funds for aerial tramway, necessary equipment and development work.

CLEOPATRA COPPER CO.**ARIZONA**

Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, pres.-gen. mgr.; Will L. Clark, v. p.; S. F. Denison, sec.; preceding officers are the directors. **Inc.**

1901 in Arizona. **Cap.**, \$10,000,000; shares \$1 par, assessable; 8,644,156 shares issued.

Property: 11 patented claims, about 149 acres, south of the United Verde mine in the Verde mining district, shows fissure and gash veins carrying ores assaying 1 to 65% copper and 1 to 500 oz. silver per ton, with fair gold values. Has 6 shafts, of 25 to 150' depth, and 9 tunnels, the Dillon tunnel, 3,200' long, planned to connect with the "1888" shaft, showing a 3' vein of argentiferous and auriferous copper sulphide, of good average tenor.

The Dillon tunnel passes through the Cleopatra into lands of the Hull Copper Co., and latter has permission to use the tunnel through the Cleopatra tract. Some good ore has been taken from crosscuts driven from the Dillon tunnel, but apparently, no commercial orebodies have been developed thereby. Work in an open cut on the top of the mountain is reported to have exposed 30' of commercial ore.

Equipment: includes a steam and electric plant, with a 30-h. p. electric hoist and 12-drill air compressor.

CLEVELAND GROUP OF MINES & MILL NEW MEXICO

Sold to Empire Zinc Co. and described under that title.

CLEVELAND MINING CO. WISCONSIN

Office: 625 Bank & Insurance Bldg., Dubuque, Iowa. S. W. Burford, mgr.; H. L. Jones, supt. **Property:** 40 acres, includes the Cleveland, Scramble Creek, Lawrence and Square Deal Mines, at Hazel Green, Grant Co., Wisc. Lead-zinc ore occurs in flats and pitches in limestone.

Development: several 150' shafts with 1,500' underground workings said to block out 100,000 tons ore. **Equipment:** includes a 75-h. p. electric hoist, a 6-drill air compressor and a 250-ton concentrating plant, put into commission in May, 1915.

Production: 90 tons of zinc concentrates daily. Shipments made to Mineral Point Zinc Co. under contract. Employs 160 men on double shift.

CLIFF MINING CO. MICHIGAN

Subsidiary of Calumet and Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Mine office: Phoenix, Keweenaw Co., Mich. **Officers:** Rodolphe L. Agassiz, pres.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding with R. C. Grew, W. E. L. Dillaway, Francis L. Higginson, Francis W. Hunnewell, Thos. N. Perkins and Clarence H. Bissell, directors.

Inc. Jan., 1910, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; issued, \$1,500,000, \$13 paid in. Is controlled through ownership of 19,400 shares, by Calumet & Hecla Mining Co. Ended 1915 with \$23,682 cash, and accounts receivable, and accounts payable of only \$60. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Saturday in May.

Property: includes the Cliff mine proper, and the South Cliff, connected underground on the 3d level. The Cliff mine, 2 miles N. E. of the Ojibway, is the oldest mine in the Lake Superior district, opened 1846, closed 1870, again reopened 1872, and abandoned 1878, paying dividends, 1849-79, of \$2,518,620. The old mine was opened on a fissure vein crossing the bedded formation at practically right angles, and was pretty thoroughly worked out before the property was abandoned. The main fissure vein had several feeders, and a number of independent fissure veins, including the West vein, which was rich in copper near surface, and the East Cliff vein, about an eighth of a mile east of the main vein. The Cliff was notably rich in native silver.

The Cliff carries the Kearsarge amygdaloidal bed for about 2 miles, and

for practically unlimited depth, the shaft being a trifle less than 2 miles from the most northerly shaft of the Ojibway, which is the nearest opening on the Kearsarge lode. The Tamarack Mining Co., which owned the Cliff until 1910, secured a complete geological cross-section of the tract, by diamond drilling, 1903-07, the Kearsarge bed being located by 12 drill holes, the majority of which were said to show commercial values, and, in addition, the property carries about 20 other amygdaloidal beds, under the greenstone bluff, which is such a prominent feature of the landscape, rising to a height of several hundred feet. A temporary vertical shaft, with a single compartment, started Aug., 1910, was sunk 217', entering the bed near the hanging wall of the Kearsarge, the ground being considerably disturbed at this point. Work in this shaft was abandoned during the first half of 1913, as the Kearsarge vein at this place proved narrow, dry and barren.

Five diamond drill holes were put down during 1914 and 1915 to explore the beds eastward in the hope of finding a profitable vein towards the Eastern sandstone. The cross-section crossed the horizon of the Old Colony, Mayflower and St. Louis amygdaloid lodes and the Bohemia and St. Louis conglomerate lodes, but very little copper was disclosed by this work.

The Cliff was the first mine ever opened on native copper, and production, 1845, was 19,903 lbs., which was the first commercial output of copper from Lake Superior. Total production, 1845-82, was 38,054,340 lbs. fine copper.

Equipment: includes a power house, with boilers, duplex hoist, and a 5-drill air compressor. Buildings include a smithy, changing house, combination office and warehouse, boarding house and a number of dwellings. The mine is reached by the Keweenaw Central railway.

CLIFF MINING CO.

UTAH

First Nat'l Bank Bldg., Milwaukee, Wis. **Operating office:** 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Ophir, Tooele Co., Utah. **Officers:** A. G. Kern, pres.; Grant Snyder, v. p.-mgr.; J. A. Stuart, sec.-treas., with A. D. Thompson, Frank Adams, Geo. Swift and E. McVicker, directors. A. H. Williams, supt. **Inc. May 31, 1906, in Maine. Cap., \$3,000,000; shares \$10 par, all outstanding. Dividends:** to 1916, \$90,000.

Property: in the Ophir district, contains silver-lead-zinc ore as replacement deposits in limestone. **Development:** by tunnels, with several miles of underground workings. **Equipment:** includes electric power and one-mile aerial tram.

CLIMAX MINING CO.

ARIZONA

Prescott, Ariz. M. E. Spaulding, supt. Owns the Climax gold mine on the Hassayampa river, near Prescott. **Development:** by 5 tunnels, longest 1,000', having a pay shoot 2" to 3' in width. Average grade of mill ore, oxidized, is said to be \$35. Sulphide ore in No. 5 tunnel is said to average \$21 per ton. It is claimed the mine has paid for itself since 1904.

CLIPPER MINING CO.

UTAH

Successor of Mohawk Mining Co. **Inc. July, 1916, by T. J. Yates, J. S. Barlow, John Russon, Dr. G. N. Curtis and J. A. Dalton, all of Salt Lake City.**

Property: near Tecoma, Utah, shows two veins exposed throughout property, carrying silver-lead and zinc ores. **Development:** by an 80' shaft with 100' of drifting. Is a prospect only.

C. & O. MINING & MILLING CO.

NEW MEXICO

Pinos Altos, Grant Co., N. M. **Officers:** J. L. Caddel, pres.; A. Caddel, v. pres.; Jackson Agee, sec.-treas.; above with John James, and A. L. McCarty, directors. A. L. McCarty, supt.

Inc. April, 1914, in New Mexico. **Cap.**, \$100,000; shares \$1 par; outstanding 90,000 shares. Annual meeting, Jan. 12th. Gross earnings from ore sales in 1914-1915 amounted to \$50,000 with operating expenses of \$40,000.

Property: 2 claims, patented, in the Pinos Altos mining district, 7 miles N. W. of Silver City. **Ore:** lead-zinc-copper in fissure vein in diorite. Vein has a N.-S. course, dips 65° and is said to have an orebody 6" to 4' wide. Ore minerals are galena, sphalerite, chalcopyrite and pyrite and average assay is said to be 2% lead, 2% copper, 8% zinc, \$4 to \$10 gold, and 10 oz. silver per ton.

Development: by 200' incline shaft with 4,000' of underground workings said to block out 5,000 tons of ore.

Equipment: includes 20-h. p. gasoline hoist, a 50-ton concentrator which is run jointly with P. A. M. & M. Co. Management states that production started in Nov., 1915.

COAHUILA LEAD & ZINC CO.

MISSOURI

Cap., \$100,000. Company operates 120 acres land owned by Horton & Horton, in the Duenweg-Porto Rico district, Jasper Co., Mo. Ore occurs in "sheetground." **Development:** by 3 shafts 240' deep. **Equipment:** includes 300-ton mill.

COAHUILA MINING & SMELTING CO., LTD.

MEXICO

Office: 614 Penobscot Bldg., Detroit, Mich. Operating office: Apartado 72, Monterey, N. L., Mex. Mine office: Jimulco, Viesca, Coahuila, Mex. **Officers:** H. T. Ambrose, pres.; Frank J. Llewellyn, v. p.; Walter E. Parker, sec. and gen. mgr.; Archibald Cattell, treas.; preceding with J. Kirby, Jr., Sidney B. Cohn and C. F. Jennings, directors; J. C. Treadwell, supt.; Alex. McCormick, mine supt.; Harry Reed, mill supt. Inc. Jan., 1902, in Mexico. **Cap.**, \$500,000 gold; shares \$1 par; nonassessable, fully issued. Dividends: 10% in 1902; 6% in 1904; 29% in 1905; 30% in 1907; 10% in 1909 and 16% in 1910, a total of 101%, or \$505,000. Annual meeting, first Wednesday in February.

Lands: include holdings in the Mapimi, Viesca and San Juan de Guadalupe districts. Properties include the Santa Maria, Sultana and other mines at Jimulco, carrying auriferous and argentiferous copper and lead ores, opened by a 700' main shaft, and a 1,000' main tunnel, with steam and electric power. The Alberto mine, in the Mapimi district, was said to have made regular shipments of high-grade ore to the Mapimi smelter, 1910. A 250-ton smelter, with steam and electric power, connected with the mines by rail, was blown in, early 1903, but was idle, 1909-13. The revolution in Mexico has practically stopped all mining in Coahuila and the mines are closed down until peace and safety again prevail.

COBALT COMET MINES, LTD.

ONTARIO

Office: 61 Broadway, New York, and Cobalt, Ont. Same officers as Caribou Cobalt Mines Co., which company owns the entire capital stock of Cobalt Comet Mines, Ltd. Inc. April 16, 1913, in Ont. **Cap.**, \$1,000,000; shares \$5 par; all outstanding. Annual meeting, 2nd Thursday of Feb.

Property: 2 part claims, patented, in Coleman Twp., Temiskaming mining district, formerly known as the Drummond mine. **Ore:** silver in fissure veins, occurs in shoots of variable widths. Ore minerals are native silver and cobalt-nickel sulpharsenides.

Development: by two shafts, 100' and 200' deep, with ore blocked out said to contain 20,000 oz. silver. Underground work in 1914 totaled 2,111'. **Equipment:** includes an air hoist, electric pump, compressed air and electric power. Employs 50 men.

Production: in 1914 amounted to 727,671 oz. silver. Low-grade ore is treated by the Dominion Reduction Co., high-grade ores are shipped.

COBALT REDUCTION CO., LTD. ONTARIO

See Mining Corporation of Canada, Ltd.

COBRE; COMPANIA MINERA EL. MEXICO

Idle. **Office:** Calle de Santa Teresa 6, Mexico, D. F. **Mine office:** Jungpeo, Zitacuaro, Michoacan, Mex. Alfred Stoffel, pres.; M. Herrle, sec.; E. Albert Armour, treas. **Inc.** March 7, 1907, in Mexico. **Cap.**, 95,000 pesos. **Property:** El Cobre y Anexas mines, shows gold, silver and copper ores.

COBRIZA y ANEXAS; COMPANIA MINERA LA. MEXICO

Alamos, Sonora, Mex. D. Manuel Salazar y Perron, pres.-gen. mgr.; Dionisio Acosta, sec. **Inc.** in Mexico. **Cap.**, 250,000 pesos; issued, 24,000 pesos. **Property:** 50 hectares, including La Cobriza mine, developed by a 75-meter main shaft, and a 225-meter main tunnel, showing ore with values mainly in copper. La Continuacion de la Cobriza and La Magdalena are virgin properties. Presumably idle.

COBRIZA MINES DEVELOPMENT CORPORATION ARIZONA

Halstead Lindsley, gen. mgr., room 1508, No. 60 Broadway, New York. **Officers:** David M. Goodrich, pres.; H. M. Jasper, sec.-treas.; W. H. Galligan, supt. Operates under lease, property of the Arizona United Mining Co., which see.

COCHISE COPPER CO. ARIZONA

Property reported sold to Standard Mining Co., for \$100,000, Oct., 1914.

COCHISE DEVELOPMENT CO. ARIZONA

Bisbee, Cochise Co., Ariz. **Officers:** Lemuel C. Shattuck, pres.; Chas. L. Jones, v. p.-gen. mgr.; T. O. McGrath, sec.; Jos. M. Muheim, treas. **Inc.** Aug. 1, 1905, in Arizona. **Cap.**, \$1,000,000; shares \$10 par, succeeding the Cochise Copper Mining Co. Annual meeting, second Tuesday in January.

Property: 16 claims, 176 acres, abutting on the Holbrook mine of the Copper Queen Consolidated, and lying north of the Divident fault and Dubacher gulch. **Development:** by a 900' three-compartment shaft. Drifts on the 300', 600' and 900' levels show small bunches of sulphide ore. **Equipment:** includes a 100-h. p. boiler, a 10x30" first-motion double-drum hoist, good for 1,200', and a 6-drill Sullivan straight-line air compressor. Buildings are an engine house, boiler house, 20x40' carpenter shop, 20x30' smithy, and a coal trestle. Property considered promising for disseminated ore. Idle since 1907.

COCOPAH COPPER CO. CALIFORNIA

Idle. **Mine and works office:** Ivanpah, San Bernardino Co., Cal. Dan. Murphy, pres.; Dr. L. D. Godshall, v. p. and gen. mgr.; G. Holterhoff, Jr., sec.-treas.

Property: on Clear mountain, 20 miles from Ivanpah, the nearest railway point, includes the Copper World and Mohawk mines, formerly operated by the Ivanpah Consolidated Smelting Co. The Copper World group shows a broad mineralized zone, up to 300' in width, with a silicious iron outcrop carrying some malachite and occasional oxides. Mine has a 180' vertical shaft, with about one-half mile of workings, on a 5' vein, carrying mainly copper carbonates and oxides, in irregular masses.

The Mohawk mine, 2 miles south of the Copper World, shows a 4' orebody with nearly vertical dip, between a porphyry foot and limestone hanging, similar to that of the Copper World, but carrying more azurite.

C. O. D. CONS. GOLD MINING & DEVELOPMENT CO. COLORADO

Cripple Creek, Colo. **Officers:** Jas. E. Hanley, pres.; L. A. Van Tilborg, v.-p.; Virgil Mann, sec.-treas. E. J. Evans, supt. **Inc.** 1915. **Cap.**, \$200,000; shares 10 cts. par. Organized to operate the C. O. D. mine in

Poverty Gulch, Cripple Creek, Clear Creek Co., which was one of the old time producers, credited with an output of \$1,000,000 in gold. The mine was closed down years ago as a result of drainage difficulties and was in litigation for a number of years. The El Paso and Roosevelt drainage tunnels have since lowered the water level 1,000' or more below the lowest workings of the mine.

The main 3-compartment working shaft was bottomed at 800' with the 10th level the lowest. Present management claims to have found an ore-body on the 10th level which warrants sinking the shaft to 1,300' level. Lessees are working on all levels from the 4th to the 10th. The first ore was shipped in Sept., 1915 **Equipment:** includes a new 65-h. p. air compressor.

C. O. D. CONSOLIDATED MINING CO.

NEVADA

Goldfield, Nev. L. K. Koontz, pres. Inc. May, 1908, in South Dakota. **Cap.**, \$3,000,000; shares \$1 par. Treasury 1,000,000 shares. Listed on New York curb. Inc. as a merger of the Goldfield C. O. D. and the Gold Bar Mining companies, taking over the C. O. D., Golden Eagle and Zoe from the C. O.-D. Co.; the Gold Bar from the Gold Bar Co., and the Victor and Victor fraction from the Goldfield Cons. Last two claims were obtained by purchase, others by exchange of stock. Controlled by Goldfield Cons.

Claims form a compact group, 90 acres, at Goldfield. **Development:** 350' shaft and several thousand feet of workings. Was operated under 5-year lease by Nevada Co-Operative Co. Reported under option in 1915 to Tonopah Mng. Co. and Tonopah Belmont Dev. Co. Said to have a total production of \$75,000 with \$250,000 milling ore on the dumps. Plan sinking shafts to 500' level.

C. O. D. LEASING CO.

NEW MEXICO

Idle. **Office and mine:** Lordsburg, Grant Co., N. M. Thos. A. Lister, pres., treas. and gen. mgr. Inc. Aug. 13, 1909, in Arizona. **Cap.**, \$1,000,000; shares \$1 par, nonassessable; issued, \$664,700. Annual meeting, first Monday in December.

Property: 2 claims, 40 acres, in the Pyramid district, 8 miles south of Lordsburg, developed by 4 pits and a 55-shaft, showing lead and copper oxidized ores.

COEUR D'ALENE ANTIMONY MINING CO.

IDAHO

Kellogg, Ida. Company in Sept., 1915, reopened antimony mine on Pine Creek, west of Kellogg, that had been idle for 10 years. **Development:** by 150' shaft and tunnels, said to show two shoots of ore, the largest being 240' long and 40' wide. The high-grade ore is said to assay 50% antimony.

Present management built and has started operating a 50-ton mill, turning out 10 tons of concentrates daily.

COEUR D'ALENE CONSOLIDATED MINING CO.

IDAHO

Idle. **Office:** Osborn, Shoshone Co., Idaho. **Officers:** Louis Bolduc, pres.; E. M. Cornelius, v. p.; C. G. Johnson, sec.; Chas. Williams, treas.; preceding with W. G. Parks, directors. **Lands:** 4 claims, 2 to 3 miles from Wardner, have 500' of tunnels and 200' of crosscuts, developing a vein of 5 to 6' width, carrying copper ore and a little lead. **Equipment:** includes a 2-drill compressor, run by water power from Moon creek.

COEUR D'ALENE DEVELOPMENT CO.

IDAHO

Controlled by Stewart Mining Co. and described thereunder.

COEUR D'ALENE PACIFIC MINES CO.

MONTANA

Idle. **Officers:** Dr. Jas. Sutherland, pres., 212 Peyton Bldg., Spokane, Wash.; E. A. Patrick, v. p.; M. N. Stratton, sec.-treas.; preceding with J. A. Reinhardt and N. E. Jesseph, directors. Inc. in Washington. **Cap.**,

\$1,000,000; shares \$1 par; nonassessable. **Property:** 2 claims, 40 acres, near the Silver Cable mine, giving fair surface indications of lead and copper ore, with a short tunnel.

COLDWATER COPPER MINING CO.

COLORADO

Office: Encampment, Wyo. Mine near Pearl, Larimer Co., Colo. Z. L. Baldwin, pres.; H. N. Backus, v. p.; Walter Phipps, sec.; Burr Lobdell, treas. and gen. mgr. **Inc.** May 18, 1900, in Wyoming. **Cap.**, \$1,000,000; shares \$1 par.

Property: 5 claims, 52 acres, in the Pearl district of Larimer county, Colo., known as the Wolverine mine. Claims have 3 fissure veins in granite and diorite, of which 1, of 20' estimated width, shows oxidized ores and native copper, with sulphides at a little depth, estimated to carry an average of 6% copper and 2.6 oz. silver per ton, opened by shafts of 90' and 170', bottom of principal shaft showing massive chalcocite and a little disseminated chalcopyrite, of high average grade. Has steam power. Idle several years.

COLE DEVELOPMENT CO.

ARIZONA

Office and mine: Globe, Gila Co., Ariz. P. J. Cole, pres.; P. J. Cole, Jr., sec.-treas. **Inc.** Sept., 1909, in Arizona. **Cap.**, \$300,000; shares \$1 par; issued, 112,000 shares. **Property:** 17 claims, known as the Cole & Goodwin group, 4 claims wide and 4 claims long, extending along Mineral creek, 3 miles west of the Gibson mine and about 10 miles S. W. of Miami, the nearest available rail point, and 10 miles N. W. of Ray, but is separated from Ray by some extremely rugged country, through which no railway is likely to build within a generation or more. Country rock is Pinal schist, carrying the Cole & Goodwin fault, traceable about 1½ miles, that cuts the schist diagonally. This property carries fissure veins in schist, and also disseminated ores in schist.

Development: by the 420' Cole incline shaft, cutting several bodies of low-grade ore, and a 35' vein carrying an 8' paystreak, mainly of bornite, with a little chalcocite, somewhat similar to the ore in the Gibson mine, estimated to average about 8% copper. There also are several short tunnels, showing schist carrying impregnations of disseminated chalcopyrite, there being a 135' crosscut tunnel about one-half mile from the shaft, and a 480' crosscut tunnel, 1,700' west of the shaft, with portal 500' vertically below the collar of the shaft. **Equipment:** includes a 22-h. p. gasoline hoist. Idle since 1910, but development work resumed 1915 and small milling plant contemplated.

COLLEGE MINE

ARIZONA

Mine, 15 miles from Wickenburg, Maricopa Co., Ariz., is opened by an 80' shaft, said to show a 20' fissure vein carrying gold and copper ore. Relocated Jan. 1, 1914, by Cowell & Jacobs.

COLONEL SELLERS MINE

COLORADO

Office: Symes Bldg., Denver, Colo. Controlled by Empire Zinc Co. J. H. Troutman, gen. mgr.; Chas. Bargler, supt. **Property:** in California gulch, near Leadville, Lake Co., Colo., shows zinc, iron, lead and silver ore, as sulphides, occurring in typical Leadville deposits. **Production:** 200 tons daily. **Ore reserves:** 2 years supply estimated.

COLONIAL COPPER CO.

ARIZONA

Idle. Chelmsford, Mass. Herbert Moseley, sec.-treas.-gen. mgr.: Geo. H. Morrill, Jr., pres.; Adna T. Denison, v.-p. **Inc.** April 29, 1910, in Maine. **Cap.**, \$3,000,000; shares \$10 par, non-assessable; issued, \$1,720,000. Was a reconstruction of the Growler Copper Co. Bonds, \$500,000 authorized, at 5%; issued, \$41,000. Annual meeting, first Monday in June.

Property: 30 claims, 26 patented, 516 acres, in 2 groups, also a 10-acre

mill site, apparently held under bond and lease, in the Growler mountains, 15 miles south of Ajo and about 60 miles southeast of Gila Bend, the railway junction pt. The Copper Hill group, of 18 claims, shows an ore zone up to 300' wide, between diabase and limestone, with a gossan traceable 1½ miles, reported by company to carry 3 veins, of 2 to 7' width, having oxidized ores, silicates, bornite and chalcocite, giving assays of 2 to 46% copper, 1 to 66 oz. silver and 0.12 to 2 oz. gold per ton.

Development: by the 100' Daisy shaft, 260' Copper Hill shaft, and 320' Yellow Hammer shaft, and the 185' Copper Hill tunnel, with a total of 1,600' of workings, estimated by management to show about \$1,000,000 worth of ore.

Equipment: includes 170-h. p. steam plant, with 8-h. p., 26-h. p. and 70-h. p. hoists, and a 2-drill Ingersoll-Rand air compressor. Buildings include assay office and commissary, boarding house and smithy, with 6 tent houses. Property considered promising, but handicapped by very poor transportation facilities.

COLONIAL MINING & MILLING CO.

IDAHO

Watson Beebe, sec., Wallace, Ida. Inc. in 1915 by Beebe Bros. of Wallace with the ostensible purpose of operating the Little Pittsburg mine on Pine Creek which was under bond to them. **Cap.**, \$1,000,000; shares, 25c. It is said that half of this was appropriated by the promoters; the other half placed in the treasury and later 200,000 shares issued. Work was started with the accompaniment of a line of lurid advertising. A payment on the bond became due about March 3 and was not met; in addition to this the company in March owed about \$23,000, including \$5,000 back pay-rolls. There seems to be no hope that stockholders will recover anything. The company was a fake which fortunately died an early death.

COLORADO & CONNECTICUT GOLD MINING CO. COLORADO

Office: Meriden, Conn. Mine office: Lake City, Hinsdale Co., Colo.

Officers: Geo. S. Wilcox, pres.; Wm. C. Corves, v.-p.; R. S. Dossin, sec.; B. F. Barnes, treas. Inc. 1902, in South Dakota. **Cap.**, \$400,000; shares \$5 par, changed later to \$1,200,000, shares \$1 par. **Property:** 3 claims, 21 acres, known as the Dolly Varden mine, in the Galena district, carrying three 2' fissure veins, opened by a 150' shaft and a 738' tunnel, with 1,900' of workings. Ore is chalcopyrite, tetrahedrite and occasional argentite, giving assays of 9 to 19% copper, with occasional silver values, and test shipments have given returns of 141 to 479 oz. silver and as high as \$11 gold per ton. Mine apparently idle in 1915. No returns secured.

COLORADO METALS & CHEMICAL CO.

COLORADO

Controls the Fourth of July Group in Boulder Co., Colo., together with the Cons. Copper M. M. & Sm. Co., and property is described under latter title.

COLORADO MINING CO.

UTAH

Office: Jesse Knight, pres., Knight Bldg., Provo, Utah. Mine in the Tintic district, Utah Co., Utah. J. Wm. Knight, v.-p.; W. Lester Magnum, sec.-treas.; R. E. Allen and A. M. Knight, directors. Perry B. Fuller, supt. Inc. 1898, in Utah. **Cap.**, \$200,000, shares 20 cts. par; fully issued. **Dividends:** paid to date, \$2,600,000, last payment of 3c made in Dec., 1912. Annual report Nov., 1915, shows cash on hand, \$42,053, with bills receivable, \$57,000, against current liabilities of \$580.

Property: 11 claims, patented, 417 acres, contains large deposits of low-grade ore carrying copper and silver values. Two orebodies now being developed on the 500' level, which is 200' below the main ore zone of the mine, and east of the old ore channel. The south deposit, 400' north of the Sioux Consolidated line, shows 10 to 15' of commercial ore. **Produc-**

tion: from leases in 1914 was 2,947 tons and in 1915, 1,489 tons, which had gross value of \$36.15 and net value of \$27.73 per ton. Metal contents were 344.35 oz. gold, 49,359 oz. silver, 413,105 lbs. lead and 295,865 lbs. zinc. Company is doing little work, as long as leasing system continues profitable.

COLORADO MINING LAND & INVESTMENT CO. COLORADO

Idle. Office: Walsenburg, Colo. Mine near Hillside, Fremont Co., Colo. E. L. Neely, pres. and mgr. Inc. 1911, in Colorado. Cap., \$750,000; shares \$1 par.

Lands: 110 acres, owned partly in fee and partly leased, are said to show gold, silver, copper and lead assaying up to \$30 per ton.

COLORADO-NEVADA MINING & MILLING CO. NEVADA

Nelson, Clark Co., Nev. Officers: F. C. Avery, pres.; Alex. Mead, v.-p.; I. W. Bennett, sec.-treas.; G. A. Duncan, mgr.; with Geo. P. Avery, C. R. Welch, P. Anderson, directors. Inc. Oct. 13, 1915 in Colorado. Cap., \$1,000,000; shares \$1 par, none outstanding Annual meeting Oct. 1st.

Property: 11 claims, patented, 163 acres, Eldorado mining district, Clark Co., Nevada, shows gold and silver ore in fissure veins in andesite, with a mining width of 15', and said to average \$10 to \$12 per ton, as fed to mill.

Development: by 500' shaft. Equipment: includes a 25-h. p. hoist, Ingersoll-Rand compressor, and a 10-stamp mill and cyanide plant, daily capacity 75 tons, which is said to give an extraction of 92%. Company started operations late in 1915. No production figures to date.

COLORADO SUPERIOR MINING CO. COLORADO

Officers: Jacob Ojanpera, pres.; John E. Porthan, sec., Ely, Minn. Isaac Nevala, gen. mgr. Cap., \$1,000,000; shares \$1 par, outstanding 561,135 shares. Bonds authorized \$250,000, issued \$155,600.

Statement as of Sept. 30, 1915, for 9 months shows total receipts \$130,465, of which \$128,544 was from ore sales; total disbursements \$111,823, leaving an operating profit for that period of \$18,641. Current quick assets, \$1,947 with current liabilities of \$32,693. Broken ore in stopes, 21,700 tons.

Property: near Telluride at an altitude of 12,500'. Mine was closed down for some time, operations being resumed in Fall of 1914. Ore: sulphides of lead and zinc containing gold and silver in a vein averaging 10' in width and supposed to be a continuation of the Argentine vein in the neighboring Tomboy mine.

Development: by shaft, 500' from N. W. end of property, with levels at 150', 300' and 450'. During early part of 1915 new work totaled 400' on the 300' and 150' on the 450' levels. Ore is treated at the Smuggler Union Mng. Co.'s mill where 20 stamps have been used on Colo. Sup. ore. Ore milled during 1st 9 months of 1915 amounted to 27,733 tons with average assays per ton of 0.186 oz. gold, 2.2 oz. silver, 3.3% lead and 5.6% zinc. Recovery ran from 44% for zinc to 77% for gold.

Production: for first 9 months of 1915, 4,138 oz. gold, 34,092 oz. silver, 1,236,321 lbs. lead and 1,383,100 lbs. zinc.

COLQUITT-TIGNER QUICKSILVER MINE. TEXAS

Marlow Wells, mgr., Terlingua, Texas. Reopened June, 1916, and 40-ton furnace started.

COLUMBIA CONSOLIDATED MINES CO. CALIFORNIA

John Phelan, pres., Bridgeport, Conn. Mine address: Sweetwater, Mineral Co., Nev. Property: 8 claims, unpatented, 160 acres, at Mt. Patterson, 3 miles west of Nevada-California State line. Ore: gold, silver in fissure vein in porphyry. Vein has strike of N. 10° E. with 45° dip and average width of 28", of which 1/3 is workable and said to average .05 oz. gold and 40 oz. silver per ton.

Development: by tunnels: No. 1 has about 850' of workings; No. 2 is in 410' with 700' of drifting. Underground workings total 4500', and are said to block out 4,000 tons ore. **Equipment:** includes 10-stamp 30-ton mill. Output during 1914-15 valued at \$9,836. Work was stopped on account of low price of silver.

COLUMBIA COPPER CO.**WASHINGTON**

Chewelah, Wash. **Officers:** C. M. Carroll, pres., Spokane, Wash.; Alex. Robinson, v.-p.-mgr.; Oscar Olson, sec.-treas. T. J. Vaughan Rhys, cons. engr. **Property:** a 10 year lease and bond, for \$100,000 on the High-grade Mining Co. property in Deertrail Mining district, formerly owned by Carson Bros. of Reardon, Wash. Claims said to show 9' of ore from which shipments have been made.

COLUMBIA COPPER MINING CO.**IDAHO**

Address: care Sharp & Irvine, Paulsen Bldg., Spokane, Wash. **Directors:** B. E. Sharp, pres., Jos. Huber, v.-p., Jos. Andrews, sec., A. G. Kerns. **Inc. May, 1914, at Wallace, Ida. Cap., \$2,500,000; shares \$1 par.**

Property: a consolidation of the properties owned by the Aeolian Cons. Copper Co., the Marguerite Mng. Co. and the California Group, all near Mullan, Shoshone Co., Idaho, and all long idle.

COLUMBIA COPPER MINING CO.**ONTARIO**

Idle. Office: 510 Chamber of Commerce, Detroit, Mich. Mine near Parry Sound, Ont. **Officers:** Dr. A. H. Côte, pres.; Dean S. Fleming, v.-p.; S. S. Southerland, sec.; Dr. W. P. Dick, treas.; Alex. Dick, cons. engr. **Cap., \$3,000,000; shares \$1 par, nonassessable. Authorized, 1910, a \$10,000 bond issue. Lands:** 200 acres, adjoin the McGowan claim of the Parry Sound Copper Co., 1 to 2 miles from Parry Sound.

COLUMBIA GOLD MINING CO.**OREGON**

Operates the Columbia gold mine, with one of the 4 owners, Frank S. Baillie, of Sumpter, Oregon, as manager. Mine described in Mineral Res. of Oregon, Vol. 1, No. 8, pp. 146-159.

COLUMBUS CONSOLIDATED MINING CO.**UTAH**

Property sold, 1913, to Wasatch Mines Co., for 160,000 shares of stock of that company, which stock was distributed. Company dissolved. Described Vol. XI, Copper Handbook.

COLUMBUS EXTENSION MINING CO.**UTAH**

Office: Judge Bldg., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake Co., Utah. **Officers:** Lawrence Greene, pres.; M. R. Evans, v.-p.; F. A. Whitney, treas.; F. B. Cook, sec.; A. O. Jacobsen, gen. mgr., Raymond Greene, and J. R. Walker, directors. Henry Barney, supt. **Inc. 1906. Cap., \$600,000; shares, 50 cents par; issued, 230,000. Stock listed on the Salt Lake Exchange. Lands:** 7 patented claims, and 9 unpatented, 130 acres, west of the mines of the Wasatch Mines Co., and south of the Rexall mine. The claims cover the Oxford and Toledo fissures, both heavy producers, in former years, and the Haskell and Emily fissures.

Development: by present company is by a 5,300' tunnel, started in workings of the Wasatch Mines Co. and driven to cut Toledo vein at 1,800' depth or 3,000' on dip, and with crosscuts to reach the limestone-quartzite contact on the Black Jack claim. A drift was run through the Black Jack and Rex Fraction, and 275' from the tunnel a raise is being driven that shows good mineralization. Several undefined orebodies have been cut, said to assay 6% copper, 10-18 oz. silver, 10% lead and 48% zinc. **Equipment:** includes motors and tramway. Electric power is furnished by the Wasatch Mines Co. Employed about 11 men during 1915.

COLUSA-LEONARD EXTENSION COPPER CO.**MONTANA**

Subsidiary of the Tuolomne C. M. Co.

Dr. O. B. Whitford, pres., 804 W. Park St., Butte, Mont.; W. W. McDowell, v.-p.; Meyer Genzberger, treas.; W. E. Reynolds, sec. Inc. Oct. 1, 1906, in Arizona. Cap., \$5,000,000; shares \$5 par. Trust Company of America, New York, registrar and transfer agent.

Property taken over May, 1916, by the Tuolomne C. M. Co. under an agreement whereby the T. C. M. Co. will acquire a 51% interest in the C. L. property for which it will sink shaft from present depth of 800' to 1600' and drive crosscuts on the latter level to the N. and S. boundaries of the group.

Property: 5 fractional claims, patented, 47 acres, consisting of the Maggie placer, Golden Hematite, Little MacQueen, Undine and Snow Bird placer, about a mile east of the Colusa and Leonard mines, and near the Pittsmont shafts of the East Butte Copper Co. There is an 800' three-compartment shaft on the Little MacQueen claim lying about the center of the group, that has cut several small stringers of ore assaying up to 9% copper, but none of commercial size, and there is a 7' vein of 2% ore carrying a 14" paystreak said to range 8 to 10% in copper tenor, with small gold and silver values and some lead and zinc.

Equipment: includes a good air compressor, a temporary hoist and a 400-gal. electric pump.

Property will be reopened August, 1916, and operated as an unit of the Tuolomne Mining Co.

COLUSA-PARROT MINING & SMELTING CO. MONTANA

Office: 503 Miner Bldg., Butte, Silver Bow Co., Mont. Hon. Wm. A. Clark, pres.; Wm. C. Siderfin, v.-p.; W. C. Messias, sec. Inc. Nov. 26, 1897 in Washington. Cap., \$500,000; shares \$50 par. Company is practically out of business, its only present property being lands, platted as an addition to the city of Butte. Has an asset of considerable value in a million ton tailing dump at the Butte Reduction Works.

COMET GOLD & COPPER MINING CO., LTD. IDAHO

Office: care Jos. F. Whelan, sec., 408 Sixth St., Wallace, Idaho. Mine near Mullan, Shoshone Co., Idaho. Archibald McCullom, pres.-gen. mgr.; A. L. Honeker, treas. Cap., \$100,000; shares 10 cts. par, assessable; ½ mill per share levied 1913 and 1914. **Property:** 4 claims, adjoining the Springfield, east of Mullan, on Stevens peak, and near 2 railroads, shows 2 veins, of 10' and 15' estimated width, about 150' apart, carrying chalcopryrite and bornite, with iron and quartz gangue. **Development:** by tunnel, cutting a hematite vein, with about 1,600' of workings.

Property worked in a small way, with proceeds of assessments levied, but no orebodies of commercial value have thus far been developed.

COMET MINING & MILLING CO. MONTANA

Office: Coeur d'Alene, Idaho. Mine near Whitefish, Flathead Co., Mont. Dr. Max A. Dorland, pres.; Fred Eppinger, v.-p.; J. H. Wiggert, sec., at last accounts. Inc. 1909. Cap., 1,000,000 shares. Developed by a short tunnel. Presumably idle.

COMMERCIAL MINING CO. ARIZONA

Office: care Phelps, Dodge & Co., 99 John St., New York. Mine offices: Prescott and Skull Valley, Yavapai Co., Ariz. Maj. A. J. Pickerell, gen. mgr.; A. B. Peach, supt. Is controlled by Phelps, Dodge & Co., Inc.

Property: includes the Senator and Snoozer mines, producing high-grade sulphide ore from fissure veins and the Copper Basin mine with 18 claims, patented, in the Copper Basin, about 6 miles from the Santa Fé railroad. **Development:** by a 300' two-compartment shaft, bottomed in good ore and 2 tunnels, opening up large reserves of 3% oxidized ores.

Employs an average of 25 men and ships 40 tons per day of 7 to 10% sulphide ore to the Douglas smelter.

COMMONWEALTH EXTENSION MINING CO. ARIZONA
J. S. Metcalf, supt., Pearce, Ariz. C. W. Hicks, pres. Control held in Bisbee, Ariz.

Property: a tract adjoining the Commonwealth mine on the E. and S. E. shows a mineralized contact that carries high-grade ore in the adjacent mine. **Development:** a 250' shaft sunk in andesite with 230' level, equivalent to 7th level of the Commonwealth and corresponding to the water level of the district. **Equipment:** includes steam plant, hoist and compressor.

COMMONWEALTH MINES CO. UTAH
Office: 420 Herald Bldg., Salt Lake City. Mine office: Newhouse, Beaver Co., Utah. **Officers:** Wm. M. Bradley, v.-p.; W. T. Aiken, sec.-treas.; Newton A. Dunyon, gen. mgr.; preceding with C. H. Strevell and Jas. H. Paterson, directors. Inc. Nov., 1906, in Wyoming. **Cap.**, \$600,000; shares \$1 par.

Property: the Commonwealth mine, 7 claims, in the Star district, adjoining Lady Bryan and Progressive mines. Claims show Topache limestone with intrusive sheets of altered green porphyry, cut by fissures, with more or less mineralization along fissures and outward along certain limestone beds. Considerable lead ore was produced from surface workings in the past and the Nellie claim has copper sulphides in its bottom workings. The Beaver claim has ores giving average assays of 13.2% copper and 17.2 oz. silver per ton, with more or less lead. **Development:** by a 1,400' tunnel, with back of about 300'. Said to have secured ore assaying up to 4% copper, 20% lead and 60 oz. silver per ton. **Equipment:** includes gasoline power and an air compressor. Development shows but little ore, mostly low-grade, and claims are not especially promising according to geological reports. Presumably idle.

COMMONWEALTH MINING & MILLING CO. ARIZONA
Office: 300 First Nat'l. Bank Bldg., San Francisco, Calif., and Pearce, Cochise Co., Ariz. **Officers:** Chas. E. Knox, pres.-gen. mgr.; A. Y. Smith, v.-p.; F. L. Bryant, sec.-treas., with E. A. Collins, M. E. McCrate, directors. E. A. Collins, gen. supt.

Inc. 1896 in Ariz. **Cap.**, \$2,000,000; shares \$1 par; all issued. Bonds authorized \$250,000, outstanding \$230,000. Annual meeting May 1. Gross earnings for 9 months of 1915, \$384,854 of which \$375,666 was from ore sales. Operating expenses over same period, \$335,452.

Property: 10 claims, 7 patented, 230 acres, in the Turquoise mining district, Cochise Co., Ariz. **Ore:** silver-gold in fissured zone in andesite and rhyolite breccia. Vein has strike S. 85° E. and dips south 60°. Average assay of ore said to be 0.066 oz. gold, 7.3 oz. silver.

Development: by incline shafts. "C" shaft is 600' deep; "D" shaft is 500' deep. Mining is done by shrinkage stoping. **Equipment:** includes 100-h. p. electric hoist, Ingersoll air-compressor, capacity 1,500 cu. ft., steam and electric power. **Mill:** stamp mill and cyanide plant with daily capacity of 330 tons.

Production:	Ore, Tons	Gold, Oz.	Silver, Oz.
1915 (9 mos.)	89,233	6,150	507,531
1914	103,924	6,546	564,798
1913	10,320	778	41,673

COMSTOCK COPPER MINING CO., LTD. IDAHO
Mine near Burke, Shoshone Co., Idaho. **Officers:** E. S. Amsden, sec., Wallace, Idaho; Otto A. Olsson, treas.; John H. Nordquist, mgr., with C. W. Anderson and A. Swan, directors. Inc. in Idaho. **Cap.**, \$1,500,000;

shares \$1 par. **Lands:** on Baldy mountain, east of Burke are developed by 800' tunnel and 700' of drifting on the vein. Is developing on a small scale, raising money by assessments of 1 mill per share, last one delinquent, Oct. 5, 1914.

COMSTOCK TUNNEL CO.**NEVADA**

Address: 25 Broad St., New York, N. Y. **Franklin Leonard**, pres.-gen. mgr.; **Franklin Leonard, Jr.**, treas. **Cap.**, \$4,000,000; shares \$2 par; \$2,769,000 bond issue outstanding, on which no interest has been paid since 1892. Stock was traded on N. Y. Exchange in June, 1915, at 8 to 20 cts. per share. Company is controlled through stock ownership by the Leonard family.

Property: 7½ miles of tunnel, draining the Comstock mines to depth of 2700'. Income of company was seriously curtailed in 1914 owing to inactivity of many mines on the Comstock lode, who pay 4% royalty on all ore extracted to the Comstock Tunnel Company for drainage and ventilation, but extensive resumption of operations in 1915-16 by the Comstock mines has restored revenues.

CONE MINING & MILLING CO.**ARIZONA**

Office: 132 Edgerly Bldg., Fresno, Calif. **Officers:** **J. P. Eaton**, pres.; **M. J. Walsh**, v.-p.; **Hugh Sparkman**, sec.-treas. **Inc.** Aug., 1911, in Arizona. **Cap.**, \$1,500,000; shares \$1 par; 778,875 shares issued.

Property: 12 claims, unpatented, 240 acres, 2½ miles S. W. of Oatman, in the Tom Reed-Gold Road district, Mohave Co., Ariz. Ore occurs in veins in rhyolite dike, traversing ground from E. to W. **Development:** 235' shaft, with crosscutting to reach ledge on 200' level. **Equipment:** includes a 15-h. p. Fairbanks-Morse hoist.

CONGOR GOLD & COPPER MINING CO.**UTAH**

Office: 506 Auerbach Bldg., Salt Lake City, Utah. Mine near Bingham Canyon, Salt Lake Co., Utah. **Officers:** **Glen R. Bothwell**, pres.-gen. mgr.; **R. C. McConaughy**, v.-p.; **Frank E. Loose**, sec.; preceding with **E. F. Jenkins** and **C. G. Hall**, directors, at last accounts. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 10 claims, 150 acres, adjoins the Bingham Amalgamated on the north, in Bingham Canyon, Salt Lake Co., Utah. Developing 3' vein from 4,000' tunnel of Montana Bingham Co., working about 100' from face of tunnel. Mine reported to have about 100,000 tons of ore exposed, running from \$6 to \$50 per ton and averaging \$14.

Company has a contract with the Montana Bingham Consolidated Mining Co., shipping its ores through the Miller Ore Transportation tunnel of that company to the Denver & Rio Grande railroad tracks at a cost of 25 cts. per ton of ore and 12½ cts. per ton of waste.

CONGRESS CONS. MINES CO., LTD. (THE)**ARIZONA**

Office: Room 514, 49 Wall St., New York. Mine office: Prescott, Ariz. **F. M. Murphy**, pres.; **Geo. D. Morris**, sec.-treas. **Property:** 27 mining claims, about 540 acres, at Congress, Yavapai Co., Ariz. A 4 mile standard gauge road connects the mines with the main line of the Santa Fé, Prescott & Phoenix Railway. Company owns two 40 stamp mills, a cyanide plant, together with all necessary mining machinery.

Mine idle 1914-15. Shaft said to be 3,000' deep and mine to have 2,000,000 tons of tailings available for retreatment. Property reported to have produced upwards of \$15,000,000. A retreatment of the tailings dump by the Holden process, is contemplated 1917.

CONGRESS GOLD & COPPER CO.**COLORADO**

Idle. Directors: **J. B. Ross**, pres.-gen. mgr.; **Guy W. Mallon**, v.-p.; **Frank L. Ross**, sec.-treas. **Inc.** April 16, 1908 in Colorado. **Cap.**, \$500,000; shares \$10 par. Bonds, \$100,000 authorized, at 6%; issued, \$50,000.

Property: 3 claims, 30 acres, the Congress and Arlington mines at Red mountain, 12 miles south of Ouray in San Juan county and the Midway mine in Ouray county. The Congress is a famous old mine worked 1884-93, said to have produced about \$400,000 worth of ore, averaging 18% copper and 11 oz. silver per ton, with small gold values. The mine, idle for some years, through litigation, was leased 1912-13. **Development:** 270' shaft with about 1,500' of workings, showing chalcocite, reported by company to average about 16% copper, 6 oz. silver and \$1 gold per ton. Mine has a 50-h. p. steam plant. See Southern Exploration & Mining Co.

CONIAGAS MINES, LTD.**ONTARIO**

St. Catharines, Ont., and Cobalt, Ont. **Officers:** R. W. Leonard, pres. and gen. mgr.; Alex. Longwell, v.-p.; with R. P. Rogers, F. J. Bishop and W. D. Woodruff, directors; J. J. Mackan, sec.-treas.

Inc. Nov. 24, 1906, in Ont. Cap. authorized and outstanding, \$4,000,000; \$5 par. Toronto General Trusts Corp., transfer agt. Annual meeting in Dec. Listed on Toronto Stock Exchange and New York Curb. Owns entire \$4,000,000 (par \$5) stock of the Coniagas Reduction Co., Ltd., which handles this company's product. Also controls the Redington Rock Drill Co. and the Mines Water Supply Co., Ltd., besides owning 6,054 shares of \$1 each, of a total issued of 40,000 shares of stock of the Wabi Iron Wks., Ltd.

Income Account, Fiscal Year Ending Oct. 31

Year	Gross Income	Net Income	Dividends & Bonuses	Surplus for Year
1914-15	\$1,013,513	\$ 658,730	\$ 600,000	\$ 58,730
1913-14	1,407,877	968,387	1,320,000	351,613 (a)
1912-13	2,186,664	1,693,583	1,640,000	53,583
1911-12	2,172,967	1,676,953	1,440,000	236,953
1910-11	1,947,566	1,612,464	1,440,000	172,464
1909-10	1,010,414	752,389	240,000	512,389
1908-09	691,678	473,534	360,000	113,534
1907-08	727,195	501,718	440,000	61,718

(a) Deficit. During year ending Dec. 31, 1914, paid 33% in dividends and bonuses. Total dividends paid to Oct. 31, 1915, \$7,840,000.

Balance sheet as of Oct. 31, 1915, shows assets, \$5,126,662, which includes: mine \$3,985,700; machinery, plant and buildings, \$215,204; Coniagas Reduction Co., Ltd., stock, \$249,400; cash in bank and on hand, \$245,840; ore in transit, \$109,296; accounts receivable, \$265,201. Liabilities include, surplus \$1,118,251.

Property: the Coniagas mine, 40 acres on the townsite of Cobalt, Coleman Twp. In 1915, company purchased 198 acres of Lot 15, Con. 1, Bucke Twp. known as the Agaunico mine, in which considerable development work was done a few years ago on a promising vein of cobalt and nickel ore. The Coniagas mine contains a large number of small, but very rich, veins carrying silver with small amounts of cobalt, nickel and arsenic.

Development: totaled 27,738' of underground workings Oct. 31, 1915. This included shafts 875', drifting 16,608' and 8,715' of crosscutting. Underground work for year ending Oct. 31, 1915, amounted to 2,735' as compared with 2,295' in preceding year. Development work was confined to the 225' and 285' levels. The latter is the lowest level. No important new orebodies were developed during the year, though it will take another year's work to completely prospect the 40 acre tract.

Ore reserves: Oct. 31, 1915, estimated as 215,995 tons containing 12,894,-380 oz. silver. Allowing 20% for possible over-estimation leaves a reserve

of 10,315,504 oz. silver, as compared with 260,000 tons containing 11,904,000 oz. silver in preceding year.

Mill: 60 stamps, daily capacity 160 tons and a small cyanide plant, recently completed. The cyanide plant was built to cyanide about 6 tons per day of low-grade canvas table concentrates and decomposed gouge from the mine, whereby an estimated daily saving of \$100 per day will be made. For year ending Oct. 31, 1915, mill treated 55,437 tons ore, an average of 3.02 tons per 24 hours, compared with 54,522 tons, an average of 2.93 tons per 24 hours, for the previous year. Mill heads averaged 23 oz. silver per ton compared with 24 oz. for the previous year. Number of men employed in mine and mill averaged 141. Electric power is used.

Production (For Year Ending Oct. 31)

Year	Tons - Mine Ore	Tons Concts.	Cost per Oz.		Ounces Silver	Price, Oz. Silver
			(a) Silver	(b)		
1915	267	607	13.62c	3.25c	2,002,053	49.25c
1914	485	688	12.44c	3.58c	2,497,394	56.75c
1913	735	1,034	8.76c	4.32c	3,252,566	60.55c

(a) Includes all expenses except shipping, smelting, refining and marketing charges which are under (b). Total production of mine to Oct. 31 amounted to 22,162,442 oz.

Ore and concentrates are treated by the Coniagas Reduction Co., Ltd., which see.

Is second only to the Nipissing Co. in production and is a splendidly managed property.

Coniagas Reduction Co., Ltd. Ontario

Is a subsidiary of the Coniagas Mines, Ltd. Owns a smelter and refinery at Thorold, Ont. R. L. Peek, supt. During fiscal year ending Oct. 31, 1915, company shipped 3,465,946 oz. silver. Company produces silver, arsenic and the oxides of cobalt and nickel. An average of 139 men employed in 1915.

CONKLING MINING CO.

UTAH

Office: 520 Atlas Block, Salt Lake City, Utah. **Mine office:** Park City, Summit Co., Utah. **Officers:** Col. Nicholas Treweek, pres.; Wm. C. Hall, v.-p.; Geo. A. Lund, sec.; J. Leonard Burch, treas.; preceding and Margaret Treweek, directors. Inc. Sept. 17, 1908, in Utah. **Cap.**, \$500,000; shares \$1 par, assessable. Is a close corporation, with 25% of stock owned by Silver King Coalition Mines Co.

Property: 2 claims, 2 miles from a railroad, shows gold, copper and lead ores, developed by a 1,000' tunnel on the lands of the Silver King. No returns secured.

CONNECTICUT ZINC CORPORATION.

MISSOURI

Office: 500 Fifth Ave., New York. **Officers:** Ross M. Turner, pres.; Geo. Tracy, v.-p.; preceding with P. W. Brooke, A. R. Turner, J. J. Coyle, H. C. Johnson, W. S. Hallowell, W. H. Lyon, A. S. Raymond, D. L. Robertson, G. P. Smith, directors. E. H. Van Wyck, treas.

Inc. June, 1914, in N. Y., to hold securities of Oronogo Circle Mining Co., of which it owns the entire capital stock, and to operate zinc properties. **Cap. authorized and outstanding**, \$1,000,000; \$25 par. Fidelity Title & Trust Co., transfer agt., Stamford, Conn. Annual meeting, second Monday in July.

Bonded debt: \$315,000 sinking fund gold 6% bonds, dated July 1, 1914, due July 1, 1924; int. Jan. and July 1, at Logan Trust Co., Philadelphia, Trustee. Coupon \$500, principal may be registered. At least \$35,000 of the bonds are callable on July 1 each year, commencing in 1915. Sinking fund

equal to 40% of net earnings is provided. Secured by pledge of the entire stock and leases of the Oronogo Circle Mining Co. Authorized and issued \$350,000 of which \$150,000 has been paid off to April 30, 1916. Interest paid without deduction for normal Income Tax. **Dividends:** paid quarterly, Jan., at rate of 4% per annum. See Oronogo Circle Mining Co.

CONSOLIDATED AMADOR MINING CO. CALIFORNIA

In Jan., 1916, company purchased from Hetty Green the old Eureka mine on the Mother Lode, at Sutter Creek, Amador County. The mine, known under the names of Eureka, Amador, Hetty Green and Hayward's and idle for 30 years, is credited with a past production of \$12,000,000 in gold.

Wm. D. Thornton is president of the resuscitated company; among the principal share holders are Thomas F. Cole, John D. Ryan, Chester A. Congdon, Wm. E. Corey, Jas. Hoatson, Ambrose Monell, Wm. W. Mein, and Philip L. Foster. Purchase price said to be over \$500,000. The new management will unwater and reopen the mine. For history of the property see Mining and Scientific Press, Vol. 112, No. 26.

CONSOLIDATED ARIZONA SMELTING CO. ARIZONA

Office: 15 Broad St., New York. **Mine office:** Middleton, Yavapai Co., Ariz. **Works office:** Humboldt, Ariz. **Victor I. Cumnock,** pres.; **Chas. A. Kittle,** v.-p., and **E. S. Hooly,** v.-p.; **Frank W. Thompson,** sec.-treas.; **John H. Flagler,** **Frank A. Dillingham,** **Chas. Hill** and **Ed. Pavenstadt,** directors. **G. M. Colvocoresses,** gen. mgr.; **W. V. de Camp,** supt.

Inc. Dec., 1908, in Maine. **Cap., \$9,200,000;** shares \$5 par, of which \$912,500 is reserved for bond conversion. Stock is listed on the New York Curb. **Bonded debt:** \$1,200,000, 5% 30-year income bonds authorized; \$974,500 outstanding, and \$1,000,000 6% 20-year gold bonds; \$250,000 outstanding. Acquired at foreclosure sale the properties of the Consolidated Arizona Smelting Co. (see Vol. X) and the Arizona Smelting Co. The intricate relationship of the old company and its subsidiaries is fully described in Vol. X. Operations in 1915 resulted in a net profit of \$194,942.

Property: 40 claims, 20 patented, 725 acres near Mayer and near Middleton, Yavapai Co., Ariz. The most valuable mine owned by the company is the Blue Bell, comprising 3 claims, carrying fissure veins with quartzite footwall and granodiorite hanging.

Development: 6 shafts, deepest 1,000' and 2 short tunnels, with about 14,000' of underground workings. Ore contains pyrite and chalcopyrite, all slightly argentiferous and auriferous. The Blue Bell vein has been proved for 350' on the 1,000' level, where it is 15' wide, and averages 3.3% Cu. with 1.2 oz. silver and .04 oz. gold per ton.

Mine is connected with the Bradshaw Mountain railway by a tram line and has electrical machinery, taking current over an 18-mile transmission line. Development and exploratory work in progress in 1916.

The De Soto Mine is also operated by this company. Developed by 4 tunnels, 5,000' in length, to depth of 1,000', with a total of 11,000' of underground workings.

Production: about 100 tons of 3.5% copper ore per day. Copper production from both mines in 1915 amounted to 4,392,000 lbs.

Equipment: the reduction plant, well located for custom business, includes sampling, concentrating, roasting, smelting and converting departments, with a machine shop and smithy. All buildings are of structural steel frame, with brick walls or corrugated-iron sheathing, floored with cement. This plant was made over in 1914, and is described by G. M. Colvocoresses, in the Eng. and Min. Journal, Sept. 5, 1914, p. 425.

A 250-ton Minerals Separation flotation plant was installed in 1913.

The concentrator has two 200-ton units, each having one 10x20" and two 7x10" Blake crushers, 1 centrifugal crusher, 3 elevators, 2 sets of rolls, one 25' Hancock jig, 10 Wilfley tables, 8 Overstrom tables, 8 vanners, 4 trommels, 8 Callow tanks and Richards, Johnson and Anaconda classifiers. The mill has a large slum pond, and overflow water is returned to the mill for re-use.

During 1915, 81,544 tons of ore and old tailings were treated, making an average recovery of 88.6% copper; 62.5% gold and 70.5% silver values. The ratio of concentration was 4.1 to 1; the mill produced 19,877 tons concentrates, containing 10.27% copper. Management plans increasing capacity to 500 tons in 1916, erecting new crushing and receiving plant, in 2 sections, 1 for concentrating and 1 for smelting ores. Average cost of milling, including flotation royalty was \$1.20 per ton in 1915, as against \$1.82 in 1914. The concentrate averages 14% copper, 28% iron, 20% sulphur, 20% insol., compared with smelting ore, carrying 4.5% copper, 20% iron, 20% sulphur, 42% insol.

The first unit of the remodeled smelter is a 7-hearth Wedge roaster, 22' 6" diam., fitted with auxiliary oil-burners and supported on step bearings instead of trunnion. There are two reverberatory furnaces, burning oil and rated at 400 tons daily capacity. Matte from the reverberatory furnaces is tapped into a launder, which delivers it to a ladle in the converter room. Production averages 500,000 lbs. blister copper per month from company ore and custom material. The blast-furnace department has both lead and copper stacks, with a 200-ton 48x60" lead furnace, and a 250-ton water-jacket blast furnace for copper. Slags are granulated. The stack is of reinforced concrete, 180' high, 18' in diameter at the base and 11' at the top.

The converter department has 2 stands, with shells of barrel type, rotated electrically. Equipment includes a 40-ton Whiting electric crane with a 15-ton auxiliary crane, cranes also taking hot slag from the converters and pouring same into the reverberatories and delivering shells.

The power plant has four 345-h. p. Stirling water-tube boilers, burning waste gases from the reverberatories, steam being sent therefrom through a 10" pipe line, under 150-lb. pressure. Machinery includes 2 Connersville blowers, a Nordberg duplex cross-compound air compressor, with 40x42" air cylinder and 18x36x42" steam cylinders. There are two 300-kw. 480-volt 3-phase 60-cycle generators, direct-connected to two 16x32x36" Nordberg cross-compound engines, and an electric turbine pump. Electric power is furnished the Blue Bell mine, 18 miles distant, current being transmitted at 15,000 volts, stepped down to 440 volts, at the Blue Bell transformer station.

The smelter treated 61,034 tons in 1915, producing 5,762,974 lbs. copper; 81,646 oz. silver; 3,092 oz. gold. Shipments averaged 3.05% copper and \$1.40 in gold and silver. Total cost per pound copper produced was 13.32c as compared with 13.92c in 1914, and average price received was 17.67c. Total cost of milling, including flotation royalty was \$1.20 per ton as compared with \$1.82 in 1914 and smelting cost was \$3.34 per ton as against \$5.55 in 1914.

Ore reserves: Feb. 1, 1916, reported as 280,000 tons averaging 3.5% copper and \$1.50 gold-silver per ton in the Blue Bell and 75,000 tons in the De Soto mine, averaging \$1.50 in gold and silver and 3.75% copper. Employed 350 men during 1915. Management is working along sound and progressive lines.

CONSOLIDATED CALIFORNIA-NEVADA MINING CO. NEVADA
Offices: 40 Cedar St., New York, and Pioche, Nevada. Geo. W. Bent, former supt. In receiver's hands. Organized 1915 to take over the Day

Bristol properties, bought in by bondholders' committee at sheriff's sale in 1915. Company started work at Gypsy mine with 50 men, and shipped 800 tons copper-silver ore in November, 1915, deepening Gypsy shaft, and installing engine, hoist and compressor at Hillside and Tempest shafts. Company had 8,300' rope tramway in operation.

In Feb., 1916, owing to inability to ship ore already mined and to secure funds from sale thereof, mines closed down and company went into receiver's hands.

The International & Intercontinental Mng. & Ref. Co., inc. 1916 as holding company, with the Uvada Copper Co. as operating company, were formed to operate the properties. (See two companies named.)

CONSOLIDATED CENTRAL BUTTE COPPER CO. MONTANA

Office: c/o R. M. Cobban, sec., Butte, Mont. **Officers:** R. R. Jones, pres.; R. H. Wearing, v. p.; D. J. Charles, treas., and E. E. Hershey, directors. **Inc. Oct. 29, 1906, in Mont. Cap., \$1,200,000; shares \$1 par, assessable; issued, 446,000 shares. Has levied 3 assessments, aggregating 6½ cts. per share, or about \$28,000. Annual meeting, second Thursday in January.**

Owens a one-third interest in the North Star, South Star and January claims, patented, and mineral and mining rights in about 100 acres of patented placer claims, adjoining the Ophir claim (Butte-Detroit Copper) on the east. The North Star, South Star and January claims are developed by a 225' shaft, said to show an orebody 3 to 6' wide. Idle several years for want of working capital.

CONSOLIDATED COPPER CO.

WASHINGTON

Office: 906 Paulsen Bldg., Spokane and Turk, Stevens Co., Wash. **Mine** at Springdale, Stevens Co., Wash. **Officers:** W. H. Stowell, pres.; Geo. C. Gates, v. p.; V. W. Brasch, sec.-gen. mgr.; preceding and Chas. A. Libby and E. R. Traeger, directors. **Inc. 1913 in Washington. Cap., \$1,500,000; shares \$1 par, assessable; total assessments to Dec., 1915, 16 mills. Annual meeting, Jan. Company is a reorganization of the Togo Mining & Smelting Co.**

Property: about 240 acres, 160 patented, in Cedar Canyon district. Ore occurs principally as copper pyrites in slate, serpentines and quartzite with a N.-S. strike and 40 to 60° dip. One orebody, developed by tunnels, with about 2,000' of workings, is reported by management to average 3 to 5' in width, in upper levels, and to carry 8% copper, 3½ to 5 oz. silver and a trace of .02 oz. gold per ton. Upper levels said to show bornite, copper glance and a little native copper. A 1,000' crosscut tunnel is said to cut several veins, undeveloped at last reports.

Equipment: includes gasoline engine and hoist. The mine has been closed down for several years, but management expects to begin operations in 1916.

CONSOLIDATED COPPER CO. OF PARRY SOUND. ONTARIO

Office: 705 Palladio Bldg., Duluth, Minn. **Mine office:** Parry Sound, Parry Sound district, Ont. **Officers:** Robt. Forbes, pres.; Robt. Millard, v. p.; J. G. Harris, sec.-treas.; preceding, with A. C. Le Richeux, Frank Cox, E. E. Rorem, Dr. J. D. Budd, F. L. Young and C. J. Jackes, directors. **Inc. Feb., 1902, in Ontario. Cap., \$5,000,000; shares \$1 par; issued, about \$3,100,000.**

Lands: 1,500 acres, patented, carry considerable standing timber, in Foley, McDougall, Haggerman and Conger townships. Part of property formerly was held by Hattie Belle Gold, Copper & Nickel Co. **Ores:** occur as contact deposits between slate and quartzite, and as fahlbands, ore being mainly chalcopyrite, with occasional bornite and chalcocite, mainly low in

grade, but with occasional seams of high-grade ore. There are 18 different orebodies, shown by test pits and stripping, of which 2 are somewhat developed. The fahlbands are said to show a width of more than 1,000', carrying 7 bands of fairly good ore, of 200' estimated aggregate width, between which is low-grade ore, part of which may be amenable to concentration. Ores assay 1.5 to 12% copper, 3 oz. silver, and from a few cents up to \$8 gold per ton. **Development:** by 180' vertical shaft, and about 25 pits of 10 to 30' depth.

The Spider Lake mine has a shaft house, and steam hoist good for 500', with necessary mine buildings. A considerable orebody has been exposed by trenching.

The Lefex mine has shafts of 90' and 40', showing nothing of particular promise. The Lefex has an iron gossan, carrying up to 2% copper and \$2 to \$3 gold per ton. A 600-lb. test shipment, from the 65' level, returned 30% copper, and various samples have shown from 0.5 to 3% nickel, and from nothing to \$20 gold per ton. Company has acquired control over 120 acres adjoining property, and plans resuming operations, 1916.

CONSOLIDATED COPPER MINING CO. UTAH

Eureka, Juab Co., Utah. **Officers:** J. C. Jensen, pres.; J. W. Burton, v. p.; A. A. Biorn, sec.-treas.; preceding, with H. S. Birch, Theo. Cederstrom and Cornelius Cederstrom, directors. **Inc.** 1911. **Cap.**, \$100,000; shares 10 cts. par; issued, 550,000 shares.

Lands: 6 claims, in the North Tintic district, slightly developed, show a narrow vein of low-grade copper ore, with gold and silver values, and a deposit of black marble, said to be of good quality. Development work in 1914 consisted of drifting and crosscutting to reach the Kendall-Douglass orebody on the 200' level.

CONSOLIDATED COPPER M., M. & SM. CO. COLORADO

Mine office: Eldora, Boulder Co., Colo. **Officers:** C. C. Munson, pres.; W. H. Hoke, v. p.; M. P. Givens, sec., 325 Bannock St., Denver, Colo.; M. L. Ericson, treas. **Inc.** Oct. 16, 1899, in Colorado. **Cap.**, \$2,000,000; shares \$1 par. Annual meeting, second Tuesday in September. Consolidation with Colorado Metals & Chemical Co. reported in 1914.

Property: 27 lode claims, partly patented, 150 acres, known as the Fourth of July group, 3 additional tunnel claims, a placer claim and a 160-acre timber claim, giving total holdings of about 600 acres, at the southern base of Arapahoe peak, in the Grand Island district. Said to have 4 contact deposits, with phonolite on one wall, of which 1, under development, was said to average about 7' in width, and to carry up to 60' of sulphides, of concentrating grade, including galena, chalcopryrite, bornite and chalcocite, all auriferous and argentiferous. **Development:** by 3 shafts, deepest 360', and the Fourth of July tunnel, of 4,800' length. Has steam power, a 6-drill Leyner 2-stage air compressor and necessary buildings. Development and exploratory work under way, 1914.

CONSOLIDATED COPPERMINES CO. NEVADA

Office: 60 Broadway, New York City. Mine office: Kimberly, White Pine Co., Nev. **Officers:** Chas. H. Boynton, pres.; Jos. B. Cotton, v. p.; Edwin F. Gray, 2nd v. p. and gen. mgr.; Thos. B. Adams, sec.-treas.; E. F. Kellogg, asst. sec.-treas.; with Thos. F. Cole, Isidore Hershheim, Mulford Martin, G. L. Perkins, F. E. Searle, J. T. Morrow and A. J. Selfridge, directors. **Inc.** May 20, 1913, in Delaware. **Cap.**, \$8,000,000; shares \$5 par, nonassessable; \$3,801,084 outstanding Dec., 1915. Bonds authorized, \$3,500,000; amount outstanding, \$225,300; convertible bonds bear 7% and are redeemable by lot at 110 plus accrued interest on any interest day, not later

than 1928. Guaranty Trust Co., New York, transfer agent; Bankers Trust Co., New York, registrar. Stock listed on New York Curb.

Statement shows cash on hand Dec. 31, 1914, \$1,505; receipts to April 30, 1916, \$123,955; expenditures to April 30, 1916, \$121,781, leaving cash on hand April 30, 1916, \$3,679.

Company was organized to secure control of the Giroux Consolidated Mines Co., Coppermines Co., Butte & Ely Copper Co. and Chainman Consolidated Copper Co., acquiring stock in the several companies on the basis of 1 new share for 2½ Giroux shares; 1 for 6¼ Butte & Ely; 1 for 3½ Coppermines, and 1 for 25 Chainman. In Dec., 1913, the company acquired the properties of the New Ely Central Copper Co. on the basis of one share Consolidated stock for 20 shares New Ely stock. These properties, aggregating 90 claims, in the heart of the Ely district, are separately described under their respective titles, though they will hereafter be operated as parts of one company.

Company was launched at a time of unsettled financial conditions and was floated with difficulty. An ore tonnage was shown June, 1915, of 25,500,000 tons ore, 1.31% copper, 17,000,000 tons fully developed, average grade 1.19%, and 8,500,000 tons partially developed, average grade 1.01%. When further work has shown a sufficient tonnage the company will, it is said, build a concentrator. Property examined by Henry Krumb and R. H. Channing, Jr.

The company is doing development work only in 1916, but the Nevada Cons. Co. is reported to be working the Ora claim under an agreement whereby the ore is mined free of charge in payment for certain rights of way. The output is said to be 10,000 tons of ore per month, shipped to the Nevada Cons. smelter.

Suit against the company was begun in 1916 to compel it to work its properties, Col. Wall alleging that the management could and should mine, mill and ship ore. The financial management of this company is piratical.

CONSOLIDATED HOMESTEAD MINES CORPORATION ARIZONA

Controlled by U. S. Continental Mines Co., which see.

CONSOLIDATED INTERSTATE CALLAHAN MINING CO. IDAHO

Offices: 61 Broadway, New York. Mine office: Wallace, Idaho. **Officers:** John A. Percival, pres.; M. G. Rodearmel, 1st v. p.; Milie Bunnell, 2nd v. p. and treas.; above, with J. B. Cotton, A. L. Riley, A. L. Warner, S. S. Titus, Otto Sussman, Jas. F. Callahan, P. H. Nelson and Louis Hanitch, directors; C. W. Newton, supt.; D. F. Haley, cons. engr.; Julian B. Beaty, sec.

Inc. June 12, 1912, in Arizona as a consolidation of the Interstate Silver-Lead Mining Co. and the Callahan Mining Co. **Cap.**, \$5,000,000; shares \$10 par, nonassessable; 464,990 shares outstanding June 1, 1916. Annual meeting in August. Listed on N. Y. Exchange. Title Guarantee & Trust Co., New York, transfer agent; Registrar & Transfer Co., New York, registrar.

Financial statement: shows June 30,

	Current Assets—			Total	Current Liabilities		Surplus
	Cash	Ore Account	Other		Liabilities	Surplus	
1916.....	\$143,573	\$596,289	\$101,709	\$ 841,571	\$34,860	\$ 806,711	
1915.....	316,588	784,190	50,864	1,151,642	56,780	1,094,862	

Comparative operating statement: year ending June 30,

	Income Op. & Gen. Year's		Surp. from Prop.		Divid's.	Surplus	
	(a) Expen's.	Profit	Last Year	Invest.			
1916	\$4,013,172	\$912,681	\$3,100,491	\$1,142,967	\$181,818	\$3,254,930	\$ 806,711
1915	2,161,177	569,404	1,591,773	(b)200,686	.....	697,597	1,094,862

(a) All from ore and concentrates except \$27,076 for 1916 and \$14,894 for 1915. (b) Operating deficit \$99,314; proceeds of bonds sold \$300,000.

Initial dividend of \$116,360 was paid April 1, 1915; total for year was \$697,597.50. Dividends for calendar year 1915 amounted to \$5.50 per share, with further dividends quarterly of \$1.50 each in April and June, 1916, a total of \$8 per share, or \$3,952,597.

Company is a consolidation of two prospects, called the Interstate and Callahan groups, the first named developed and the Interstate vein found while Walter Harvey Weed was consulting engineer, on whose advice the present consolidation was effected at a time when this part of the Coeur d'Alene district was regarded by many mining men as worse than unpromising. The mine has developed into one of the principal lead-zinc producers in the U. S.

Property: 79 claims, 1,004.84 acres, 601 patented; also the Nipsic group, 7 claims, in the Coeur d'Alene district, Wallace, Shoshone county; also stock holdings in the Blue Grouse mining company which adjoins the Cons. Interstate Callahan.

Geology: the two fissure veins thus far worked in the property are the Interstate and the Callahan. The veins cut through Prichard slates, which are intruded by a monzonite porphyry dike and by small diabase dikes. The Interstate vein varies from 3-20' in width, the Callahan from an inch to 8'. For geology of the district see U. S. G. S. P.P. 62, and 17th Annual Report of the Mining Industry of Idaho, 1915, by Robt. N. Bell.

Development: totals 20,500'. The principal working level is tunnel No. 4, about 1,200' below the mountain top, where an oreshoot 1,200' long has been encountered, running from 1-54' in width. This ore extends from the uppermost tunnel down, with equally good values on the lowest level. The present shaft has been sunk 450', and Nos. 5, 6 and 7 levels have been opened at a point 223', 457' and 675', respectively, below No. 4 level. New work for year ending June 30, 1915, was 1,510', mainly crosscuts and drifts. In August, 1916, 3' of high-grade ore was opened up for 50' on the 7th level.

Ore reserves: 350,000 tons, averaging 25% zinc. Development has not yet found lower limits of orebody, nor of ore shoots on Nipsic, Blue Grouse or Amazon-Manhattan veins, for which the outlook is decidedly promising.

Equipment: is modern and installed with a view to future big development. Buildings include saw-mill, bunk and rooming houses for 300 men. The concentrating mill, which treated at the rate of 10,000 tons of ore per month during 1915, was completely remodeled and equipped with 16" main feed elevator, screens, jigs, Traylor rolls, Aikens de-slimmer, settling classifiers, two 3" pumps, concentrate bins, two 12' Dorr tanks, 30' Dorr settling tank, spitzkasten, tables, motors, Callow tank, Oliver filter press, tube mill and flotation unit. Shipments are at the rate of 6,800 tons of concentrates per month, and the recovery averages a little better than 90%. Ore is conveyed from the mill over an aerial tramway to Sunset, on the N. P. R. R. A new mill, which will double the present output of the property, is to be erected at Enaville at some future time.

Company owns the Nipsic group, bought 1916, the Nipsic Co. being dissolved, Aug., 1916.

This tract of 7 claims, 6 patented, is located about a mile north of the portal of Interstate No. 4 tunnel, the main working level of the mine. The group lies between the Idora and Interstate-Callahan groups on the Beaver creek side of the Nine Mile divide.

The claims are crossed by two fissure veins in quartzite and slate, that average 3' in width and carry bands and shoots of lead and zinc ore, the lead ore carrying 4 oz. silver per ton to each 10% lead. The mine has

been intermittently prospected since 1892, but no important orebody discovered. There are several tunnels, longest 1,200', with a total of 2,140' of workings.

The group is intrinsically valuable, but has an additional value to the Interstate Callahan, as it permits much deeper tunnel work than any now existing and gives an outlet on the Beaver county side of the mountain, with easy access to the North Fork.

Production: for year ending June 30, 1916, amounted to 124,684 tons, from which there was produced 65,715 tons of crude ore and concentrates. Costs for first quarter, 1916, were: mining, \$3,666; milling, \$1,238; loading and shipping, \$0,766; total, \$6,110, or \$11.369 per ton of concentrate.

The management is able and progressive. On average metal prices of 5.68c for zinc, 4.55c lead and 57.85c for silver, company's May, 1916, output would yield a profit of \$90,747, or over \$1,000,000 yearly.

CONSOLIDATED KANSAS CITY SM. & REF. CO. TEXAS

Owens the El Paso smelter at El Paso, Tex. Company owned by American Smelting & Refining Co., and property described under that title.

CONS. KING DEV. & COLUMBIA COP. MG. CO. ARIZONA

Office and mine: Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, pres.; Mary A. Hull, sec. Inc. in Arizona. Cap., \$6,000,000; shares \$1 par. **Property:** 11 claims, 154 acres, south of the United Verde mine, showing several bodies of oxidized and sulphide ores, carrying fair values in copper, gold and silver. Mine has a 100' shaft and a 750' tunnel, with about one-half mile of workings. Idle since 1913.

CONSOLIDATED MINES CO. CALIFORNIA

Office: 413 H. W. Hellman Bldg., Los Angeles, and Randsburg; Kern Co., Cal. Geo. Orr, supt. **Property:** at Randsburg, carries a vein containing gold and tungsten ore, developed by 600' shaft. **Equipment:** includes 5-stamp mill, pumps, compressor and air-drills. Listed in Los Angeles.

CONSOLIDATED MINES & REDUCTION CO. COLORADO

Office: 433 Century Bldg., Denver, Colo. Mine office: 412 E. Bennett Ave., Cripple Creek, Colo. Officers: P. A. Burns, pres.; R. A. Schwab, v. p.; John H. Gallup, sec.-treas.; J. B. Conger, gen. mgr.; with W. W. Oliver, directors. Inc. March 10, 1916, in Colo. Cap., \$1,200,000 common and \$300,000 preferred stock; shares \$1 par.

Property: the Mary A. and Ella W. claims on Tenderfoot Hill, in the Cripple Creek district; the Kittie Wells No. 2 mine, on Carbonate Hill; the Buckhorn mine, adjoining the Kittie Wells on the east, and the Tenderfoot Hill mine. In April, 1916, company secured a 5-year lease on the Dante Gold Mine Co., which see. Company also has a mill site on Carbonate Hill. The Ella W. has been developed to a depth of only about 85'. Vein opened for 100' along the strike, said to be 20' wide and to assay \$20 to \$50 per ton.

The Tenderfoot Hill property is said to show ore in vein 1' to 22' wide, assaying \$3.20 to \$75 gold per ton. **Development:** the 700' Tenderfoot tunnel with drifts and crosscuts. **Equipment:** includes a 30-h. p. hoist and an 8-drill electric air compressor.

Production: claims to have shipped 20 cars ore in first 3 weeks of March, 1916. Plans building a 250-ton mill and cyanide plant, sinking a third shaft, extending the Tenderfoot tunnel an additional 700', and adding a 6-drill air compressor to the tunnel equipment. Company has sent out much expensive advertising and is evidently in the hands of the "promoter."

CONS. MG. & SM. CO. OF CANADA. BRITISH COLUMBIA

Secretary and office: J. Kitto, Room 1202, C. P. R. Bldg., Toronto, Ont. Works office: Trail, Trail district, B. C. **Officers:** W. D. Matthews, pres.;

Geo. Sumner, v. p.; Jas. J. Warren, managing dir.; preceding, with E. B. Osler, Chas. R. Hosmer, H. S. Osler, W. L. Matthews, J. C. Hodgson and Wm. Farwell, directors; Robt. Holden Stewart, gen. mgr.; Selwyn G. Blaylock, asst. mgr.; T. W. Bingay, compt.; James Buchanan, smelter supt.; J. F. Miller, refinery supt.; M. E. Purcell, supt. Centre Star mines; F. S. Peters, supt. Le Roi mines; J. K. Cram, supt. St. Eugene and Sullivan mines; C. H. MacDougall, supt. construction at smelter; W. M. Archibald, engr. in charge of Slocum-Ainsworth properties.

Inc. 1905 as Canadian Consolidated Mines, Ltd. Cap., \$15,000,000; \$100 par; issued \$6,966,240; increased from \$5,500,000 in 1909 to \$7,500,000, and again in Dec., 1915, to present amount. Company's fiscal year ends Sept. 30. Annual meeting, third Tuesday in December.

For fiscal year 1915 net profits were \$795,411, and surplus account showed a balance of \$2,058,299. Dividends: for fiscal years—\$234,940 in 1906; \$480,005 in 1907; \$66,940 in 1908; \$464,352 in 1913; \$464,376 in 1914; \$464,398 in 1915; with total dividends to end of 1915 of \$2,175,011. An 8% dividend rate was resumed July 2, 1913, when 2% was paid; changed Jan. 1, 1916, to 10%.

Property: company was formed to take over the following properties, either by direct ownership, or by stock control: War Eagle Consolidated Mining & Development Co., Ltd.; Centre Star Mining Co., St. Eugene Consolidated Mining Co., The Rossland Power Co., and the Trail smelter, formerly operated by the British Columbia Southern railroad. In 1907 the Iron Mask, Idaho and Enterprise mines at Rossland were purchased and the Phoenix Amalgamated Copper Mines, Ltd.; also the Keystone and Four Ace claims adjoining the Phoenix, located at Phoenix, B. C. In 1910 the company acquired the La Plata, or Molly Gibson group, near Nelson, and the No. 7 group in the Boundary district. In 1911 company purchased control of the Fort Steele Mining & Smelting Co., Ltd., owning the Sullivan silver-lead mine, near Fort Steele; Le Roi Mining Co. at Rossland; the Virginia and Abe Lincoln mines. In 1915 company purchased the Monte Christo, Paul Boy, Eddie J. and the Iron Horse mines, all at Rossland, and acquired a controlling interest in the Silver King Mines, Ltd., at Nelson. Also the No. 1 and Highland groups in Ainsworth. In 1913 the Deer Park, Grand Prize and Mabel in Rossland were taken over and the Ottawa Mine near Slocan City purchased.

The Le Roi-Centre Star group, on the southern slope of Red mountain, at Rossland, is the principal property. Country rock is a series of effusive and fragmentary volcanics of the Paleozoic age, intruded by an elongated mass of monzonite-porphry. This monzonitic mass, with its adjacent rocks, has been intruded by a large number of nearly vertical dikes, from a few feet to 250' wide, with generally N.-S. trend, the dikes being basaltic, and occasionally slickensided, larger dikes cutting off the veins completely, with the more important orebodies occurring at the points of intersection, and having a series of faults, mainly parallel to the dikes. Ore occurs in shoots of 3 to 50' width, and 50 to 600' length, widening at intersections of veins with dikes. Ore is strongly auriferous and fairly argentiferous chalcopyrite, associated with pyrite, and pyrrhotite with gangue of silicious altered country rock, ore ranging 0.5 to 2% copper and \$8 to \$20, and occasionally up to \$100, gold, per ton. Pay shoots extend, in some cases, from wall to wall, and form local enrichments, walls in some cases being very indistinct, and ore shading into the country rock. There are several veins, the more important being the Centre Star, Le Roi and War Eagle, on which the mines are opened mainly, these being shear zones, carrying chalcopyrite disseminated mainly in pyrrhotite, with some pyrite and occasional arsenopyrite.

The Rossland group, which now has a total acreage of about 775 acres, includes the Le Roi, Centre Star, War Eagle and Iron Mask mines, which are practically one, all connected by drifts and crosscuts, with about 54 miles of workings. For fiscal year 1914-15 new openings were 15,548' with 22,577' of diamond drilling. Mines are worked by overhand stoping, partly on the shrinkage system and partly timbered with square sets, cut from round timber. There is electric haulage throughout, with 13 electric locomotives hauling 2-ton side-dumping cars to the underground ore pockets of the Centre Star shaft. The ore pockets are on the hanging-wall side of the shaft, 2 on each level, 1 directly behind the other, the front bin, of 70 tons capacity, being for waste, and the 150-ton back bin for ore.

The water from the lower levels of the Le Roi and the other connected workings is handled through the Centre Star, the pumping equipment consisting of a No. 6 Cameron on the 16th level, a No. 7 Cameron on the 14th level, a 4" Centrifugal driven by a 50-h. p. induction motor on the 12th, a Triplex 7½"x15" plunger driven by a 50-h. p. motor on the 10th, a Quintuplex 4x12" plunger driven by a 50-h. p. motor on the 6th, a Triplex 7"x10" plunger driven by a 50-h. p. motor on the 5th level, while a 7½"x15" Triplex plunger driven by a 75-h. p. motor on the 9th level Le Roi handles the water from the levels above to the Black Bear adit.

The Centre Star mine has a 2,200' three-compartment shaft, sunk at about 68°, with 16 levels opened, at intervals of 125 to 175'. The shaft timber has been replaced with concrete from the 12th level to the bottom. The Centre Star has 8 or 10 different orebodies, but mining is principally from the Centre Star vein, the ore of which averages 0.6% copper, 0.3 oz. silver and \$8 to \$10 gold per ton.

The mine has a 106' wooden head frame, with 11' sheave wheels, a 24x36" Jenckes-Farrel crusher, of 100 tons hourly capacity, driven by a 75-h. p. alternating motor; shaft storage bins of 450 tons cap., ore sorting and sampling plant with Pan and Link belt conveyors, carrying ore to the shipping bins of 1,200 tons capacity. The engine-room has an 1,100-h. p. 28x60" Nordberg hoist, with two 10' drums of 5' face, good for 10-ton loads to depth of 3,000' at a speed of 2,000' per minute, using a 1¼" plow-steel hoisting rope, hoist cages 10' high, having hinged bottoms that are turned back when hoisting ore, with 4-ton skips swung under.

Buildings include carpenter shop, smithy and machine shop.

In the Centre Star-War Eagle-Iron Mask group, ore is mined from the 3 Centre Star veins, viz., Main, North and South, as well as from the Iron Mask, War Eagle, Josie, Poorman and Mugwump veins.

The War Eagle 1,300' three-compartment shaft, sunk at 50°, is now used only for handling men, timber and supplies, a 8¼"x12" air hoist having been installed on the No. 2 level for the purpose, after the destruction by fire of the original surface equipment. The War Eagle mine has 11 levels opened.

The Le Roi group is producing ore from the Le Roi main South, Intermediate, North Peyton and Hollywell veins. The Le Roi mine has a 1,650' five-compartment shaft, connected underground with the Star shaft; the Le Roi workings are also connected on the 15th 1,650' and 1,850' levels with those of the Centre Star.

The Le Roi shaft is equipped with a Fraser & Chalmers hoist, good for 3,000', and there is also a smaller hoist having 6' drums, two 40-drill air compressors and other necessary equipment.

Electric power for the complete operation of the mines is taken from the Bonnington Falls plant of the West Kootenay Power & Light Co., 35 miles distant, at 60,000 volts, stepped down at the mine to 2,000 volts for

distribution and use. The compressor room has a 120-k. w. direct-current generator, driven by an alternating current motor, supplying current at 250 volts for electric motors on surface and underground, and for lighting. Air for drilling is furnished to all the mines through one system. The Centre Star plant has two 40-drill compressors, one a Canadian-Rand Corliss duplex compound 2-stage compressor, with 22" and 40" steam cylinders and 48" stroke, with 28x32" air cylinders, but the steam cylinders have been disconnected, and compressor is rope-driven by a 650-h. p. Westinghouse induction motor. The other compressor is a hybrid, built over from an Ingersoll straight-line into a duplex machine having 2 Canadian-Rand cylinders, rope-driven, by a 600-h. p. Canadian Westinghouse synchronous motor.

The Le Roi compressor working in the same system is a Rand 2-stage air compound steam 40-drill machine, with steam cylinders cut out and air cylinders bushed to 3,000 cu. ft. capacity, rope-driven from a 400-h. p. synchronous motor. A second 2-stage air compound steam 40-drill Rand machine is in reserve, with battery of boilers sufficient to drive both machines.

Operations at Rossland, 1914-1915, have been extensive, some 315,000 tons of gold-copper ore having been shipped.

The **Richmond-Eureka** mine, at Sandon, B. C., has argentiferous lead and zinc ores, developed by tunnels aggregating 1¼ miles in length. Ore is transported to bin on C. P. R. R. tracks at Sandon by 4,000' aerial tram.

The **Sullivan** mine, at Kimberly, is a lead-zinc producer, whose ore occurs in a replacement deposit, in a fine grained argillaceous quartzite. Ore is a mixture of fine grained galena, zincblende and iron sulphides, the ore shoot showing a maximum stope width of 125'. **Development:** principally by tunnels and raises. **Workings** total 5½ miles. **Production:** 1914-1915, 45,000 tons.

Equipment: consists of an hydraulic installation, comprising 30' concrete dam, 5,000' of 30" wood stave pipe delivering water under a head of 200' to 3 Pelton wheels operating a 120-k. w. alternating current generator, 2,200 volts, and driving a 3,000 cu. ft. Rand 2-stage compound steam air compressor. Steam cylinders disconnected. An auxiliary steam plant of sufficient capacity to operate the machine at full load was installed to provide against water shortage. Electric current from the 120-k. w. generator is carried to the mine over 7,000' transmission line. There is also an auxiliary air plant at the mine comprising a 6-drill, 2-stage compound steam Rand air compressor, and sufficient boiler capacity to operate.

A 6,000' aerial tramway carries ore from the mine rockhouse to the loading bins on the C. P. R. R. tracks. About 100 men are employed.

The **Molly Gibson** mine, bought 1910, formerly owned by Molly Gibson Mining Co., Ltd., and later by La Plata Mines, Ltd., has a regular fissure vein in granite containing highly argentiferous lead-zinc ore. Developed by over two miles of tunnels. An aerial tram 2 miles long connects mine and mill, while a second, 5 miles long, connects mill and loading bins, 5 miles from Kootenay Lake. The mine is equipped with 100-ton mill, operated by water power, and two air compressors. Employs about 40 men.

The **St. Eugene** mine, at Moyie, has produced over 1,000,000 tons of silver-lead ore. The mine has about 20 miles of workings, is equipped with a 500-ton mill, but considerable of its equipment has been dismantled. Now being operated by a small force and shipments of crude ore regularly made.

No. 1 Group, at Ainsworth, 400 acres, has a contact deposit between dolomite and a dark lime schist. The ore consists largely of oxides of iron, zinc and lead in a silicious lime gangue. Principal value is in silver. De

velopment, by tunnel and winze, totals $1\frac{1}{2}$ miles. Equipment includes a 2-stage $11 \times 16 \times 18$ " Jenckes air compressor, driven by belt from 150-h. p. 2,080-volt motor, power being supplied from a 350-k. w. generator at Highland Mill, Cedar Creek, 9,000' distant; and an aerial tram, connecting mine ore bins with loading bins, on shore of Kootenay Lake. Storage capacity at mine and lake bins is about 700 tons.

Highland group, 240 acres, has a series of fissure veins. Ores are silver-lead and development is by $2\frac{1}{2}$ miles of tunnels. Equipment includes 6-drill air compressor, driven by water power, and a single rope aerial tram 4,000' long, connecting mine ore bins with 150-ton mill at Kootenay Lake. Power for mill is from a 350-k. w. generator, driven by a Pelton wheel under a head of 1,000'.

The **Ottawa** mine has a fissure vein in granite. Development by $1\frac{1}{2}$ miles of tunnel and winze. Principal metal is silver, associated with copper, lead and zinc sulphides, some barite in gangue.

The **Silver-King** mine on Toad mountain, back of Nelson, purchased in 1912, was unwatered in 1913, the surface plan repaired, machinery installed and made ready for production. The mine works well mineralized fissure veins in granite, yielding high-grade silver-copper ores. Development by $3\frac{1}{4}$ miles of tunnels and winzes. Equipment includes single rope aerial tram $4\frac{1}{2}$ miles long, connecting ore bins at mine with shipping bins on C. P. R. R. tracks at Nelson, 2 single stage straight line Ingersoll air compressors, driven by motors, a double drum-gear electric hoist, using current at 220 volts, and a $7" \times 10"$ Triplex plunger pump. Mine not operated in 1914-1915; all development operations having been curtailed after outbreak of European war.

The **Trail smelter**, located near the International boundary line, treats both copper and lead ores and does an extensive custom business in addition to treating the company's ores. In 1915 nine furnaces were in blast and 650 men employed.

There are 2 sampling mills, equipped with crushers and Vezin samplers; No. 1 mill, for copper ores, has 200 tons hourly capacity; No. 2, for lead ores, has 100 tons hourly capacity.

The smelter has a calcining department, and blast-furnace departments for copper and for lead. All the copper ores are bedded and hauled from the beds by electric locomotives to the charge bins, and from charge bins to the blast furnaces. The lead ores for roasting department are delivered to beds by a system of belt conveyors, and drawn from these beds by a belt conveyor over an electric scale to the roasters.

The calcining department consists of three $22' 6"$ 7-deck Wedge roasters, and five $26'$ Godfrey roasting furnaces. The roasted ore is sintered in 34 Huntington Heberlein sintering pots and 2 Dwight Lloyd sintering machines, fumes being passed through the Cottrell precipitation tank.

The 1,800-ton copper smelter has 5 blast furnaces, largest $45" \times 420"$, all taking a 32-oz. cold blast. Ore is treated crude in the blast furnaces, making a first-fusion product of 10 to 15% copper tenor, which is cooled, crushed and smelted with silicious ore and 4% coke to a matte of 35% copper, and shipped to Tacoma for conversion. Two $12'$ Great Falls type converters are being installed in this department, and in the future all matte will be converted here.

The 350-ton lead smelter has one $45 \times 180"$ and three $45 \times 180"$ blast furnaces, with mechanical feed, taking mainly calcined ores, crude lead ores being roasted in seven $26'$ Godfrey furnaces, which reduce the sulphur from the original tenor of 16% to only 8%, and these calcines are re-roasted in fifteen $9'$ Huntington-Heberlein sintering pots, yielding a product car-

rying only 4½% sulphur. The fully sintered ore, carrying 30 to 50% lead, is smelted in the blast furnaces, each making 50 to 85 tons of lead bullion daily, with about 4% matte fall. This matte is roasted and again put through the blast furnaces, and slags are granulated. Blast furnace gases are passed through a Cottrell precipitation tank.

In connection with the smelters is an electrolytic lead refinery, handling anodes cast from the silver-lead bullion. This plant, of 100 tons daily capacity, was the first electrolytic lead refinery ever built, and uses the Betts process. The lead is of exceptional purity, with average assay of about 99.997%, which means that a short ton of lead carries only about 1 oz. of impurities, which is marvelously successful work.

The silver refinery, taking silver sludge from the electrolytic lead tanks, has a water-jacketed reverberatory furnace for the production of doré metal, and the necessary kettles, tanks and bluestone plant for parting the precious metals with sulphuric acid, also furnaces for melting and casting the silver and gold bullion. Products are silver 0.999 fine, and gold 0.995 fine. A hydro-electric zinc plant is reported about ready to leach complex zinc ores and produce electrolytic zinc in 1916. It will have an output of 25 to 35 tons of spelter per day. The process is similar to that used at Anaconda, Mont., but is the direct result of the operation of an experimental plant treating ore from the Sullivan mine and producing 1,000 lbs. of zinc per day.

Power for the reduction works is electric throughout, brought 30 miles from Bonnington falls, on the Kootenay river, received at the transformer station at 22,000 volts, and there stepped down to 550. The installed electric capacity is about 5,000-h. p. Blast is supplied at 32 oz. for all furnaces, by one No. 9, one No. 9 1/27, one No. 11 and one 400 cu. ft. Root blower, and one 200 cu. ft. Connersville blower.

The works have a central heating station and well-equipped machine, carpenter, boiler and electrical shops. The assay office, which handles an unusual variety of work, in great detail, is exceptionally commodious and well equipped.

In the past three years the smelter has had many betterments, both in the lead and copper smelting departments. In 1915 these included an additional lead furnace, charge bins equipped with conveyors and weighing hoppers for the lead furnace department, wash houses for the men, an additional 20-ton crane in the roasting department, new lead ore sampling mill, copper converters with necessary equipment, beds for bedding copper ores, and additional tanks at the lead refinery.

Production: Year	Tons Ore Smelted	Gold, Oz.	Silver, Oz.	Lead, Lbs.	Copper Lbs.
1915.....	447,064	148,891	2,230,500	40,177,910	5,306,184
1914.....	374,771	129,083	2,568,301	34,617,318	3,645,997
1913.....	407,124	186,017	3,224,458	48,325,252	3,454,814
1912.....	.....	129,789	1,765,992	26,072,074	2,914,181
1911.....	.....	119,067	1,458,758	24,026,015	4,421,988
1910.....	.....	137,614	2,162,406	42,368,816	5,974,959
1909.....	.....	114,920	2,443,475	43,675,077	4,637,631
1908.....	.....	121,380	2,224,888	32,157,139	4,004,468
1907.....	.....	69,186	1,100,271	20,380,083	3,433,310

Considering that the Centre Star and War Eagle mines were reported worked out, when taken over, the company has made a signal success. The management is enterprising and thoroughly competent.

CONSOLIDATED NEVADA-UTAH CORPORATION. NEVADA
 Office: 63 William St., New York. Mine at Pioche, Lincoln Co., Nev., and Frisco, Beaver Co., Utah. **Officers:** Chas. H. Clarkson, pres.; Victor Lindenberg and J. A. Jorgenson, directors. **Cap.,** \$1,000,000; shares \$1 par.

I. Cumnock, treas.; Wm. F. Roberts, sec.; Jos. W. Kay, F. A. Dillingham, W. J. Palmer, Wm. B. Randall, directors; H. R. Van Wagenen, mgr.

Inc. 1913 in Virginia. **Cap.**, \$6,000,000; shares \$3 par; issued, \$3,936,396; in treasury, \$1,163,604; reserved for bond conversion, \$900,000; authorized bond issue \$900,000, 1st mtge. 6%; issued, \$499,867.

Company is a reorganization of the Nevada-Utah Mines & Smelters Corporation, which went into bankruptcy in 1912 and whose holdings were sold under judgment proceedings for \$100,000 to the new company. Stockholders in the old company who subscribed 50 cts. in cash for each share held and deposited their old stock, received bonds for the cash paid by them and 200 shares of stock in the new company for each \$100 subscribed.

Property: 3 groups of mines, owned through control of subsidiary companies; the Pioche group, at Pioche, including several productive mines that are largely developed; the Imperial group at Frisco, including the Comet mine and the Last Chance at Bingham, Utah.

The Pioche property is operated by the Amalgamated Pioche Mines & Sm. Corp'n, of which Mr. W. J. Palmer, of Trippe & Co., is president; 60% of the stock is owned by the Consolidated Nevada-Utah. The Amalgamated Pioche group comprises 38 claims, 33 patented, also 51 town lots and 1,528 acres miscellaneous lands. The mines at Pioche (formerly owned by the Pioche Con.) include silver-lead properties that were large producers, 1870 to 1876, and suspended operations 1893, being popularly credited with a past production of \$20,000,000 gross, which probably is a high estimate. The May Day mine of this group has a 1,100' shaft and there are 2 shafts on the Yuba mine adjoining. The Meadow Valley claim has a 400' three-compartment incline shaft. The old Independence shaft is said to show a 40' body of sulphide ore between the third and fourth levels.

Development: to March, 1915, consisted of 800' of crosscuts and drifts on the 1,400' level with stopes on the 1,200, 1,300 and 1,400' levels. About 20,000 tons milling ore blocked out between these levels.

Production: for 13 months ending June, 1915, was 4,199 tons zinc ore and 158 tons lead ore shipped to smelter and 13,200 tons milling ore on dumps. Ore shipped assayed 40% zinc, 25 oz. silver, with some gold and lead values averaging \$26 per ton. A new contract was made with the U. S. Zinc Co. for purchase of ore and concentrates after July 1, 1915.

Equipment: includes 700' Leschen aerial tramway, steam power and 4-drill air compressor. New mill put in commission April, 1916, treating 70 tons daily.

The Half Moon group of 6 claims, 42 acres, lies 1½ miles west of Pioche. It is understood to be the policy of the new company to lease the upper levels and develop the deeper workings itself. The Telephone claims and parts of Imperial Group are operated by lessees on a royalty basis.

The Jack Rabbit group is connected with the Pioche by a 20-mile narrow-gauge railway, and Pioche is connected with the San Pedro railroad by a 28-mile branch line known as the Caliente & Pioche, completed 1907.

Company owned 48% of the stock in the Day and Bristol mines, formerly operated by the Day-Bristol Cons. Mng. Co.; this property was sold at receiver's sale in 1914 for \$99,200 (see Uvada Copper Co.), and the Cons. Nevada-Utah Co. decided to lose their holdings rather than expend \$150,000 on an unproven property.

The Imperial group, near Frisco, Utah, is a copper property formerly owned by the Imperial Gold & Copper Mining Co. It was purchased at a judgment sale by the old Nevada-Utah to satisfy its claim of \$100,000 against the Imperial Co. Developed by tunnels showing carbonate ores. The Comet mine, belonging to the Nevada-Utah Mining Co., a single claim,

adjoining the Cactus, is said to carry a continuation of the Cactus orebodies of the Newhouse Mines & Smelters Co. The mine has a single shaft of 300' depth, sunk on gossan carrying about 1% copper. The adjoining Cactus mine is opened by a 6,000-ft. tunnel and the development of the ~~Comet~~ would necessitate an even longer tunnel or an extensive aerial tram.

The Consolidated Co. also owns all the capital stock of the Pioche-Pacific Railroad Co., and all the capital stock of the Manhattan Copper & Gold Mining Co., comprising the Manhattan group of 7 unpatented mining claims in the Highland mining district about 10 miles westerly from Pioche, and the Half Moon and Telephone claims, in the Ely mining district, Lincoln county, Nev.

Company controls, through ownership of 300,962 out of 600,000 shares, the Ohio Kentucky Cons. Mining Co., whose sole assets consist of 200,000 shares of Amalgamated Pioche Mines & Smelters Corp'n.

CONSOLIDATED SONORA MINES CO.

MEXICO

C. P. Shaver, sec., care Bank of Thibodaux, Thibodaux, La. Operating office: Douglas, Ariz. Mine near Fronteras, Sonora, Mex. Jas. Beary, pres.; Chas. P. Shaver, sec.-treas.; Chas. McHenry, supt. Cap., \$3,500,000; shares \$1 par. Is a close corporation. Property: 1,140 hectares, slightly timbered, on both sides of the Fronteras river, about 25 miles S. E. of Douglas, shows numerous outcrops of ore carrying lead, silver and gold.

Development: on the Mary L. claim includes a crosscut tunnel, intersecting a vein at 425' and a 325' shaft sunk at this point on the vein, is all in ore with 125' of drifting on the 50' level and a 430' drift on the 300' level. Shipments to the Douglas smelter, though profitable, did not pay mining and development costs and mine was closed down, Jan., 1913, on account of repeated depredations at the property and danger to the men from the revolutionary disturbances. Still idle, Dec., 1915.

CONSOLIDATED VIRGINIA MINING CO.

NEVADA

Offices: 339 Bush St., San Francisco, Calif., and Virginia City, Nev. **Officers:** W. W. Turney, pres.; H. Zadig, v. p.; A. W. Havens, sec.; T. F. McCormick, supt.; with W. G. Morrow, H. L. Slosson, Jr., and Wm. Bannan, directors. Inc. Nov., 1904, in Cal. Cap., 216,000 shares; \$10 par, assessable; all outstanding. Stock transferred at company's office in San Francisco. Registration Trust Co., San Francisco, registrar. Listed on New York Curb and in San Francisco.

Property: the Con. Virginia claim, 1,310' along the Comstock Lode at Virginia City, is being operated in conjunction with the Mexican Gold and Silver Mining Co., which sec. Has no orebody exposed.

CONSTANCIA MINE.

CUBA

Maxmillian Paetzold, San Ignacio 54, Havana, has reopened this old mine in Pinar del Rio, and made preliminary shipments of 15% copper ore. Said to have opened up a new orebody.

CONSTITUTION MINING & MILLING CO.

IDAHO

Address: Judge Geo. Turner, pres., 525 Seventh St., Spokane, Wash. Thos. Thwaite, gen. mgr. Cap., \$1,000,000; increased Jan., 1916, to \$1,500,000; shares \$1 par, assessable. Said to have \$10,000 in cash and 250,000 shares stock in treasury, Feb., 1916. **Property:** 10 claims, on east fork of Pine Creek, 9 miles from Pine Creek siding on O.-W. R. & N. R. R., Coeur d'Alene district, shows zinc-lead ore in veins 4' to 8' wide.

Development: by adits, one at vertical depth of 150' and the other at 400'. At 1,500' south of the latter a 550' crosscut tunnel cuts the vein 150' below tunnel No. 2. This orebody is said to be several hundred feet long. A shaft, being sunk at the portal of tunnel No. 2, was 80' deep in February, 1916. Company employs 20 men.

Production: several carloads shipped late in 1915 said to average 41% zinc, 7% lead and 4 oz. silver. Management claims it is going to build a concentrator in the near future.

CONSUELO MINING, MILLING & POWER CO.

MEXICO

Subsidiary of the Mines Co. of America, which see.

CONTACT CONSOLIDATED COPPER CO.

MONTANA

Idle. Mine office: Bailey Blk., Helena, Mont. H. C. Hoffman, pres.; E. T. Kemper, sec.; H. Topel, treas.; N. H. Graeniling, supt. Inc. Aug. 19, 1907, in Nevada. Cap., \$500,000; shares \$1 par, nonassessable. **Property:** 3 claims, in Colorado gulch, near Helena, with about 300' of workings, including a shallow shaft, shows auriferous copper ore from surface. **Equipment:** includes gasoline power. Small shipments have been made intermittently for several years. Is a prospect.

CONTACT COPPER CO.

MICHIGAN

Office: 70 State St., Boston, Mass. Mine office: Houghton, Mich. **Officers:** Harry F. Fay, pres.; C. J. Morrisey, sec.-treas.; preceding, with W. A. Mosman, W. L. Frost and John G. Stone, directors. G. S. Goodale, supt. Inc. May, 1910, in Michigan. Cap., \$5,000,000; shares \$25 par; paid in \$2.50; issued 111,125 shares. Annual meeting third Thursday in March. Company is a reorganization of the Elm River Copper Co., whose shareholders were given the privilege of exchanging their stock for shares in the Contact Copper Co. on the basis of share for share, on condition that they subscribed for additional shares at \$2 each, to the extent of 50% of their holdings in Elm River. Practically 75% of Elm River stock was exchanged and the Contact Co. has now acquired title to all the real estate and personal property of the former company, which has been dissolved and is now in process of liquidation.

Payments on sale of timber lands and further collections on account of assessment in 1915 have provided the company with ample working funds. Report Jan. 1, 1916, showed cash on hand \$18,948.

Property: 2,300 acres, in Sec. 6, T. 52 N., R. 35 W., Sections 1, 2, 11 and 12, T. 52 N., R. 36 W., and Sec. 36, T. 53 N., R. 36 W.; also a mill site in Sec. 30, T. 54 N., R. 36 W., and an option on 800 acres in Sec. 12 and 13, adjoining the old Elm River tract on the southeast. The property has a maximum length along the strike of 16,900'.

Nearly a complete cross-section has been secured by upwards of 11,600' of diamond-drill borings, despite the heavy overburden on nearly all of the tract. Borings have given cores carrying copper from a number of different beds, but not in commercial quantities.

Property was closed down during part of 1913 and all of 1914. On July 1, 1915, drilling was resumed in the S. E. $\frac{1}{4}$ of Section 11, believed to contain the Baltic lode opened on a neighboring property and carrying various grades of commercial copper. Up to March, 1916, about 5,271' of drilling had been done; in holes No. 18 and 19 the Wyandotte No. 8 lode was located at depths of 450' and 950', respectively, from the outcrop. Hole No. 20, now being sunk, should cut the lode at 1,550'. The lode, where cut, is 50' thick, a strong amygdaloid showing a little copper.

Equipment: includes a Duplex hoist good for 1,000', 2 Burt marine boilers and a 4-drill air compressor. Water is taken from a dam by a Blake pump. Buildings include a carpenter shop, two-story warehouse, boarding house with accommodations for 100 men, school house and a number of dwellings.

CONTACT COPPER CO.

NEVADA

Hutchinson, Minn., and Contact, Elko Co., Nev. **Officers:** S. G. Anderson, pres.; Wm. Schultz, v. p.; Sam G. Anderson, Jr., sec.-treas.; with J. A. Lindenbergh and J. A. Jorgenson, directors. Cap., \$1,000,000; shares \$1 par.

Property: two groups, the Lucie, 7 claims, and the Blue Rock, 9 claims, at Contact, said to show copper carbonate ore in veins. **Development:** the Lucie group has a 145' shaft, said to show an orebody 75' wide at the bottom. The Blue Rock has 2 shafts 50' and 30' deep, both said to show ore. Management says it will sink the main shaft to the 500' level. No production to date.

CONTACT MINING & MILLING CO.

CALIFORNIA

Trimmer, Fresno Co., Calif. **Officers:** J. K. Apperson, pres.; C. C. Overstreet, sec. Present owners have operated the property since 1894, incorporating in 1914.

Property: 3 claims, unpatented, 9 miles from Trimmer, shows ore containing free gold, galena and pyrite, in a flat pitching deposit in granite, said to average \$21.25 per ton, including a little silver. The gold occurs mostly in the ochre on the footwall; pay shoot varies from 4" to 2' in width. Another vein on the property, 3' wide, is said to assay \$11.60 gold per ton. Partly developed by a 90' tunnel.

Development: 110' adit and two 60' drifts on the vein. Ore is sledged ½ mile to the mill. **Equipment:** includes a Straub patent stamp-mill which has ten 175-lb. stamps operating in a circular mortar, 115 drops per minute, 5½" drop, driven by a 6-h. p. distillate engine; capacity 4 tons per day. Five men are employed. See Mines & Min. Rec. of Fresno Co., p. 15, California State Mineralogist's Rept., 1915.

CONTINENTAL COPPER & GOLD MINING CO.

ARIZONA

Office: 611 Security Bldg., Los Angeles, Cal. **Officers:** Jas. R. Haddock, pres.; Coyle J. Tracy, v. p.; Herbert T. Muzzy, sec.; Fred Knobloch, treas.; preceding, with John Breiner, E. P. Clapp, J. F. Halsted, directors. Inc. June, 1905, in Arizona. **Cap.,** \$1,000,000; shares \$1 par, nonassessable; issued, \$900,000. Annual meeting, first Saturday in November.

Property: 6 claims, patented, 120 acres, in the Santa Maria, Yuma Co., district, shows slates, schists and limestones, with igneous intrusives, said to carry 12 fissure veins and contact deposits, of which one, of 8' estimated average width, traceable 1,500', has been developed by a 100' shaft, a 429' crosscut tunnel and 20' and 161' drift tunnels, with 700' of workings, showing occasional oxidized ores, estimated to average 10.87% copper and \$4 gold per ton. Idle several years, except for annual assessment work.

CONTINENTAL MINES DEVELOPMENT CO.

CALIFORNIA

Office: 301 First National Bank Bldg., Riverside, Cal. Harwood Robbins, pres. Inc. 1911 as a holding company. **Cap.,** \$500,000; shares 1 par.

CONTINENTAL MINES, POWER & REDUCTION CO. COLORADO

Office: 401-2 First National Bank Bldg., Denver, Colo. Mine office: Lombard, Clear Creek Co., Colo. **Officers:** Henry I. Seemann, pres.-gen. mgr.; K. R. Seemann, v. p.; Frank R. Baker, 2nd v. p.; Wm. H. Wariner, sec.-treas.; preceding, with E. J. Weinand, Chas. E. Brown and Chas. Eddy, directors. Inc. Nov. 7, 1905, in Colorado. **Cap.,** \$5,000,000; shares 1 par, nonassessable; issued, \$4,315,000. Annual meeting, first Wednesday in November.

Property: 182 claims, 2,000 acres, in the Lincoln mining district, said to show 75 fissure veins and contact deposits, ranging in width from 2' to 75'. Country rock is gneiss, schist and granite, with porphyry dikes. Vein system claimed to be proven to depth of 1,000' and traceable 4 miles. Ores are sulphides, reported by management to carry 1 to 7% copper; 1 to 35% lead, from a trace to 6% zinc, 1 to 200 oz. silver and \$5 to \$500 gold per ton.

Development: by shafts of 135', 150', and 200' and a number of tunnels of 100' to 2,000'. The Seemann tunnel, now idle, is about 4,000' long. The mine has approximately 4 miles of workings, with about 1 mile in ore.

estimated by management to show 300,000 tons of ore in sight. Most of the work is now being done on the Lombard vein and through 4 tunnels, 800', 1,500', 1,600' and 3,800' long.

Equipment: includes electric power, 150-h. p. at mine and 150-h. p. at mill, 25-h. p. hoist and 7-drill Sullivan air compressor. There are about 20 buildings.

The mill has 20 quick-drop gravity stamps, one 8x12" Blake crusher, 3 Card tables, 3 Wilfey tables and 2 sizers, capacity 100 tons per day. Company plans continuous development, adding an oil flotation plant to the mill, increasing its capacity to 200 tons per day, and selling commercial current. Claims production will be started in the spring of 1916.

CONTINENTAL MINING CO.

MEXICO

Mine office: Monclova, Coahuila, Mex. Otto Koehler, pres.; Otto Wahrmund, 209 River Ave., San Antonio, v. p.-gen. mgr.; N. G. Newton, sec.; Arthur L. Tuttle, gen. supt. Inc. April, 1905, as a reconstruction of Continental Copper Co. **Cap.**, \$1,000,000; shares \$10 par. Is closely allied in ownership and management with the Jimulco Mining Co. Owns the Panuco mine with 65 hectares, opened in 1700 and worked at intervals since. Property was bought from the Panuco Copper Co., under whom it was badly mismanaged. Ore deposit is a chimney of breccia, cemented by metallic sulphides, mainly chalcopyrite, but with a little chalcocite, in a quartz gangue, the country rock being granitic. The ore is reported to average about 3½% copper.

Property: includes a 40-mile railway, from Monclova to Panuco. Old company invested about \$1,000,000 in the property and improvements. Largest production, under former ownership, was 1,466,059 lbs. fine copper in 1902, and a small production was secured, July-Nov., 1907, by present company, estimated at 1,250,000 lbs. copper. Mine considered promising, though low in grade, and management good. Closed down since 1913, on account of danger to life and property by revolutionary bands.

CONTINENTAL-MORRIS COPPER MINING CO.

WYOMING

Office: Morris, Ill. Mine near Encampment, Carbon Co., Wyo. **Officers:** J. H. Rogers, v. p.; Dr. G. A. Leach, sec.-treas.; preceding with I. F. Hatcher, U. C. Davis, W. A. Thomas, E. R. Joyce, B. C. Hitchcock and B. W. White, directors. Inc. March 31, 1908, in Wyoming, as a merger of the Continental Copper Mining Co. and Morris Mining Co. **Cap.**, \$2,250,000, increased later to \$5,000,000; shares \$1 par, nonassessable; issued, \$1,750,000. Annual meeting, first Tuesday in February.

Property: 7 claims, patented, 120 acres, in the Battle Lake district, carrying about 50 acres of good pine timber. Claims show schist, with 4 veins, of 13 to 40' estimated average width, traceable 1,500 to 3,000', carrying carbonate and sulphide ore, estimated to average 1 to 8% copper, with small gold and silver values. **Development:** includes several shafts and tunnels. **Equipment:** includes a steam hoist, good for 500', and 2 buildings. Idle, but resumption planned in 1916.

CONTINENTAL ZINC CO.

MISSOURI

Office: 87 Milk St., Boston, Mass. **Officers:** Jere A. Downs, pres.; J. B. Hardon, v. p.; F. H. Baird, sec.-treas., Boston; preceding with F. T. Rubidge, Chas. Hayden, Galen L. Stone and R. F. Hoyt, directors.

Inc. April 4, 1902, in Me., as successor to Continental Zinc Mng. & Sm. Co. **Cap.**, \$550,000; shares \$25 par, all outstanding. Reduced 1916 to \$110,000; shares \$5 par. No bonded debt. Hayden Stone & Co., Boston, transfer agt.; Old Colony Trust Co., Boston, registrar. Annual meeting, first Tuesday in April. Listed on Boston Stock Exchange.

Dividends: formerly 8% per annum, quarterly; reduced to 2% in 1908; 1909 and 1910 none; since 1910 to 1916 at the rate of 4% payments semi-annually, J. & J. 1; Dec. 31, 1915, \$10 per share, in partial liquidation. Further dividends in liquidation of about \$2 per share may be expected, with further small cash distributions as the real estate is gradually sold.

Balance sheet as of Dec. 31, 1915, showed assets: \$684,984, which included real estate and property \$350,000; Litteral tract, \$63,900; Litteral mining and milling plant \$65,455, notes receivable \$1,500; cash \$15,282; deficit \$188,734; accounts receivable \$111; Temagam property \$1. Liabilities: included depreciation reserve, \$95,000; Empire & Con. First Addition, \$14,256; depletion \$25,728. The year's profit from the Kohinoor tract amounted to \$22,421, from the Litteral tract \$24,428, from Temagam, \$359.

Property: 2 tracts of land, 200 acres, at Joplin, Mo., the orebodies of which are fast becoming exhausted; the old Kohinoor tract upon which there are no mining operations at present and upon which the company is gradually selling house lots, and the Litteral tract which is leased on a royalty basis. Royalties for 1915 were \$25,389. Life of Litteral property figured in 1915 as 2 years.

Continental Zinc must be considered a liquidating proposition.

CONZETTI MINE

CALIFORNIA

Property at Cecilville, Siskiyou Co., Cal., contains a vein of quartz ore, said to be 4'-11' wide, showing milling averages of \$40 per ton, which must be selected ore. **Development:** shaft and crosscut. **Equipment:** 6-stamp mill. Developing in 1915. Worked by owners.

COOKE MINING & REDUCTION CO.

MONTANA

Idle. Mine near Cooke, Park Co., Mont., is developed by tunnels, showing auriferous and argentiferous copper ores. Has a small steam plant. District is remote from transportation, being on N. E. border of the Yellowstone Park.

COOPER MT.-SUMMIT CONSOLIDATED MINE

CALIFORNIA

Owned by G. H. Goodhue, Indian Falls, Plumas Co., Cal. **Property:** 36 claims, unpatented, 690 acres, near Genesee, Plumas Co., shows gold, silver and copper ore in fissure veins with granodiorite footwall and schist hanging-wall. **Ore:** a sulphide, occurs in shoots varying in width from 2' to 20' and in length from 60' to 210', average assays said to be 4% copper, 6 oz. silver and \$3.16 gold per ton.

Development: 120' vertical shaft and 5 tunnels, longest 460'. Total underground workings 1,200' claimed to block out 6,600 tons of ore. Total output to date said to be \$55,000.

COPETE CONSOLIDATED COPPER CO.

MEXICO

Office: 15 William St., New York. **Mine office:** Francis C. Nicholas, mgr., box 394, Nogales, Ariz. **Officers:** Wm. T. Read, pres.; F. C. Hanford, v. p.; Myra B. Martin, sec.-treas.; preceding with Ralph Melczer and John G. Morrow, directors. **Inc. March, 1906, in West Virginia. Cap., \$1,000,000; shares \$1 par, nonassessable; issued 549,170½ shares. Annual meeting, first Wednesday in March.**

The company was organized to develop the property formerly owned by the Copete Mining Co., under an agreement with that company, title to the property being vested in the Melczer Mining Co., legalized in Mexico, and the entire stock issue of which is held by the Copete Consolidated Copper Co.

Property: 120 pertenencias, comprising the Last Chance, Copetito, Jalisco, Santiago, and El Copete claims, about 173 acres, at El Copete, Sonora, shows an immense gossan capping, apparently the remnant of a great blanket vein, the greater part of which has been eroded away.

Development: by several tunnels and a 615' shaft with about 7,000' of workings. Ores are mainly gold with considerable iron pyrites and some copper, giving average assay values of \$6 per ton. The bottom of the ore zone seems to have been reached at about 300' Idle, owing to reclamation disturbances.

It is believed that those in control of the company will use every effort to bring the enterprise to a successful issue and the past may be considered a closed chapter. Those interested in the history of the company will find it given in Vols. X and XI, The Copper Handbook.

COPETE MINING CO.

MEXICO

Office: 15 William St., New York. Myra B. Martin, sec. **Inc.** 1900, in West Virginia. **Cap.**, \$5,000,000; shares \$5 par. Owned stock of the Melzer Mining Co., transferred, 1906, to Copete Consolidated Copper Co., which sec.

COPPER AGE & EDISON MINING CO.

MONTANA

Idle. Chas. J. Heidenreich, Spokane, Wash., pres.; Morton Webster, Wallace, Idaho, sec.-treas.; L. N. Hyde, supt. **Inc.** 1906, in Washington. **Cap.**, \$250,000. **Property:** 12 claims, 4 miles south of Saltese, is an eastern extension of the Richmond mines, carrying extension of copper-bearing outcrop of that mine, the vein paralleling the Monitor. The vein is exposed for some 700' in the tunnel just east of the divide; it averages 10' thick, is nearly vertical and carries a very little chalcopryrite and chalcocite in a siderite gangue.

Development: includes a main 1,160' crosscut tunnel, with back of 600' showing sulphide ore assaying up to 30% copper and \$14 gold per ton.

COPPER BASIN MINING CO.

IDAHO

H. W. Weller, mgr., Mackay, Idaho. Is a new company operating a recently discovered copper property and shipping a carload a day by motor truck to Mackay.

COPPER BASIN MINING & MILLING CO.

NEVADA

Mine near Battle Mountain, Lander, Co., Nev. **Officers:** L. G. Hardy, pres.; W. H. Brammel, sec.-treas.; preceding with C. W. Knudson and T. N. McCauley, directors. Wm. Burge, supt. **Cap.**, \$30,000; shares 10 cts. par, nonassessable; issued, 270,000. Annual meeting, second Monday in January. **Property:** 6 claims, 120 acres, in the Battle mountain district, 10 miles west of Battle mountain, shows veins in quartzite with orebodies along the line of the limestone-quartzite contact. The veins vary from 1 to 4' in width and carry 1½% copper, 8 to 15% lead, 7 to 12% zinc, 5 to 15 oz. silver and \$1 in gold. Vein runs N. W. with dip of 70°. **Development:** 1,200' of work including a 250' shaft and 300' tunnel with 2 other shafts and 2 tunnels. Management estimates 1,000 tons of ore blocked out.

Tests were made at University of Nevada in 1914, to determine most profitable process to be used on ore. Presumably closed down.

COPPER BELT MINES CO.

WYOMING

Idle. Lusk, Converse Co., Wyo. Edwin Hall, pres. and mgr. **Inc.** June 25, 1906, in Wyoming. **Cap.**, \$2,000,000; shares \$1 par. Company owns a controlling interest in the Lucky Strike Mining & Smelting Co.

Property: held under bond and lease, includes the old Michigan mine, and about 600 acres of mineral and timber lands, in the Rawhide Buttes district, 12 miles south of Lusk, latter showing 4 parallel veins, 2 traceable nearly a mile. This property is developed by a 640' shaft, and a 525' tunnel, with about 5,000' of workings, showing copper carbonates and sulphides, disseminated in limonite.

The Michigan mine, in Muskrat canyon, has shallow workings in a wide vein from which about \$100,000 in ore was taken in earlier operations.

Equipment: includes 54-h. p. Fairbanks & Morse gasoline engine, 5-drill air compressor, and mine buildings. Company out of funds.

COPPER BELT MINING & DEVELOPMENT CO. NEVADA

Letters returned, 1916, from Ludwig, Lyon Co., Nev., and mine probably idle. C. W. Walker, supt.; I. H. Baird, pres. Owns the Baird mine, or group of claims in Mason Pass section of Yerington district, showing a 3' vein of ore developed by a 200' incline shaft on the vein.

COPPER BOTTOM MINING & MILLING CO. WYOMING

Inez, Converse Co., Wyo. Henry Metz, Sr., pres.; Fred Metz, sec-treas. **Property:** the Green Hope mine, in the Hartville district, Laramie county, is under bond and lease until 1916, to Messrs. Wm. F. Moenke and Geo. Botsford, Sunrise, Wyo. Mine has produced about 125 tons of ore. Company also owns a few copper claims in the region at the head of Broom creek, 15 miles north of Sunrise in Sec. 26, T. 29, N., R. 65 W., on which annual assessment work has been done.

COPPER BUTTE MINES ARIZONA

Idle. **Office:** 906 New York Life Bldg., Minneapolis, Minn. **Operating office:** Phoenix, Ariz. **Directors:** Ace P. Abell, pres.; Wm. H. Lucia, v. p.; Frank A. Bates, sec.; Henry A. Blume, treas.; P. P. Parker, agent. **Inc.** July 21, 1900, in Arizona, as the Arizona Copper Mountain Mining Co., and name changed, June, 1904, to present title. **Cap.**, \$6,000,000; **shares** \$10 par.

Property: 16 claims, 8 patented, about 320 acres 4 miles N. W. of the Ray Consolidated, in the Walnut Grove or Mineral Creek district, 2½ miles north of the Gila river, with a good wagon road to the Phoenix & Eastern railway. **Property** was worked, 1879-81, on a small scale, for silver.

Geology: lands lie in a mountainous tract, east of the Florence Valley, and, while near the Ray Consolidated, property more closely resembles the form of copper deposits mined by the Moctezuma Copper Co. at Nacozeni, Sonora, Mex. **Property** shows rhyolite and later dacitic lavas, resting on a surface of schist, sedimentary rocks and granite, the granite being part of a broad mass, many miles in extent, cut through by the Gila river, the Copper Butte property lying on the border of this granite batholith.

The ore deposit is a mineralized mass of breccia formed of rock fragments, being an old volcanic throat, having an abrupt contact with Ray granite on the east and west, and a nearly vertical contact with dacite. The breccia consists largely of schist, varying from dark and light gray, pearly sericitic schist, to silicious schist, with fragments of quartz, diabase, granite and limestone. The deposit is peculiar, being part of the breccia mass that has been altered and mineralized, the only known counterparts of this surface ore being found at the Arizona-Hercules mines, 5 or 6 miles to the eastward, and at the Black Warrior mine, near Globe. **Property** shows extensive red areas similar in physical character to the ore, save that they carry no copper. The eastern red area of breccia shows rude bedding, with a dip of about 25° E., away from the mountain. The most promising portions of the property are an eastern tract of about 20 acres, on Copper Butte claims Nos. 2, 6 and 12, and a western tract of about 10 acres on the Junebug and Carlisle claims. The schist areas exposed show traces of copper at many points. Silicate ore is exposed at numerous points on the property, by discovery shafts, pits and trenches. Assays, made 1910, by disinterested parties, gave from 1.5% copper in lean breccia, up to 13.6% copper from the ore dump, at the Black Oxide pit.

Development: by 300' incline shaft which passes out of the ore; numerous shallow surface workings in ore and 6 tunnels, 2 longest 175' and 300', mine having a total of about 2,000' of workings. Principal shafts are the 175' James incline, and the 2-compartment vertical Wallace shaft. The

oxidized and silicate ores at and near surface could be mined economically and cheaply.

Equipment: includes a 60-h. p. steam plant and several buildings. There is considerable shipping ore in the old workings, which can be profitably mined. Property is a puzzle, needing drilling to determine possible deep ore occurrence, since experience shows that the rich silicate ores are often surficial. Existing workings give an unduly favorable aspect to the ground, which is considered promising.

COPPER BUTTE MINING CO.

UTAH

Idle. Office: Richfield, Sevier Co., Utah. Wm. Johnston, pres.; George H. Ogden, sec.-treas. Property is a copper prospect on Gold mountain, in the Kimberly district, Piute Co., Utah. **Development:** by a short tunnel, showing a 6' vein of low-grade silver-bearing copper ore.

COPPER BUTTE MINING CO.

WASHINGTON

Orient, Ferry Co., Wash. J. D. Gumpper, pres.; H. J. Miller, sec.; Willis Townsend, gen. mgr. Inc. Dec., 1905, in Washington. **Cap., \$1,000,000;** shares \$1 par. **Property:** 4 claims, patented, in the Pierre Lake district, south of Orient, shows 2 veins in open cuts, 14' and 15' wide, respectively. **Development:** by 300' shaft with drifts on the 100' level shows copper-gold ores, but not in commercial quantity. No recent returns.

COPPER CANYON MINE

ARIZONA

Owned by the Leviathan Mines Co., which see.

COPPER CHIEF MINES CO.

ARIZONA

Office: room 814, No. 60 State St., Boston, Mass., and Bouse, Ariz. **Officers:** Richard Darling, pres. and treas., 925 W. 49th St., Los Angeles, Cal.; Richard Darling, Jr., v. p.; B. A. Darling, sec. Inc. 1910, in Ariz. **Cap., \$5,000,000,** shares \$1 par, outstanding \$3,000,000.

Property: 28 claims, unpatented, 560 acres, 20 miles S. W. of Bouse, is said to show a contact deposit containing copper and gold ore that assays 1.3% to 20% copper. Little work has been done on the property to date. Management plans adding a 25-h. p. gasoline hoist and a small compressor and doing development work.

COPPER CHIEF MINING CO.

ARIZONA

Jerome, Yavapai Co., Ariz. Owned by the Hayden and Midgeon estates, Torrington, Conn., Franklin Brooks, Colorado Springs, Colo., and Arthur Hendey. Reported 1915 to have been taken over by the Guggenheim interests.

Property: 23 claims, 11 patented, adjoining Senator Clark's Iron King mine in the Black Hills range, just outside the Verde district proper. The orebody is 60 to 100' wide, and consists of copper-bearing iron oxide carrying gold, silver and a little copper, the total value being about \$6 per ton. Sulphide ores occur at and below 280'.

Development: by 400' shaft, 2,225' of work on the 100', 160', 220' and 280' levels. A crosscut tunnel, now 900' long, is being driven to connect with the bottom of the shaft. Mine reported to have a large tonnage of low-grade oxidized ore, which cannot stand transportation to a distance. Future of the property depends upon development of sulphide ore in quantity.

Management claims 400,000 tons of oxidized ore and 100,000 tons of sulphide ore blocked out, with oxides averaging about 1% copper and \$10 gold and silver, and sulphides assaying 3% copper with gold and silver, giving gross values of \$11 per ton. **Equipment:** includes a 200-ton cyanide mill, erected in 1915, electric power, air compressor and hoist. Employs 35 men.

COPPER CHIEF MINING CO.**MONTANA**

Office: Wallace, Idaho. Mine near Saltese, Missoula Co., Mont. J. H. Taylor, sec.-treas. Cap., \$1,000,000; shares \$1 par; assessable; last assessment (No. 4) of 2½ mills per share, called Oct. 8, 1913. Property: 11 claims, in the St. Joe district, carrying a fissure vein in quartz, supposed to be an extension of the Bullion vein, with a strong gossan showing a little copper. Property has been tested by trenches and prospect tunnels, and management planned reaching the vein at 700' by a crosscut tunnel, being driven 2,500' by the Copper Chief and the Bullion Mng. Co. Equipment: includes compressor, water wheel, pipe line and buildings.

COPPER CLIFF COPPER MINING CO.**WASHINGTON**

Office: 724 Peyton Blk., Spokane, Wash. Mine office: Chewelah, Stevens Co., Wash. T. F. Wilson, pres., treas. and gen. mgr.; J. O. Blair, v. p.; L. C. Dougherty, sec.; L. K. Armstrong, mg. engr. Inc. Feb. 24, 1912, in Washington. Cap., \$1,000,000; shares \$1 par; issued, \$62,000.

Property: 60 acres and 40 acres timber lands, held under bond and lease, in the Chewelah district, shows contact deposits between altered granite and limestone. Ores are mainly copper, with small silver values. Development: by shafts of 332' and 730', and by tunnels, longest 600', giving depth of 1,000'. Property closed down in 1914, but operations resumed in Spring of 1915.

COPPER CROWN MINING CO.**MICHIGAN**

Inc. July 18, 1902, in Michigan. Cap., \$2,500,000; increased about 1911, to \$3,000,000; shares \$25 par; issued, 66,200 shares. Company reported, July, 1916, to have sold its property to the Cass Copper Co., for 40,000 shares of latter company's stock.

Property: 2,500 acres, 6 to 8 miles west of the Victoria, and 8 miles north of Matchwood, Ontonagon Co., Mich., the nearest railroad point, includes a number of old mines, principal properties being the Hamilton and Norwich mines. The Lafayette mine, formerly owned, was sold, 1909, for \$14,000.

The first work of the present company was on the Hamilton, where a 602' tunnel was driven and a 270' shaft sunk on the Meads vein, the tunnel of 602' securing a back of only 300', and a shaft was sunk by mistake on a drift boulder in sandstone. Later work was at the Norwich mine, which, next to the Victoria, is the most extensively developed and promising mine west of the Ontonagon river. The Norwich tunnel is 950' long, with 1,000' of drifts that give an encouraging copper showing. The Norwich mine, worked 1850 to 1865, produced 993,360 lbs. fine copper, securing masses of native metal up to 10 tons in weight. The bed is bunchy, but shows considerable promising stamp-rock. The Meads bed was located by a series of prehistoric pits along the outcrop, the 270' shaft thereon showing a strong bed, up to 25' in width, with a 720' drift to the westward, on the fourth level. Idle since 1907, and reported involved in tax titles.

COPPER GIANT MINE**ARIZONA**

Hackberry, Mohave Co., Ariz. Wm. Neagle, supt. Property optioned in 1913, by United Verde Copper Co., Jerome, Ariz., which see.

COPPER HILL MINE**CALIFORNIA**

Jackson, Amador Co., Cal. W. F. Detert, owner and mgr. Property: 2,500 acres, patented, on the Consumnes river, shows a quartz-porphry dike of 500 to 600' width, with large gossan outcrop underlain by chalcopryrite, associated with pyrrhotite. Developed by 6 shafts, deepest 500', sunk on a 50' vein east of and parallel with the Consumnes river, which carries a 2' to 4' paystreak of fine-grained massive chalcopryrite, assaying 20 to 30% copper, with appreciable values in gold and silver. The mine has

about 3,000' of workings. Mine was worked, 1861 to 1881, securing a considerable production, as is evidenced by extensive slag dumps. Idle since 1881.

COPPER HILL MINING CO.

COLORADO

La Plata, La Plata Co., Colo. Inc. Oct., 1913. Cap., \$500,000; \$90,000 paid in for development work. E. N. Beach, mgr. Property: 450 acres, a copper and gold mine in Bed Rock gulch, 4 miles from D. & R. G. R. R., shows the Esmeralda and Copper Hill veins, developed by several tunnels and reported mining and shipping copper ore, Sept., 1914. Will install power plant and plans tram line.

COPPER HILL MINING CO., LTD.

MONTANA

Idle. Office: Wallace, Idaho. Mine near Quartz, Missoula Co., Mont. Officers: Morton Webster, pres.; A. T. Ryan, v. p.; P. L. Eberhardt, sec.-treas.; preceding with Howard K. Welch and Jas. Howarth, directors. Inc. March, 1908, in Montana. Cap., \$250,000; shares 25 cts. par, nonassessable.

Property: 7 claims, 125 acres, in the Sunrise district, on the Montana side of the Montana-Idaho divide, showing an altered zone of highly silicious rocks of 25 to 50' width, carrying fine disseminations of copper carbonates and sulphides. Mine has a 75' tunnel, showing ore said to be somewhat similar to that of the Snowstorm, and assaying about 4% copper.

COPPER HOARD MINING CO.

WASHINGTON

Chewelah, Stevens Co., Wash. Albert I. Kulzer, pres.; E. D. Germain, sec.-treas. Property: the Lookout claim, formerly owned by Col. G. F. Belcher, adjoining the United Copper mine, has been bonded to the Chewelah Grey Copper Mng. Co. This company is sinking a shaft to the 400' level and has installed machinery.

COPPER KING MINING CO.

MONTANA

Cooke City, Park Co., Mont. Property: the King and Queen group, developed by tunnels, showing an extensive orebody, with fair values in gold.

COPPER KING MINING & SMELTING CO.

IDAHO

Mullan, Shoshone Co., Idaho. Officers: E. B. Crawford, pres.; R. C. Vanderford, v. p.; Hon. Harry W. Ingalls, sec.-treas. and gen. mgr., with Henry Billberg and B. M. Ingalls, directors. Inc. Aug. 28, 1901, in Idaho. Cap., \$1,500,000; shares \$1 par; issued, 675,462 shares.

Property: 18 claims, surveyed for patent, on the West fork of Deadman's creek in the Snowstorm copper belt, has 2 narrow fissure veins, carrying galena and chalcopryrite ore said to assay 5% copper, 28% lead and 15 oz. silver per ton. Development: by 2 tunnels on the Copper King vein, on the Burke side of the mountain and No. 3, the lower tunnel, on the West fork of Deadman gulch, at depth of 927' below the Middle tunnel, No. 2 being 2,000' and No. 3 approximately 5,000' in length.

According to governmental reports, the vein is but 1' wide, runs N. W., dips at 52° S. and shows copper-lead sulphides in a quartz calcite gangue. The work is in Newland slates and St. Regis quartzite, not having yet reached the Revett quartzite.

Equipment: includes 12" and 24" Pelton wheels, taking water under a 500' head, with a 4-drill Franklin air compressor and a small electric light plant. Buildings include an engine house, boarding house, bunk house and barn. About 10 men employed. Property considered promising and management good.

COPPER KNOB MINE

NORTH CAROLINA

Idle. Hopkins, Ashe Co., N. C. Richard Eames, Jr., owner. Lands: 160 acres, freehold, also 90 acres miscellaneous lands, show a 30" fissure

vein in hornblende slate, carrying carbonate and sulphide ores, mainly bornite, estimated to average 6 to 8% copper, 15 oz. silver and \$12 gold per ton. Property was opened 1880. Has steam power, with hoist and 2-drill air compressor, and a 5-stamp mill.

COPPER MOUNTAIN CONS. MINING CO.**CALIFORNIA**

Mine near Redding, Shasta Co., Cal. **Officers:** John Pillius, pres.; F. G. King, v. p.; Fred Grotefend, sec.-treas. and supt. **Property:** the Sugar Loaf group, about 340 acres, immediately N. E. of the Mountain Copper Co., Ltd., on Sugar Loaf mountain, has an ore zone, in rhyolite, with N. S. strike, carrying a gossan up to 400' in width. Developed by 12 tunnels, aggregating 4,365', which have cut several small detached pockets of sulphide ores. **Equipment:** includes electric power and an air compressor. Three men employed.

COPPER MOUNTAIN MINING CO.**OREGON**

Grant's Pass, Josephine Co., Ore. C. E. Phillips, pres.; J. W. Gayetty, v. p.; W. R. Nipper, sec.-treas. Property is a gold mine, 40 miles from Grant's Pass, in the Takilma district. A 100-ton plant contemplated.

COPPER MOUNTAIN MG. & DEV. CO.**BRITISH COLUMBIA**

Office: 5406 Union Ave., South Tacoma, Wash. **Mine office:** Quatsino, Atlin district, B. C. B. S. Cowles, pres.; Jos. Hutchinson, sec. **Cap.,** \$200,000; shares 10 cts. par. **Property:** the June Group, 5 claims, 5 miles from shore at head of Quatsino Sound, near Quatsino Company's ground. Is a contact metamorphic deposit of magnetite and chalcopyrite, occurring between crystalline limestone on the north and granite (and felsite). Gangue is garnet, calcite, epidote, etc. An analysis shows 8.81% copper, 29.76% iron, 18.36% sulphur, 17.52% silica, 12.96% lime, 2.83% alumina, with trace of gold and 7.5 oz. per ton silver. The contact is 100' to 300' wide and traceable 3,800 through the group. A large amount of ore is shown on the surface, and the deposit has been worked opencast. A 5-ton shipment to the Tyee smelter assayed 2.18% copper, 0.63 oz. silver, 80c gold per ton. Reported under option 1916 to Judge Nash Rockwood, 61 Broadway, New York and New York capitalists. Company also owns 4 claims near Ryan, Stevens Co., Wash., developed by 300' shaft and 115' tunnel, showing a 75' lens of low-grade ore.

COPPER MOUNTAIN MINING & DEVELOPMENT CO. MONTANA

Office: Mullan, Idaho. Mine near Thompson, Sanders Co., Mont. **Officers:** John Hendricksen, pres.; A. B. Willard, v. p.; D. Flynn and John Foss, directors. **Inc.** 1906, in Idaho. **Cap.,** \$1,500,000; shares \$1 par. Annual meeting, second Tuesday in December.

Property: 5 claims, one fractional, 95 acres, with 3 adjoining claims, at the head of Copper creek. Mine has 2 tunnels, the upper a crosscut, deflected for 56' along the vein, said to be 25' wide, carrying pockets and seams of copper carbonates, with gold and silver values. Idle.

COPPER PRINCE CONSOLIDATED M. & M. CO.**IDAHO**

Office: Coeur d'Alene, Idaho. **Mine office:** Herrick, Shoshone Co., Idaho. **Officers:** Saml. R. Hite, v. p.; W. H. Batting, W. M. Ramsey, W. W. Parshall, John S. Craig, E. E. Dillinger and Boyd Hamilton, directors. Frank Drummond, supt. **Inc.** July 30, 1910, in Idaho. **Cap.,** \$4,000,000; shares \$1 par, nonassessable; cap. reduced, Sept., 1915, to \$400,000; issued \$2,775,000. Annual meeting, first Monday in September.

Property: 37 claims, unpatented, 740 acres, in 2 groups on the north bank of the St. Joe river, 6 miles and 20 miles, respectively, above the head of navigation. Property includes water rights. The Copper Prince group, formerly known as the Black Prince, has 13 claims, and the Idaho-Virginia,

or Gold Ridge group, of about 24 claims, is about 6 miles east of the Copper Prince, and 3 miles from the Milwaukee railway.

The Copper Prince group shows contact orebodies, between granite and Revett quartzite, of 20 to 30' estimated average width, carrying chalcopyrite, bornite and gray copper, giving assays of 3 to 41% copper, and 8 to 13 oz. silver per ton. **Development:** by 500' of drift tunnels, driven from the sides of 2 canyons. The orebody has been traced by trenches and cross-cut tunnels, on each claim, for the entire length of property, a distance of 7,800'.

The Idaho-Virginia group is reported to have a 15 to 20' contact deposit, between granite and slate, carrying galena giving assays of 8 to 40% lead, and 14 to 46 oz. silver. **Developed:** by 2 shafts of 50' and 250' depth, and 3 crosscuts, intercepting a vein said to show galena ore of good quality. Buildings include a smithy, boarding house and a stable.

Company plans utilizing water power from Prince Creek, by 6 miles of 3' ditch and 1 mile of 3' flume. **Equipment:** includes 4 boilers, 2 hoists, 2 six-drill air compressors, and a saw mill. Property has been under development for 6 years. Former president, L. B. Holbert, brought suit in 1916 against company to recover \$27,970 for services rendered and money advanced.

COPPER QUEEN CONSOLIDATED MINING CO. ARIZONA

Office: 99 John St., New York. Operating and works office: Douglas, Cochise Co., Ariz. **Officers:** Dr. Jos. Douglas, pres.; Arthur Curtiss James, v. p.; C. H. Dodge, v. p.; Geo. Notman, sec.-treas.; G. H. Dowell, gen. mgr.; Gerald Sherman, supt. mining dept.; Joseph P. Hodgson, mine supt.; F. Rutherford, smelter supt., and C. C. Barclay, purch. agt. Inc. Aug., 1885, in New York. **Cap.,** \$2,000,000; shares \$10 par. Is controlled through entire stock ownership by Phelps, Dodge & Co., Inc. The company was operated for many years as a close corporation, without making its figures public, but is said to have paid, 1888 to 1907, inclusive, dividends aggregating \$30,000,000 or upwards. Dividends: \$3,000,000 in 1908; \$4,025,000 in 1909; \$6,300,000 in 1910; \$5,200,000 in 1911; \$5,707,351 in 1912; \$5,700,000 in 1913; \$4,500,000 in 1914; \$7,000,000 in 1915.

Property: comprises the Copper Queen and other mines at Bisbee, a large smelting plant at Douglas, on the Mexican border, 30 miles from the mines and 21 claims, 19 patented, including the Emma Mine, which see, in the Central City mining district, Grant county, N. M., besides mining interests in various other localities. Mineral lands in the Warren, or Bisbee district, comprise 176 patented claims, 2,298 acres.

The Copper Queen, one of the best known copper mines of the world, was opened, 1880, on an outcrop of oxidized copper ore in massive limestone, opposite the Copper Queen hotel in Bisbee. The original orebody, now represented by a large cave, averaged 23% copper. The ore was smelted in a 30" water-jacket furnace, with English coke, brought via San Francisco. This orebody was exhausted in 3 or 4 years and the mine experienced many vicissitudes, until additional orebodies were developed, by following seams and stringers of ore leading to further large and rich deposits.

Geology: the ore-bearing formation of the Copper Queen and other mines of the Bisbee district, consists of thickly bedded limestone beds, dipping to the southward and cut by intrusive porphyritic dikes. Until 1902, the principal orebodies were found at the base of the carboniferous limestone beds, which are broken by igneous intrusive rocks, that evidently have a strong genetic bearing upon deposition. The ore deposits occur as pockets, lenses, chimneys, bunches, shoots, veins, stringers and seams, the

larger bodies being connected, in most cases, by small veins, or mere knife-blade seams. The limestone and its included orebodies have a general gentle dip to the southeast, necessitating deeper shafts as distance is made toward the southeast. Extensive bodies of high-grade ore have been found, since 1902, in the deeper levels driven in the older limestones (Cambrian), and developments prove these underlying orebodies to be persistent to great depth. The mines show beautiful caves, lined with calcite crystals and stalactites and wonderfully fine crusts of azurite, malachite and cuprite; some of these caves are of considerable size. Many of the shafts are bot-tomed in sulphide ores of high-grade, consequently the depth of the ore-bodies, while already proven great, is conjectural. New orebodies are de-veloped yearly and the ultimate lateral limits of payable ore are unknown.

"In the Copper Queen mine, the majority of the ore has occurred in a zone encircling the west boundary of the porphyry intrusion of Sacra-mento Hill. It has a width varying from 800 to 1,200', and a thickness of about 400'. It reaches the surface in the older part of the mine to the N. W., but dips to the S. E., where it is reached at 1,400' below the Czar collar, in its farthest extension at present developed on Copper Queen ground. There is one major extension from the N. W. end of the zone toward the west along the Czar fault, and others of minor importance.

"Individual orebodies are scattered through the zone in an eccentric manner, only matched by their own irregularities of form and size. Their most general characteristics are the softness of the ore and their great horizontal rather than vertical extent. It has been estimated that the aver-age vertical thickness of ore in the Czar and Lowell divisions is between 30 and 35'. It is calculated by assuming it to be uniformly distributed over its horizontally projected area.

"In this zone, and for some distance above it, the ground has been subjected to intense alteration and intense but irregular oxidation. It has resulted in an enormous quantity of earthy or clayey material, which may be either ore or waste, which, when wet, is both heavy and tenacious. Below alteration, the ground is fairly hard, and the limestones contain pri-mary ores differing from those heretofore considered typical of the camp, and which have not yet been thoroughly exploited."

Development: the Copper Queen mine has 7 shafts, all connected on the even numbered levels. The entire output is concentrated at and hoisted from the 1,700' Sacramento shaft. The mines are opened ahead for several years, development averaging about 1 mile monthly of new workings, or at the rate of 1 linear foot of new work for 10 tons of ore extracted, which figure is proven by past experience to maintain practically constant ore reserves, while avoiding excessive advance openings that require useless maintenance cost. The stopes are filled throughout and the mines are tim-bered with square sets, mainly Washington fir, an average of 30' in timber, board measure, being required for each ton of ore won in the oxidized zone.

The underground haulage plant is very extensive, with 21 miles of tracks, covering every second level from the 4th to the 16th, inclusive, ore from the intermediate levels being dropped through chutes, and all ore hauled to the Sacramento shaft for hoisting. The haulage system includes Goodman electric locomotives and side-dumping ore cars. Chutes have been installed throughout the mine for loading the cars, which discharge into large storage bins at the Sacramento shaft, through which all ore is hoisted. The system is fully described by Mr. Gerald F. G. Sherman. *supt. in Trans. A. I. M. E., Sept., 1915, p. 1837.* In order to complete the underground traction system, it was necessary to open many lateral drifts

and crosscuts, which were located in solid ground, wherever possible, as the electric tram lines are the arteries of the mine.

The Uncle Sam mine has an old shaft, and a new shaft, sunk 1908, of 224' depth. This mine is connected with the Czar, Holbrook and Sacramento shafts, and has a large orebody, discovered 1913, that compares favorably with the bonanza deposits of the adjoining Shattuck mine.

The White Tail Deer mine lies across the range on the edge of the mesa near Don Luis, being reached by wagon road through a detour of several miles. There is an old 100' incline shaft, sunk 1893. A new shaft, begun June, 1910, has some drifts on the 150' level. The mine shows a deposit of low-grade ore, with prospects of developing ore of better grade. It has been unworked, save by lessees, for several years.

The 4-compartment Sacramento shaft, 1,700' deep, handles the entire output of the mines. Work was started, Oct., 1915, to concrete the shaft. There are loading bins on the even-numbered levels from 400 to 1,600', reached by the electric haulage lines from all other workings of the mine. The shaft was sunk in rock for practically its entire depth, insuring as great a degree of immunity from drawing as is possible in this district. The Sacramento shows some rich ore, discovered 1913, on the 1,500' level near the Hoatson claim line. Exploratory work, in the porphyry stock of Sacramento Hill, which is the geological keystone of the Bisbee ore deposits, has shown up a large tonnage of concentrating ore.

The hoist at the Sacramento is a powerful Nordberg tandem-compound engine, having 7' drums with 5' face, operated by steam, with 6 auxiliary engines, actuated by oil, under 150 lbs. pressure. Hoisting is done in 3-ton skips, and the hoist can raise a skip each minute, giving the shaft a capacity of fully 4,000 tons daily.

The Sacramento shaft has, perhaps, the most elaborate and ingenious system for mixing and loading ores to be found at any copper mine. This is fully described by Sherman in the paper already noted. The ventilation of the whole property with its 6 downcast and one upcast (Lowell) shafts is well described by Chas. A. Mitke, in Bull. A. I. M. E., Sept., 1915, p. 1941.

The central power plant near the Sacramento shaft, includes a boiler house, having four 400-h. p. Stirling water-tube boilers, furnishing steam direct to the hoists at the nearby Sacramento and Gardner shafts, the hoists at the other shafts being operated by compressed air. Equipment of the engine house includes three 500-k. w. Curtis turbo-generators, 3 Ingersoll-Rand air compressors, of about 100 drills aggregate capacity, a 70-drill Nordberg air compressor, the largest in the Southwest, and a 7,000 cu. ft. Nordberg compressor. Fuel is Texas and California petroleum, with large tanks for oil storage. All of the shafts, and the principal mine buildings, are reached by spurs of the El Paso & Southwestern railway.

In addition to the Copper Queen mine at Bisbee, the company has important interests in several other districts, particularly the Burro Mountains, N. Mex., where it owns the Chemung and Burro Mtn. properties, and the Commercial mine, near Prescott, Ariz. See Geol. of Burro Mts., by R. E. Somers, Bull. A. I. M. E., May, 1915, p. 957.

The company owns mineral lands in the Old Hat district, in the Catalina mountains, north of Tucson, Pima county, Ariz.; also holds the Hanover mine at Fierro, Grant county, N. M.

During the past few years a large tonnage of concentrating ore has been developed in Sacramento Hill, necessitating the building of a concentrator. A 90-ton test mill was built in 1914, the best saving being effected by combined hydraulic and flotation methods. Tests, on a working scale demonstrated that 1.3% of copper will make ore, and it is prob-

able that 1% material can be worked. Based on the results of this experimental work a 3,000-ton concentrator will be built on the flat west of Douglas.

The Douglas smelter, known as the Douglas Reduction Works, is at Douglas, Ariz., 28 miles from the mine and one-half mile from the Mexican border. This plant treats 3,000 tons daily, handling the output of the Copper Queen mines and that of the Moctezuma Copper Co., as well as doing a general custom-smelting business. The works occupy a site of 320 acres and are served by a very complete standard-gauge railroad system, reaching every building. The plant was blown in March, 1904, since which time there has been almost continuous enlargement, the works costing fully \$4,000,000, smelting about 3,000 tons daily, there being no concentrator to eliminate part of the tonnage from the final furnace charges. The plant is incidentally described by J. Moore Samuel, in Bull. Am. Inst. Mng. Engrs., June, 1916, p. 1079, in a paper on Dust Losses.

Water for the works is secured from artesian wells, of about 300' average depth, the water rising nearly to the surface, with 1 well, of about 1,000' depth, flowing 200 gals. per minute. A large reservoir and cooling tower have been built in connection with the water supply.

The ore-bedding system consists of 5 pits, each 40x800' in size, and 11' deep, having an aggregate storage capacity of 90,000 tons. Ore, received from the mine in side-dumping steel cars, is discharged into the pits, which are lined with white tufa rock. The pits are filled with the different grades of ore required to constitute a normal furnace mixture, and the ores mixed by a mechanical plow. Ore is removed, as required by the furnaces, with steam shovels, running on permanent tracks laid upon the floors of the pits.

The blast furnace building, 150x900' in size, of steel frame, also covers the converter department. Three 60-ton traveling cranes, of 60' span, run the entire length of the building. There are ten 400-ton blast furnaces, each 44x240" with forty 4" tuyeres, and 16' in height from the tuyeres to the charging floor. The 10 furnaces are set 15' apart, in a single row, with a 10x20' settler between each pair, the lower half lined with chrome brick and the upper half with ordinary fire brick. Ore is charged on either side, alternately, charging being done from trains of twenty 2,500-lb. cars, hauled by 13-ton electric locomotives. Slags flow from the settlers into 18-ton slag cars, hauled by electric locomotives. The slag dump is 1,700' long, and is kept trim by a special leveling machine, operated by electric power. The blast furnaces consume 350 to 400 tons of coke daily.

The dust chamber is of steel frame with brick and tile walls, roofed with reinforced concrete supported by steel trusses and has a bottom of tiled hoppers.

Molten matte is taken from the blast furnace to the converters by 60-ton electric traveling cranes, each having two 15-ton auxiliary hoists. The converter department has 7 stands, operated hydraulically, with 10 shells, of the Great Falls type, basic lined. Copper is poured in a Walker casting machine, and product is blister copper of about 99% tenor, with considerable gold and silver values. The converter plant has a flue, taking the gases from the 7 stands to a dust flue 11' in diameter at the hoods and 13' at the dust chamber.

The 260' steel stack of the blast furnace building is 30' in diameter at the base and 25' at the top.

The calcining and reverberatory plant is 100x850' in size, of steel frame. Ore is brought in over an elevated railway track on steel trestles, 400' in length, and dumped into concrete storage bins, and drawn, from the bins to the roasters by belt conveyors. There are three 100' reverberatory fur-

naces and sixteen 75-ton McDougal calciners. A slag tunnel, 30' wide, 15' deep and 276' long, has electric cars, connecting with the slag tracks. The tunnel is lined with 4' concrete walls, with a 2' separating wall in the center. The reverberatory furnaces are next to the old building, succeeded by the slag tunnel, on top of which there is a battery of four 400-h. p. water-tube boilers, followed by a dust chamber; the McDougal roasters occupy the northern end of the building. The reverberatory department has a separate 300' stack, of 22' inside diameter, built of special hollow bricks, with walls 42" thick at the bottom and 12" at the top, requiring 1,250,000 brick and standing on a base of 60' diameter requiring 1,100 cu. yds. of concrete.

The power house, of steel and brick, was enlarged to transmit electric energy 72 miles to El Tigre mine, in northern Mexico. The power plant has about 20 units, of various sizes and types, aggregating more than 6,000 h. p. Equipment includes 4 Nordberg cross-compound blowing engines, each direct-connected to a 400-k. w. 250-volt direct-current generator; Nos. 9 and 10 Connersville blowers, set staggering; a cross-compound 2-stage condensing air compressor, with piston capacity of 2,000 cu. ft. of free air per minute, at 100 lbs. pressure, for running the pneumatic tamping devices, operating charging doors of the blast furnaces and pumping water; 3 triplex motor-driven pumps, delivering water into compression tanks, at 350 lbs. pressure per square inch, with automatic regulation; four 400-k. w. 250-volt direct-current generators, supplying power for cranes, slag locomotives and electric lights; two 750-k. w. turbo-generators and a number of minor engines and dynamos. The power plant is equipped with a complete set of gauges and meters, keeping exact record of the distribution of power to every department and subdepartment.

The steel boiler house has six 500-h. p. and four 1,000'-h. p. Stirling water-tube boilers, with a Green fuel economizer, and a Foster superheater with capacity of 90,000 lbs. of steam per hour. The stack of the boiler house is of brick, 177' high and 13' in diameter at the base. Boilers are arranged to burn either coal or petroleum, but latter is used exclusively, consumption of California and Texas petroleum, at the mine and works, amounting to about 500,000 gals. monthly. Oil for fuel is at present cheaper in first cost, easier and cleaner to handle, and effects a great saving in the wages of 3 daily shifts of stokers, formerly required at every boiler plant.

A limestone quarry, at Lee station, 7 miles east of Douglas, has a large crusher and storage bins, the smelter requiring 400 to 500 tons of limestone daily, for flux. A saw mill is operated, in the forests of the Chiricahua mountains, though the bulk of the timber and lumber requirements of the mine and works are met by the importation of timber from the Pacific coast.

	Production:	Tons Mined	Lbs. Copper	Oz. Silver	Oz. Gold	Lbs. Lead
1915.....	783,211	88,551,180	943,368	18,974	9,388,418	
1914.....	732,829	86,066,143	1,036,672	15,769	8,889,175	
1913.....	867,481	97,181,725	919,138	16,213	5,701,628	
1912.....	786,368	88,280,908	1,027,130	18,023	2,953,685	
1911.....	619,132	74,489,728	1,227,453	16,895	5,658,936	
1910.....	596,193	76,428,908	608,096	12,430	696,118	
1909.....		84,802,147	601,828	8,674	437,601	
1908.....		82,533,145	530,492	8,352	182,677	
1907.....		66,916,972	338,723	4,197	.....
1906.....		79,536,416	332,723	7,573	.....

Smelter production, including custom ores:

	Tons Treated	Oz. Gold	Oz. Silver	Lbs. Copper
1915.....	1,063,329	29,840	1,388,149	125,144,027
1914.....	835,016	26,259	1,405,301	119,957,017

COPPER QUEEN & COPPER KING GROUP **NEW MEXICO**

Mine near Steins, Grant Co., N. M. Dr. J. O. Hamilton, of El Paso, Texas, owner. **Property:** 17 claims, is reported to show a monzonite porphyry dike, 100' wide impregnated with copper sulphides and averaging about 3% copper. **Development:** by shallow shafts. Mine east of the San Simon valley and 5 miles from the S. P. R. R.

COPPER QUEEN GOLD MINING CO. **ARIZONA**

Officers: Louis Goldman, pres.-mgr., Paris, Tex.; R. F. Scott, v. p.; W. F. Gill, sec.; A. Goldman, treas.; preceding with J. K. Bywaters, H. P. Mayer, C. R. Caldwell, J. H. Gooch, H. S. Bettes, directors. J. B. Harper Stoddard, supt. **Cap.,** \$2,000,000; shares \$1 par; outstanding 1,238,089.

Property: 25 claims, 23 patented, and a mill site on the Agua Fria river, 6 miles east of Humboldt.

Claims show great beds of black, silicified schist, cut in places by rhyolite dikes. **Development:** by 3 tunnels; No. 1, 593' long with about 2,500' of workings, including shaft and workings on 300' level; No. 2, 600' long, with 2,100' of workings on adit level, a 300' inclined shaft and 800' of workings on the 100' level; No. 3 with about 300' of workings. The vein, 7' to 12' wide, contains ore carrying chalcocopyrite, chalcocite and tetrahedrite, with some gold and silver.

Equipment: consists of a 3-drill air compressor and 32-h. p. gasoline engine at No. 2 tunnel. Treasurer's report for year ending Feb. 1, 1915, shows total cash and securities of \$14,924. Development work is being done on a small scale.

COPPER QUEEN MINE **CALIFORNIA**

Portola, Plumas Co., Cal. Mine bonded to J. R. Walker, of Salt Lake City. Developed by tunnel, showing a vein of gold-copper ore. See Walker Mng. Co.

COPPER QUEEN MINE **IDAHO**

T. E. G. Lynch, owner, Digby, Nova Scotia, Canada. Mine near Téndoy, Lemhi Co., Idaho.

The mine is erroneously reported to be the property of the Copper Queen Gold Mining Co., in a Geological Survey report (Bull. 528, p. 120), but has belonged to T. E. G. Lynch since 1899. The Copper Queen Mining & Smelting Co. leased the Queen of the Hills mine, 40 miles away. Lessees Copper Queen mine shipped 448 tons of sorted ore to Salt Lake City, 1911, that averaged 29.4% copper, 5.2 oz. silver and 0.81 oz. gold per ton. Reported Dec., 1915, that mine has recently been leased to the Idaho-Seattle Mng. Co., which see.

COPPER QUEEN MINING CO. **WASHINGTON**

Property taken over by Copper King Mining Co. and a new company organized under title of King Mining Co., which see.

COPPER QUEEN MINING & MILLING CO., LTD. **IDAHO**

Company was amalgamated with the Reindeer Copper & Gold M. & M. Co., Ltd., and reorganized under title of Reindeer Queen Mining Co., 1913. Described under latter title.

COPPER QUEEN MINING & SMELTING CO. **IDAHO**

Office: 608 Lonsdale Bldg., Duluth, Minn. Mine office: Salmon, Lemhi Co., Idaho. Geo. H. Crosby, pres. and gen. mgr.; Emerson Hill, v. p.; A. J. McLennan, sec.-treas.; A. F. Bennett, supt. **Inc.** June 12, 1905, in Arizona. **Cap.,** \$500,000; shares \$1 par, nonassessable; issued, \$282,000. Absorbed 1908, the Copper Queen & Crescent Mining & Smelting Co., giving 1 share for 8.

Property: the Queen of the Hills mine, 17 claims, 320 acres, in the Eureka district, 7 miles N. W. of Salmon, is said to show 3 nearly vertical

fissure veins in granite and schistose quartzite, with a generally N. E. strike. The Eva, or westernmost vein, shows an 8 to 14" quartz band on the wall of a brecciated zone 5' wide. The central, or Queen, and the Nellie veins show 12 lodes of granite breccia partly cemented by quartz. The ore is coarsely crystalline quartz, carrying pyrite, chalcopyrite and some galena, with \$3 to \$5 in gold occurring in 5 known oreshoots, 2 in the Nellie, 2 in the Queen and 1 in the Eva vein.

Development: by shafts of 105' and 400' with 5 levels and by 7 tunnels, longest 450' with 4,700' of workings. Property was idle for nearly 5 years, but resumed work in Aug., 1915. Present work consists of sinking a winze on the Nellie vein.

Equipment: includes 100-h. p. electric plant, a 24-h. p. hoist, good for 700' and a 5-drill air compressor. There are 10 buildings, including a 50-ton log mill, having 15 Allis-Chalmers stamps, a gyratory crusher and 2 Wilfley tables.

COPPER RANCH MINING CO.

UTAH

Mine near Milford, Beaver Co., Utah. Moses Thatcher, pres.; C. L. Rood, v. p. Inc. in Utah. Cap., \$500,000; shares 50 cts. par.

Property: 17 claims, 340 acres, in process of patenting, includes the Jewel mine, between the Old Hickory and O. K. mines of the Majestic Mines Co. Claims carry 2 miles of the strike of a vein of about 100' claimed width, showing ores, assaying up to 43% copper, 10 oz. silver and \$8 gold per ton. Management estimates that entire vein will average 4 to 7% copper, with fair gold and silver values, which is a serious overestimate. Ore carries 5 to 25% iron, rendering it desirable for fluxing purposes. The mine has but slight development, with a shaft poorly planned, 32' deep on the incline and 43' farther vertically, mainly in ore. Equipment includes whim and hoist. Shipments of oxidized copper-silver ore resumed in 1913 by lessees and company.

COPPER RANGE COMPANY

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Painesdale, Houghton Co., Mich. Sales Dept.: 32 Broadway, New York. **Officers:** Wm. A. Paine, pres.; F. W. Denton, v. p.-gen. mgr.; Frederic Stanwood, sec.-treas.; above with Chas. J. Paine, Jr., F. McM. Stanton, S. L. Smith, directors. W. Parsons Todd, sales mgr., New York; John M. Wagner, purch. agent, Houghton, Mich. American Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Annual meeting 1st Wednesday in May.

Inc. 1899, in Michigan. Cap., \$2,500,000, increased 1915 to \$10,000,000; shares \$25 par. The company is now the successor of the Copper Range Consolidated, which Dec., 1901, took over 99,699 shares of the company's stock. On Oct. 18, 1915, this holding company was formally dissolved and the shares exchanged for those of the Copper Range Co.

Dividends: \$1,536,086 in 1905; \$2,304,810 in 1906; \$2,304,810 in 1907; \$1,536,740 in 1908; \$1,536,930 in 1909; \$1,537,340 in 1910; \$1,357,104 in 1911; \$788,428 in 1912; \$1,084,498 in 1913; \$1,182,003 in 1915; total dividends to Dec. 31, 1915, \$15,168,749.50.

The balance sheet shows:	Assets:	1915	1914
Cash at Boston.....		\$ 853,641	\$ 177,249
Cash at mine and Supplies.....		615,559	627,460
Copper on hand.....		1,934,027	1,053,733
Copper Range R. R. Bonds.....		890,000	876,000
Accts. receivable.....		82,414
Michigan Sm. Co. stock.....		76,470	340,000

\$4,689,697 \$3,146,036

Liabilities:	1915	1914
Notes payable		\$1,200,000
Mine indebtedness	189,949	237,400
Accts. payable	201,949	
One-half Champion	907,934	603,410
Excess of assets	3,390,464	1,105,226
	\$4,689,697	\$3,146,036

Net income for 1915 from operations of all the subsidiary companies after deducting dividends was \$2,382,759, or \$9 per share. The dividend was but \$.3, the difference being added to surplus.

Holdings consist of the entire assets of the Copper Range Consol. Co., namely: 50,000 shares of Champion Copper Co., which is one-half the total issue; 99,990 shares Baltic Mining Co.; 99,353 shares Trimountain Mining Co.; 96,500 shares Atlantic Mining Co., and 42,443 shares of Copper Range Railroad Co. stock.

Property: 16,467.64 acres, mainly in Houghton County. Mining companies controlled own an additional 12,240.4 acres. Average yield of copper per ton of rock was 22.90 lbs. in 1914 and 32.50 lbs. in 1915, the highest figure yet obtained. The company's original tract of 9,360 acres mineral and 441 acres non-mineral land, lies between the Baltic mine (800 acres) on the south and the Tri-mountain (1,351 acres) on the north. The Champion lies between the Baltic and the St. Mary's Mineral Land property. All the properties are described under their respective titles, although they are subsidiaries of the Copper Range. The Atlantic mine has been idle since the mine was wrecked by air blasts in 1911. The Baltic mine, an highly mineralized amygdaloid bed 15'-60' wide, mined through three shafts, 2,500' deep. The Champion works three separate amygdaloid beds mined by four 2,000' shafts. The Tri-mountain output comes from the Baltic bed mined by 4 shafts, one 2,800' deep.

The company is the second largest producer of the Lake Superior district.

The total 1915 production of copper from which this company's profits are derived, that is, Baltic, Tri-mountain, and one-half of Champion, was 37,035,642 lbs. This compares with 19,953,854 lbs. in 1914, and is 3,895,345 lbs. larger than the best previous production in the history of the company.

Costs and Profits—1915

	Production, Lbs.	Cost Per Lb.	Profits	Price Rec.
Baltic	12,028,947	9.50c	\$ 949,965.40	17.4c
Trimountain	8,302,896	9.52c	654,746.52	17.4c
Champion, one-half	16,703,799	6.30c	1,854,524.52	17.4c
Copper Range Co.—				
1915	37,035,642	8.06c	3,459,236.44	17.4c
1914	19,953,854	10.66c	541,961.06	13.38c
1913	18,767,359	11.71c	595,958.01	14.89c
1912	28,967,428	10.51c	1,631,676.10	16.16c
1911	29,310,579	9.74c	817,879.86	12.54c

The above table shows the effect of improvements in mining and of new mining and milling machinery. These improvements give assurance that operating results similar to those of 1915 may be expected to continue under average conditions.

Development: for 1915 totaled 37,903', or more than in 1913 and 1914 together. Ore reserves were increased in 1915. The new selling department of the company effected a substantial saving in commissions and proved an

unqualified success. Copper Range is an assured success and worthy of all that has been said about it.

Assuming a cost of 10c a lb. and an annual output for 1916 of 50,000,000 lbs., the earnings per share would be \$12.50 for 20c copper, and \$1.25 per share for each cent change in the price of copper above or below that figure.

Copper Range Consolidated Co.

Company dissolved Oct. 18, 1915, shareholders receiving an equal number of Copper Range Co. stock in exchange.

Copper Range Railroad Co.

Office: 82 Devonshire St., Boston, Mass. Operating office: Houghton, Mich. Officers: Wm. A. Paine, pres.; F. W. Paine, v. p.; Frederic Stanwood, sec.-treas.; preceding officers, John H. Rice, Frederick W. Denton, Thos. S. Dee, Wm. D. Calverley, Samuel L. Smith, F. R. Bolles, gen. mgr., directors.

Inc. 1899 in Michigan. Cap., \$5,000,000; shares \$100 par; issued, \$4,244,300. Debentures outstanding, \$2,280,000 first-mortgage 5% bonds. Company is authorized to issue bonds to extent of \$20,000 per mile of completed main line, and \$15,000 per mile of completed branch lines and side-tracks. Is controlled by Copper Range Company. Balance sheet of Dec. 31, 1915, gave cost of road at \$6,183,390, with equipment inventoried at \$869,332. Earnings were \$601,643 gross and \$186,979 net in 1914; \$811,346 gross and \$326,895 net in 1915. The first dividend, of 10%, was paid 1909. About 75% of the gross income is derived from transportation of ore, mineral and freight.

The railroad has upwards of 100 miles of trackage, the 65-mile main line running from Calumet to McKeever, and connecting with the Keweenaw Central at Calumet; the Duluth, South Shore & Atlantic, Hancock & Calumet and Mineral Range railways at Hancock and Houghton, and the Chicago, Milwaukee & St. Paul railway at McKeever. The company also has trackage rights over 19 miles of the Chicago, Milwaukee & St. Paul railway, between McKeever and Ontonagon, and operates a daily passenger service between Calumet and Ontonagon, with additional trackage rights of 73 miles over the same line, over which fast freights are operated between Calumet and Channing, Mich. Trackage rights have been given the Chicago, Milwaukee & St. Paul over the Copper Range between McKeever and Houghton, and a direct passenger service, with exceptionally good equipment, is operated jointly by the Chicago, Milwaukee & St. Paul and Copper Range lines, between Chicago and Houghton. Spurs connect the main lines with all of the principal mines along the right-of-way.

The company owns a half interest in a bridge crossing Portage lake, between Houghton and Hancock; also extensive water frontage on Portage lake, in the western part of Houghton, with general office building, shops, roundhouse, warehouses and wharves for merchandise and coal. The coal wharf is equipped with modern unloading machinery, and has deep water alongside, capable of accommodating the largest freighters plying the great lakes. The Copper Range railway is a model small road.

COPPER REEF CONSOLIDATED MINES.

ARIZONA

Office: Wm. A. Griffith, sec., 1409 Park Bldg., Pittsburgh, Pa. Inc. Feb. 19, 1910, in Arizona. Cap., \$5,000,000; shares \$5 par; issued 632,000 shares. Union Trust Co., Pittsburgh, transfer agent. Annual meeting, first Monday in February.

Property: 125 claims, 2,500 acres, including 600-acre mill site, in the Stanley Butte district, 15 miles S. W. of San Carlos, and west of Stanley P. O. Claims are on the western slope of a high mountain ridge whose

eastern face shows granite overlaid by 600' of quartzite capped by limestone, while the western slope is plated with massively bedded gray limestone. On the claims these rocks are carboniferous and cut by numerous fractures carrying small replacement bodies of silicious copper ore. The rocks dip down the slope at 35° and most of the orebodies are either in gash veins or occur along fractures, conformable to the bedding. In the many older pits and shallow shafts, the narrow gash veins were not over 2' wide and the ore pinched out at 20 to 30' in depth.

Development: said to aggregate 3,600', is mainly by tunnel, but includes the 575' North Star and 125' Jessie shafts. The manager estimated in 1914 80,000 tons developed by this work, which is a liberal estimate. Ores average about 5.4% copper and 68% silica, the copper being partly in the form of chalcopyrite and bornite, mixed with chrysocola, malachite and azurite, etc. Management claimed average value of 8.65% copper with varying gold and silver values up to \$12 per ton.

Equipment: includes two 40-h. p. gasoline hoists, an Ingersoll-Rand 4-drill air compressor and all necessary mine buildings.

Operations suspended end of 1915. Secretary writes, March, 1916, that company is quite satisfied with its property and the existing conditions, and requests no publicity in the Handbook. Investors take notice.

COPPER SHIELD MINING CO.

NEVADA

Office: 45 W. Second St., Salt Lake City, Utah. Mine office: Contact, Elko Co., Nev. **Officers:** Dr. C. I. Douglas, pres.; U. U. Hiskey, v. p.; C. R. Strock, sec.-treas.; H. M. Shields, mgr., and J. A. De Valley, directors. **Inc.** 1907 in Nevada. **Cap.,** \$1,000,000; shares \$1 par; issued, 610,000. Annual meeting, second Tuesday in April. **Property:** 11 claims, 200 acres, in the Salmon River district. **Development:** by 4 shallow shafts, deepest 73', and several tunnels, with a total of 646' of workings, showing 4 veins in monzonite porphyry dikes in grano-diorite, said to carry up to 40% copper and 2 to 6 oz. silver per ton. About \$1,100 expended on development work in 1914-15. Oregon Short Line railroad is 37 miles distant.

COPPER-SILVER MONTANA MINING CO.

MONTANA

Dead. Holdings acquired at receiver's sale in 1914 by New Copper Silver Mining Co., which see.

COPPER & SILVER ZONE MINES.

ARIZONA

W. R. Martin, owner, Union Depot supt., El Paso, Texas. Mine near Globe, Gila Co., Ariz., adjoining the Old Dominion and Globe Consolidated mines and near the Superior & Boston. **Property:** 25 claims, about 500 acres, in diabase area, 1 mile east of Globe, was originally worked for its silver ore, found near the surface, but development has proven the existence of copper at depth and owners expect to encounter the extension of the Gladiator vein of the Old Dominion mine.

Development: by the 103' Clark and 108' Faugh shafts on the Old Ironsides claim, from which ore shipped has returned 1.25 to 3.5% copper, \$19 to \$236 silver, or an average of \$21.60 per ton. Nothing additional reported Dec., 1915.

COPPER STATE MINING CO.

ARIZONA

Office: 411 Metropolitan Life Bldg., Minneapolis, Minn. **Martin E. Tew,** pres.; **John A. Nelson,** 1st v. p.; **E. E. McCarthy,** 2nd v. p.-treas.; **S. H. Hudson,** sec.; preceding officers, **Geo. P. Douglas,** **A. M. Anderson** and **Walter De La Hunt,** directors; **W. C. Steubing,** mgr.; **Geo. S. Croyle,** foreman and electrician; **Gilbert O. Tew,** store mgr. **Inc.** 1915 in Ariz., as a successor to the Calumet & Copper Creek Mining Co., the Old Reliable Copper Co., the Copper Creek Mining Co. and other companies. **Cap.,** \$7,500,000; \$2,500,000 issued. All stock certificates held in trust under a

pooling agreement until Jan. 1, 1918, or until the financing of the company has been completed.

Property: 130 claims, unpatented, including 100 acres mill and smelter sites, 300 acres timber lands and 200 acres miscellaneous lands; also 28 patented claims under option, making total area 2,500 acres in the Copper Creek, or Bunker Hill, district, Graham and Pinal counties, Ariz. Properties are in the Copper Creek basin, on the western slope of the Galiuro mountains, 31 miles S. E. of Winkelman and Hayden, on the Arizona Eastern R. R.

Claims include the Sycamore Flat, Cumberland, Sioux Chief, Silver Reef, American Eagle, Copper Giant and Old Reliable groups. Country rock in lower basin is diorite, with porphyry intrusions, showing a large number of ore bodies, there being several different breccias and oxidized zones carrying mineral, ore bodies usually being elliptical, but sometimes occurring in chimneys. Outcrops, of which there are more than 50, are very prominent. Oxidized ores, including chrysocolla, are found at and near the surface, sometimes in commercial quantities, giving place, at shallow depth, to sulphides, chalcopyrite, bornite and chalcocite, associated with pyrite, in altered and brecciated diorite, some native copper showing in flakes and grains along shear zones. Company reports that one orebody 300' wide and 420' long has been developed to 342' depth, in porphyry breccias.

The Old Reliable mine has an orebody with the second largest outcrop in the district, same having a sectional area of 147,000 square feet, or about $3\frac{1}{2}$ acres. Development is by an upper tunnel, with back of 640' and 13 crosscuts, and a lower tunnel 480', with about 2,200' of workings, estimated by manager to show 250,000 tons of 3% ore ready for stoping, and an additional 350,000 tons of 2.25% ore partly blocked out.

The American Eagle group has 3 prospect tunnels, a 1,025' working tunnel, and a 300' three-compartment shaft, with about 3,500' of workings, showing oxidized ores at surface, with an orebody reported to be developed for about 50x100'. This mine is estimated by company to have developed about 60,000 tons of ore, averaging 3.78% copper and 8 oz. silver, with a trace of gold. The mine has electric lights underground, and equipment consists of a 75-h. p. electric hoist good for 500', 3-drill and 1-drill electric air compressors and a smithy.

The Prince mine is developed by a 300' shaft and drifts on 3 levels. Company claims 500,000 tons of ore averaging 3.56% copper in this mine. On the Globe mine a shaft has been sunk 650' and 300,000 tons of 3.08% ore are said to be blocked out on the 150', 250' and 450' levels. The Copper Giant mine, said to have an outcrop of nearly 4 acres, has a 200' shaft connecting at depth of 124' with a tunnel from which 2 drifts several hundred feet in length have been driven into the ore breccia. In the Silver Reef, Kimbro, Copper Reef, Sioux Chief, Rough Rider and several other claims belonging to the company, copper ore has been exposed by short tunnels and shallow shafts. Hand-sorted ore from these workings has been shipped to smelters, giving returns of 12% to 30% copper and \$5.50 to \$27 gold and silver per ton. From the Cumberland and Lead Carbonate mines, in which veins of galena have been exposed, several carloads of ore netting \$45 per ton and upward in gold, silver, copper and lead have been shipped.

A 180-ton concentrating mill was built several years ago. Power plant consists of two 100-h. p. boilers, a 200-h. p. Corliss engine, a 160-k. w. 2,300-y. G. E. dynamo. A 3-phase transmission line, 4 miles long, supported by steel towers, connects power plant with mill and 3 of the mines. Water supply system includes 5 miles of $2\frac{1}{2}$ " pipe, and a concrete dam $26\frac{1}{2}$ ' high and 131' across the canyon, creating a reservoir holding 8,000,000 gals. of water. Company also owns and operates a $2\frac{3}{4}$ -mile narrow gauge railroad, connect-

ing the Old Reliable mine with the mill, equipped with 18-ton Porter locomotive and 8 cars; a 31-mile telephone line connecting the mine with Mammoth, Winkelman and Hayden, and a store, used as a commissary and office building. A 60-h. p. distillate engine and 4-drill air compressor are installed at the Old Reliable mine. Other improvements are a machine shop, assay office, ice-making plant and 25 buildings for employes.

Production: by former owners in 1914 was 8,400 tons of ore, making 758 tons of concentrates averaging 28.26% copper, or a total of 428,421 lbs. copper. Company plans further systematic development, the building of concentrating mill in the San Pedro valley and the extension of the narrow-gauge railroad to this point.

Property has merit if handled for ore and not as a stock-selling proposition. Roy Sibley and Col. Frank J. Sibley, who formerly controlled the property, were promoters of the worst type, but are said to be eliminated from the present company.

COPPER & URANIUM MINING CO.

IDAHO

Office: Rexburg, Idaho. Mine office: Clyde, Blaine Co., Idaho. Henry Flamm, pres. and gen. mgr.; M. H. James, v. p.; Alfred J. Cole, sec.-treas.; preceding officers and James Shail, directors. **Property:** known as the Automatic mine, in the Hamilton district, has a 125' shaft on a 10' contact vein between limestone and quartzite, said to show copper and uranium ores, Developing with 2 shifts, 1915.

COPPER WORLD EXTENSION MINING CO.

WASHINGTON

Idle. Loomis, Okanogan Co., Wash. Walter A. Boyle, pres.; Edw. H. Caylor, v. p.; Alfred F. Carman, sec.-treas.; R. J. Thomas, supt., at last accounts. Inc. Jan. 11, 1904, in Washington. **Cap.**, \$1,500,000; shares \$1 par.

Property: 8 claims, 160 acres, on Palmer mountain, in the Wannicut lake district, shows an orebody about 25 to 30' wide, opened by a 300 2-compartment shaft, with crosscut on 210' level said to show 17' vein of chalcopryrite, assaying 8% copper, 4 oz. silver and \$1.40 gold per ton. **Equipment:** includes steam plant, with 2 small hoists and 5-drill air compressor.

Reported under bond to Ernest Barton, who plans erecting electric smelter.

COPPER WORLD GOLD MG. & SM. CO.

WASHINGTON

Idle. **Office:** 401 Columbia Bldg., Spokane, Wash. Mine office: Loomis, Okanogan Co., Wash. Jerome L. Drumheller, pres. and mgr.; John Wentworth, v. p. and supt.; S. A. Child, sec.-treas. Inc. in Washington. **Cap.**, \$3,000,000; shares \$1 par, nonassessable. **Property:** 2 claims, patented, lying between the Copper World Extension on the east and the Leadville mine on the west, on Palmer mountain, 4 to 5 miles N. E. of Loomis. Claims show a gossan of 100' width, traceable 2,000'. The mine has several short tunnels and shallow shafts, and a 135' two-compartment incline shaft, having a 125' crosscut, reported to be in ore, without reaching the hanging wall, ore being reported to give average assays of 4.5% copper, 2 oz. silver and \$1 gold per ton, with excess of iron.

COPPERFIELD PORPHYRY COPPER MINING CO.

ARIZONA

Care Oscar A. Turner, Kingman, Ariz. **Cap.**, \$1,000,000; shares \$1 par; 500,000 in treasury; 100,000 offered at 25c. **Property:** 6 claims, 120 acres, in Grand, Wash, Mineral Park section, Wallapai mining district, Mohave Co., Ariz., 22 miles north of Kingman. Ground covers high bluffs, called Ithaca and Goat Peaks, of old turquoise mines, which were drilled some years ago and very low-grade copper ore found. Copperfield group covers lower slopes where waters leaching bluffs would gather. Surface for 1,000' across said to show copper stain.

Development: by 200' shallow tunnel, reported to show 2% copper,

both as native and sulphide. Churn drill hole 53', reported to have been recently put down. Property is not a new discovery, despite attempts to make it appear so, and the 4-drill holes used to "indicate" tonnage showed values too low to be of commercial interest. Control of the company was acquired July, 1916, by the Arizona Copperfields, Inc., which took over more than 89% of the capital stock. Is a promotion of George Graham Rice, New York.

COPPERMINES CO.**NEVADA**

Property sold to the Consolidated Coppermines Co., which see.

COPPERROX MINING COMPANY OF ARIZONA.**ARIZONA**

Office: 96 Harris Ave., Providence, R. I. Mine near Courtland, Cochise Co., Ariz. T. F. Gilbane, pres.; Geo. F. Wordley, 1st v. p.; Thomson E. Going, 2nd v. p.; Hon. G. W. Esterbrooks, sec.-treas. Inc. Jan. 17, 1910, in Arizona, as successor of the Arizona Copper Syndicate of Providence. Cap., \$1,000,000; shares \$1 par.

Property: 28 claims, 18 patented and 2 mill sites, patented, in the Dragoon mountains, 3 miles from Courtland. Property is slightly developed, having a 236' shaft and about 500' of tunnels on a contact said to be traceable 3 miles, with surface ores carrying gold, copper and manganese, said to assay up to 16.5% copper. President reports, 1916, that a manganese "Motherlode" has been opened up by recent work. Company is merely a holding company and will lease or sell controlling interest.

COPPERSMITH MINING & MILLING CO.**MONTANA**

Idle. Mine near Lothrop, Missoula Co., Mont. Inc. Jan. 23, 1909, in Idaho. Cap., \$3,000,000; shares \$1 par, nonassessable; issued, \$2,200,000.

Property: 8 claims, unpatented, 160 acres, the Coppersmith group of 6 claims and the Inverness group of 2 claims, also a water right and mill site, about 6 miles up Petty creek from Lothrop. Property carries some good timber. The Coppersmith claim shows limestone and quartzite for an estimated width of about 400', and length of about one-half mile, with outcrops yielding 3 to 20% copper ore, that has given assays of 2 to 17% copper.

Development: by prospect shaft and crosscut tunnel, said by management to cut merely 300' of silicified limestone averaging 1% copper. Property also has a number of open cuts and pits, and a 50' shaft, bottomed in ore estimated to average better than 6% copper, with small gold and silver values. The Coppersmith was formerly reported to show 3 main veins, one reported to be over 100' wide at surface, giving ore assaying 2 to 3% copper. The Exty vein, parallel with and 500' from the Coppersmith, is reported as 15' wide.

The Inverness group, 3 miles from Lothrop, has a vein of 3 to 4' width, in quartzite and slate, carrying malachite, chalcopyrite and chalcocite, giving assays of 15 to 17% copper and \$10 to \$12 per ton in combined gold and silver values. Property has 4 buildings. Idle except for annual assessment work, and property not considered encouraging.

CORBIN COPPER CO.**MONTANA**

Office: 60 Congress St., Boston, Mass. Mine office: Butte, Mont. R. M. Edwards, pres. and gen. mgr.; Henry Tolman, treas., Newton, Mass.; with S. L. Powers, Jos. C. Walker and H. B. Byrne, directors; A. L. Wyman, sec. Inc. Dec. 24, 1908, in Michigan. Cap., \$3,750,000; shares \$25 par, assessable; amount issued, 130,000 shares; amount outstanding, 21,010 shares; amount in treasury, 128,990 shares; \$8 per share paid in. Company sold 15,000 shares of treasury stock, early 1910, at \$10. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agt. Stock is listed on the Boston curb. Annual meeting, third Tuesday in April.

Three assessments levied: \$65,000 due Feb. 11, \$65,000 due April 22, \$130,000 due Nov. 14, 1913. Poor response was made to these and the company was forced to borrow \$95,000 on its notes, giving, as guarantee, the unpaid assessments. Owing to lack of funds all work was stopped on Corbin property early in 1914.

The company owns 57 mining claims, 45 patented, near Corbin in Jefferson county, explored under lease and bond; 6 claims at Rochester, Madison county, and the Gambrinus, Belcher and Welch claims at Butte, Mont.; \$150,000 was paid for the Butte claims.

The Corbin group lies at the head of Clancey creek, a few miles west of Corbin, on the western side of an andesite hill across from the Boston & Corbin mine. This property carries several strong fissure veins in andesite on which considerable exploration work has been done with disappointing results. A vein opened for 800' in the Rosalie tunnel carries up to 20 oz. silver and 7% copper, but is only 18" wide.

The Montana tunnel shows a pyritized conglomerate with andesite, dacite and aplite cobbles, the matrix containing small silver values in the upper tunnel, while the winze in the lower tunnel shows considerable pyrite. The Bonanza tunnel is driven on a tourmalinized granite dike in andesite, and in places the tourmaline rock carries galena and chalcopyrite with small amounts of zinc-blende and pyrite. The Corbin property is not considered favorably.

Equipment: includes steam and electric power, commercial current being taken from the Missouri River Power Co. Buildings include a general office, laboratory, warehouse, three smithies, barn, boarding house, 6 bunk houses and 6 dwellings.

A 100-ton mill, near the portal of the Bonanza tunnel, at Wickes, planned as the first unit of a larger mill, was completed July, 1910, and is idle for lack of ore.

The Butte property lies about 800' west of the Gagnon shaft of the Apache Co. and is believed to carry the extension of the vein worked in that mine. A shaft, sunk on the Gambrinus, was 345' deep when the work was stopped in 1914. At a depth of 85', a crosscut was driven south 45' to prove the apex of the vein and found it to consist of 2' of quartz and 10' of vein matter, carrying silver-lead ore. On the 200' level N. and S. crosscuts were run. The south crosscut cut the vein 7' wide here, 70' from the shaft. Better assays were obtained here than on the 80' level. The north crosscut at 180' from the shaft cut a 5' vein, which showed lead, zinc and copper. About 400' of drifting and crosscutting were done in the mine.

The Rochester group shows a strong quartz outcrop, the vein being developed by a 523' shaft in which a crosscut at the bottom level has encountered 2 parallel veins, 15' apart, that assay 3 to 7% copper. Property is locally known as the Blowout mine. No work has been done here for about two years. The company's most promising asset is the Butte property.

CORBIN-COPPER KING MINING CO.

MONTANA

Office: State Savings Bank, Butte, Mont. Mine address: Corbin, Jefferson Co., Mont. W. H. Hall, pres.; W. D. Gibson, v. p.; R. M. Depeu, sec.; R. B. Nuckolls, treas.; preceding officers, I. A. Heilbronner, Wm. Gemmell and M. H. Schultze, directors. Inc. 1911 in Montana, as successor to the Montana-Corbin Copper Co. Cap., \$1,000,000; shares \$5 par; issued, 199,994 shares. Stockholders of the Montana-Corbin Co. received a new share for old on payment of 25 cts. a share.

Property: 2 claims, 26 acres, about 1 mile from Corbin, in Picnic gulch, shows 4 well-defined veins carrying bornite and chalcopyrite averaging

about 10% copper, 20 oz. silver and 50 cts. gold per ton. **Development:** consists of a 2-compartment shaft, 400' deep, with about 500' of workings, on the Hidden Treasure claim, and several pits and shallow shafts on the Copper King claim. There are also several short tunnels.

Equipment: includes two 60-h. p. boilers, a 15-h. p. hoist, and a 5-drill electric air compressor. Idle since organization.

A full report on this property was made, 1911, by Alfred Frank, E. M., supplementing earlier reports by E. P. Jennings, E. M., and L. S. Ropes.

CORBIN METAL MINING CO. MONTANA

Office: Pittston, Pa. Mine office: Corbin, Jefferson Co., Mont. J. H. Foye, pres.; John Hoy, v. p. and gen. mgr.; Thos. McLaughlin, sec.; M. W. O'Boyle, treas., at last accounts. **Inc.** 1907 in Montana, as Corbin-Montana Copper Co., changing name, Jan., 1910, to present title. **Cap.**, \$1,000,000; shares \$1 par, nonassessable; issued, \$400,000. Company apparently is a twin of the Jefferson-Montana Copper Mines Co. Windsor Trust Co., New York, registrar and transfer agt. Annual meeting, second Tuesday in April.

Property: 11 claims, 176 acres, known formerly as the Baldwin mine, 2 miles S. E. of Corbin, in the Colorado district, shows 5 fissure veins ranging from a few inches to about 8' in width, cutting granite. Ores carry chalcopryite, bornite and galena, estimated by company to average 4% copper, 8% lead, 5 oz. silver and \$2 gold per ton. **Development:** by 500' two-compartment incline shaft with considerable drifting on 500' level, cutting a small orebody carrying lead-zinc-copper sulphides, and by several short tunnels.

Equipment: includes electric hoist, good for 1,000' depth, and a 10-drill air compressor, taking current from the Missouri River Power Co. There are 6 buildings, including carpenter shop, smithy and change house. Idle several years.

CORBIN-VALPARAISO COPPER MINING CO. MONTANA

Presumably defunct. See Vol. XI, Copper Handbook.

CORDOVA COPPER CO. ARIZONA

Idle. Office: 500 Lonsdale Bldg., Duluth, Minn. Mine office: Globe, Gila Co., Ariz. Henry B. Hovland, pres.; Hoval A. Smith, v. p.; David L. Fairchild, treas.; Harvey P. Smith, sec. **Inc.** May, 1909, in Arizona. **Cap.**, \$3,000,000; shares \$10 par; issued 100,704, fully paid; 77,069 outstanding, \$2 paid. Company owed about \$63,000 at last reports. Annual meeting, second Tuesday in September. Company was formed to take over the property and options of the Globe Consolidated Copper Co., now owning 98% of the stock of that company.

The Globe Consolidated property includes the Globe-Boston group of 21 claims, the Mallory group and other holdings aggregating 270 acres, north of the Old Dominion mine and west of the Arizona Commercial **Development:** by the 1,225' three-compartment Gem shaft with extensive crosscuts on the 1,100' and 1,200' levels, cutting the Gem and Future veins, which have shown a little ore occasionally, but nothing of commercial size.

Shipments made from a vein 5 to 8' wide on the 1,200' level, averaged 3.35% copper, 33% iron, 35% sulphur, with \$1.30 in gold and silver.

Equipment: includes hoist and 12-drill air compressor. Management has struggled faithfully to make a mine, both east and west of Globe, but is out of funds and the property idle since 1910, with rather poor prospects. Stockholders planning reorganization and refinancing latter part of 1915.

CORDOVA MINES, LTD. ONTARIO

Office: Sun Life Bldg., Toronto, Ont., Canada. Mine office: Cordova Mines, Peterboro Co., Ont. **Officers:** P. Kirkegaard, pres.; Wm. H. Price, v. p.-treas.; Edw. Willan, sec.; with C. M. Kirkegaard and M. Garvey,

directors. F. Oliver, mgr.; J. C. Stacey, supt. Inc. 1911 in Ontario. Cap., \$500,000; shares \$5; \$50,000 in treasury. Company is operated as a close corporation.

Property: 678 acres, owned in fee simple, in Belmont Twp., Peterboro county. Ore occurs in diorite in fissure veins, said to be from 4'-30' wide and from 50'-400' long, carrying quartz, calcite and iron sulphides, with average assays of from \$4-\$5 per ton.

Development: shafts of 160', 400' and 500' depth, with a total of 6,000' of underground workings. **Equipment:** includes 30-stamp mill of 150 tons daily capacity; two 2,000' compressors, hydro-electric power plant, pumps and 1,800' tramway. Management estimates 150,000 tons of ore blocked out, Jan., 1916. Operated intermittently during 1914-1915. Power plant to be enlarged in spring of 1916.

CORNUCOPIA MINES CO.

OREGON

Owns the Union-Companion mine at Cornucopia, Baker Co., Ore., 25 miles from a railroad. Gold was discovered in this district in 1880, and in 1895 the Union-Companion claims, although but slightly developed, were sold for \$60,000. A 20-stamp mill built in 1896 gave an extraction of only 65%; this, with high transportation charges, made it difficult to operate profitably. In 1913 a cyanide plant was completed and since then extraction has been much higher.

The vein is said to be traceable on surface for 6,800', with strike of N. 20° E.; dip of 45° W., and 2'-5' wide, maximum width 20'. Wall rock is granodiorite and schist. Hanging and footwalls are well marked. Vein material is massive white quartz containing 3 to 5% of pyrite, which contains the gold. There is some silver sulphide present, also appreciable quantities of chalcopyrite, arsenopyrite and blende. Ore ranges in value from \$10 to \$20 per ton.

Development: by incline shafts, with the 500' the lowest level at last accounts, said to show 4 ore-shoots having an average width of 3' and an aggregate length of 1,200'.

Mill: 20 stamps, weight 950-lb. each, making 98 drops per minute through 7". Ore is crushed in a 0.125% KCN solution. Stamp duty is 5.15 tons per stamp. Fine grinding is done in two 5'x22' tube mills, each driven by a 50-h. p. motor. The cyanide plant is equipped with Dorr thickeners, 3 Pachuea tanks, and 2 continuous revolving drum filters. An extraction of 87 to 89% of gold and silver is obtained. Average consumption of supplies per ton of ore is cyanide, 1.4 lbs.; lime, 3 lbs.; zinc dust, 0.9 lb. Power is furnished by the company's hydro-electric plant, 2 miles from the plant. Current is transmitted at 6,600 volts and transformed to 2,200 volts for use. Cost of treatment is said to be \$2 per ton. Production figures not available. Sec. Min. Res. of Oregon, Vol. I, No. 8, pp. 36-49.

CORONA MINING & MILLING CO.

CALIFORNIA

Office: 770 E. 4th St., Salt Lake City, Utah. Officers: J. A. Headlund, pres.; J. S. Ryan, v.p.; J. A. Stanley, sec.; W. G. Romney, treas.; with Thos. W. Bell, J. P. Moss, J. H. Hurd, directors. Thos. W. Bell, supt.; C. E. Merwin, Spokane, Wash., and Mosecow, Utah, fiscal agt.

Inc. 1915 in Ariz. Cap., \$3,000,000; shares \$1 par; issued \$1,600,000, non-assessable. Farmers & Stockgrowers Bank, Salt Lake City, registrar. Annual meeting in June.

Property: the Confidence mine, known also as the Mormon Gold mine, 12 claims, 2 patented, 240' acres, in Funeral Range, Death Valley, Inyo Co., Calif., 12 miles from Shoshone, a station on the Tonopah & Tidewater R. R. The mine was worked in early days by a small syndicate of Mormons.

Ore: free milling gold and a little silver in fissure vein in granite; said

to assay \$20 per ton. Outcrop of vein said to be 1,200' long and from 4' to 70' wide. **Development:** tunnels and several shafts, deepest 140'. Present management claims there are 117,000 tons of \$20 ore in place, which can be mined for less than \$1 per ton. This cost figure is too low.

Company planning to erect a 100-ton stamp mill in 1916.

CORONADO MINE.

Described under North Pinal Mng. Co.

CORONADO MINING CO.

ARIZONA.

ARIZONA

Idle. Clifton, Graham Co., Ariz. **Inc.** July 12, 1902, in Maine. **Cap.** \$1,000,000; shares \$1 par. Is controlled through ownership of a stock interest of about 53%, by the Shannon Copper Co., and the remainder of the stock is held principally by Phelps, Dodge & Co. Officers and management are the same as those of the Shannon Copper Co.

Property: 30 claims, 400 acres, patented, near Metcalf, adjoins the mines of the Detroit Copper Mining Co. and the Coronado mine of the Arizona Copper Co., Ltd. Mine has a 2-compartment shaft, on the Garnet claim, showing a fair body of auriferous and argentiferous chalcopryrite on the 200' level; also several shallow shafts and short tunnels. The Emerald mine shows ore averaging 3% copper.

CORTEZ ASSOCIATED MINES.

MEXICO

Office: 53 State St., Boston, Mass. Mine office: Jacala, Hidalgo, Mex. Joseph S. Fay, pres.; Olof Wenstrom, v. p.; Freeman Hinckley, sec.-treas.; preceding officers, Wm. R. Fay, Robt. A. Manning and Philip W. Wrenn, directors. **Inc.** Jan. 3, 1910, in West Virginia. **Cap.** \$1,500,000; shares \$3 par, nonassessable; issued, \$825,000. Company began business with \$275,000 cash, and Dec. 31, 1915, had on hand \$675,000 cash loans and accounts receivable. Boston Safe Deposit & Trust Co., transfer agent. Stock is listed on the Boston curb. Annual meeting, first Tuesday in March.

The Cortez Associated Mines is primarily a development and holding company, formed to explore and develop mining properties until they are ready to produce, and then to promote an operating company. Lands, 1,079 pertenencias, 2,666 acres, in 4 groups, in the districts of Jacala, Zimapan and Ixmiquilpan, about 20 miles distant. The lands include the entire old mining camp of Jacala.

Zimapan is 85 miles north of Mexico City and Jacala is 35 miles N. E. of Zimapan, this place being 43 miles from Sayula on the National railroad. The Pachuca-Zimapan R. R., under construction, has been completed to Ixmiquilpan.

The Jacala property shows thickly bedded blue limestone intruded by granular monzonite with alteration along the contact and mineralisation of the metamorphosed limestone by copper and silver-lead sulphides. The intrusive mass is $1\frac{1}{4}$ miles long and 700' wide. The contact zone carries numerous orebodies showing chalcopryrite and magnetite below the 300' zone of oxidation.

Careful exploration has shown that most of the ore shoots are low in copper and carry but 1 to 3 oz. in silver. At the Santa Maria ore shoot, the copper ore is found in a narrow chimney of 4 or 5% ore; in the Humboldt and Abeja, there are a few thousand tons of 4% ore. Main development is by the Cortez 1,770' tunnel, which has opened up about 35,000 tons of pyritic ore containing magnetite and chalcopryrite, the average copper contents being 1.72%. Several hundred thousand tons may possibly be developed here, and as the ore contains 50% iron, it will be valuable for a flux.

The Humboldt, Cortez, Abeja and Santa Maria show promise of making producing mines. The Humboldt has a magnetite-garnet outcrop, explored.

by the 1,304' Humboldt tunnel with drifts and a 130' incline winze, mostly in ore. The Santa Maria 394' shaft has developed a body of soft, leached copper-bearing gossan of 6,000 sq. ft. area. This shaft will connect with the Humboldt tunnel.

The Abeja shaft, 50', sunk 1912 through altered limestone to porphyry contact, shows massive, porous magnetite with chalcocite and oxidized copper minerals. This work will connect with the Cortez tunnel. The Gallo mine, east of the Humboldt, has a 350' shaft, connecting with the Humboldt tunnel, 1,055' from the portal.

Small silver-lead replacements in limestone also occur at Jacala, but the Carmen mine is the only one of promise. This is a well-known old producer, 1½ miles north of Jacala, that yielded 40 oz. silver-lead ore for many years. The mine workings are on the contact between limestone and porphyry and have developed a replacement chimney of silver-lead ore in limestone, worked by an incline shaft to a depth of 900'. The company's new work has not yet cut the downward continuation of this ore shoot.

The San Nicolas group includes the Soledad and Ensino Largo mines. The Ensino Largo, 6 miles from Jacala, shows irregular replacements of rich silver-lead ore in crystalline limestone developed by a 900' tunnel. This tunnel will also develop the Soledad mine. Production from the Ensino Largo mine in 1912-13 was 72 tons, valued at \$99 per ton.

Zimapan lies in a broad, arid valley with the 4,000' deep Moctezuma canyon 9 miles west and the 3,000' deep Toliman canyon 6 miles west. The mines lie in the Toliman canyon and on the ridge between it and the Moctezuma river. The ore deposits appear around a large intrusion of monzonite porphyry either as contact deposits carrying copper, or silver-lead deposits in the surrounding limestone, especially along fissures and intrusive dikes. The latter form pipes, or chimneys, either vertical or inclined. The copper properties at this place are practically undeveloped, but a contact deposit showing disseminated copper pyrite, zinc blende and galena, promises to develop a large tonnage.

The Sirena lead-antimony mine lies 9 miles north of Zimapan. Ore occurs as a replacement deposit, in Cretaceous limestone, cut by a porphyry dike, and apparently follows the bedding of the limestone, dipping about 40° S. The ore is massive and consists of pyrrhotite, arsenopyrite, blende and jamesonite, forming an orebody 700' long and 30' thick. Ore reserves: estimated at 1,000,000 tons of lead-antimony ore averaging 8% lead and 4% antimony. Examination of this property has been made by Waldemar Lindgren and W. L. Whitehead. See Economic Geol., Vol. IX, No. 5.

On Jan. 20, 1916, the company voted to sell the Sirena property to the Antimony Corporation, organized by Chas. F. Rand. The Cortez company receives 90,000 shares common stock, of which 50,000 shares are to be donated as treasury stock, to the Antimony Corp., and will be given as bonus to subscribers to preferred stock at the rate of one share of common stock bonus for every two shares preferred stock. See Antimony Corporation.

Property has been closed down since 1913, owing to revolutionary disturbances.

COSSACK MINING CO.

NEW MEXICO

Property: Lone Star Group, formerly owned by Navajo Gold Mining Co., near Bland, Sandoval Co., New Mexico. A. J. Underwood, supt. **Ore:** gold-silver, in veins, running nearly N.-S. and from 12 to 40' wide. Ore averages \$6 per ton in gold and is amenable to cyanide treatment.

Development: about 5,000' of workings, including crosscut tunnels.

Equipment: 100-ton cyanide plant and concentrating mill. Employed 150 men in 1915.

COTTONWOOD KING MINING CO.

UTAH

S. A. Perry, pres.; Geo. B. Bywater, sec. Inc. July 2, 1915. Cap., 1,500,000 shares, 10c par; 225 shares in treasury. In March, 1916, company reports \$900 cash on hand and notes payable \$6,800. Listed on Salt Lake Exchange.

Property: 7 claims and a bond and lease on the Giles property, located between Big Cottonwood and Park City, Utah. Bond calls for \$600,000, with no payments due for 3 years.

Development: 2,100' of tunnels and 187' shaft with 260' of workings. Management, in March, 1916, claims 50 tons ore in sight, average grade \$75 per ton, and to have refused a flattering offer for the bond and lease.

COYLE MINE.

MONTANA

Owned by Peter Coyle. Worked under lease by Courtney Bros., Phillipsburg, Mont. Property in Hasmark district, near Phillipsburg, shows contact deposit between granite and limestone, carrying silver-lead-copper, in veins 2'-6' wide, ore occurring in the limestone. The main vein is essentially a silver-bearing lead carbonate, said to assay 70 oz. silver and 10% lead per ton.

Development: 100' tunnel, winze and drifts. Equipped with 12-h. p. gasoline engine, air compressor and 2 drills. **Ore reserves:** 700 tons of ore in bins, result of 6 months development work.

Production has been steady since 1914, interrupted only because of low silver prices in autumn of 1914. Employs about 15 men.

CREOLE MINING CO.

UTAH

Officers: Norman W. Haire, pres. and managing director, 412 Dooly Block, Salt Lake City, Utah; H. A. Lemke, v. p.; J. M. Reynolds, sec.-treas.; with J. S. Farrington and R. J. Jeff, directors. Inc. Sept. 28, 1915, in Utah. Cap., \$100,000, shares 10c par; outstanding, \$69,820; assessable. Annual meeting 1st Monday in October.

Property: 10 claims, 6 patented, 75 acres, in Lincoln mining district, Beaver Co., Utah, shows gold, silver, copper, lead ore in a contact deposit between granite and limestone. Deposit has an E.-W. course and dips E. 38°. Average assays said to be 12% copper, 5% lead, 17 oz. silver and \$1-\$5 gold per ton. **Development:** 220' incline shaft and 200' tunnel, with total underground workings about 1,500'.

In 1915 one car of ore shipped is said to have netted \$43 per ton. In Jan., 1916, a lease was given on a portion of the property to Geo. H. Dern and C. C. Griggs, and shipments started. To June 1st, 34 carloads of ore reported shipped. Management believes prospects are promising. Eleven men employed.

CRESCENT MINING CO., LTD.

WASHINGTON

Office: Room 202, Donalds Bldg., 322 Donald St., Winnipeg, Manitoba, Can. Mine office: Twisp, Okanogan Co., Wash. D. C. McFee, pres.; W. J. Creighton, v. p.; J. H. Sutherland, sec.-treas.; with F. R. Creighton, C. H. McNaughton, D. D. Young and D. Munroe, directors. Theo. E. Dickel, mgr. Cap., \$3,000,000; unsubscribed stock, \$2,000,000; shares \$1 par; non-assessable. Directorate authorized to sell 750,000 shares of capital stock at 10 cents to furnish necessary funds for development work. Company is a reorganization of the Crescent C. Mng. Co.

Property: 43 claims, about 860 acres, and a mill-site on the east side of Cascade Range, in Okanogan Co., about 100 miles S. W. of the Granby. Ore occurs in fissure veins, carrying chalcopyrite, bornite and quartz. Main development by tunnel.

Equipment: includes a Samson turbine, electric plant, air drill, saw-mill, mine buildings and miners' lodgings. A compressor and hydro-electric plant will be installed. Management reports no debts and plans driving tunnel to 1,500'.

CRESSON CONSOLIDATED GOLD M. & M. CO. COLORADO

Offices: 137 S. La Salle St., Chicago, Ill., and Cripple Creek, Colo. Richard Roelofs, gen. supt. Company is a close corporation and gives out no information. The mine, located on Bull Hill, Cripple Creek, was for a long time regarded as a "lemon." A phenomenal strike was made late in 1914 on the 1,200' level when a vug approximately 14'x33'x36' was found, which is said to have been lined with calaverite and sylvanite and to have yielded \$468,637 from one shipment. During 1915 several rich shipments were made and \$1,200,000 in dividends is said to have been paid in the first half of 1915.

Reported sold in July, 1916, for \$4,200,000; with officers in the new company as follows: A. E. Carlton, pres.; Claude K. Boettcher, v. p.; A. J. Zang, sec.; E. P. Shove, treas.; Richard Roelofs, gen. mgr., with T. B. Burbridge, Chas. M. MacNeill, Spencer Penrose, Irving T. Snyder, Adolph Zang and L. G. Carlton, directors.

CRESTON COLORADO CO. MEXICO

Subsidiary of the Mines Co. of America, which see.

CRIMORA MANGANESE CORPORATION. VIRGINIA

Office: 15 Broad St., New York; and Crimora, Augusta Co., Va. **Directors:** John D. Brooks, pres.; Homer F. Merriman, v. p., and John H. Hulbutt, sec.-treas. Wm. L. Hogg, mgr., Crimora. Inc. Sept. 29, 1914, in Va. Cap., \$1,000,000; shares \$100 par; all outstanding. Transfer office: Security Transfer & Registrar Co., New York. Annual meeting, last Monday in Sept. Bonds: authorized and issued \$500,000 1st mtge. 6% sinking fund gold bonds, due 1929.

Property: 946 acres, including the Crimora mine, 2 miles east of Crimora station, on the Norfolk & Western R. R. The mine was first opened in 1867 and acquired by present company in 1914. Deposit consists of manganese-ore masses of various sizes scattered through a clay basin, ½ mile long, several hundred yards wide and 200' deep. The ore is hard and consists of psilomelane and pyrolusite. Percentage of ore to clay varies considerably, from 1 ton ore to 5 or even 20 tons of clay. Ore assays 38 to 52% manganese. See U. S. G. S. Bull., No. 427, pp. 58-61, pp. 101, 270.

Development: by open pits using a drag line excavator; formerly done by underground workings. Management claims 1,000,000 tons ore proven, with probable reserves of 3,000,000 tons.

Equipment: electric power, and a 200-ton mill, which started operating in June, 1916. Management anticipates a yearly production of 50,000 to 60,000 tons ore, 38 to 52% manganese.

CRIPPLE CREEK DEEP LEASING CO. COLORADO

Cripple Creek, Colo. Inc. in 1915. Company is a close corporation, 50% of the stock being held by the Milltown Extension Gold Mining Co., a Nevada corporation, and the remainder by those controlling the Jerry Johnson mine. The Deep Leasing Co. has a lease on the workings of the Jerry Johnson mine below the 650' level. The property is described under title of Jerry Johnson Gold Mining Co. Most of the work has been done on the 850' level. Shipments started in Oct., 1915, and have been at the rate of about 4 cars of \$24 to \$30 ore per month.

CRIPPLE CREEK DRAINAGE & TUNNEL CO. COLORADO

Colorado Springs, Colo. Jas. F. Burns, pres.; with J. T. Milliken, I. T. Snyder, R. Roelofs, Irving Howbert, executive committee. Company has

driven and operates a transportation and drainage tunnel through the ground of the Cripple Creek producers, from western slope of Grouse Mtn. toward the Golden Cycle and Vindicator mines at the N. E. end.

The tunnel as originally driven had a length of over 14,000'. In sections it is 10' wide, 7' high, with a ditch on one side 3' deep and 6' wide. Grade is 0.3%. Average cost per foot of tunnel was \$27.27, the cost being defrayed by the larger companies of the district. An extension financed in the same manner has been started. The only large mines not directly benefited by the tunnel are the Vindicator and Golden Cycle, but the extension, a little over 10,000' long, will extend to these mines. In Feb., 1916, the tunnel was discharging 15,000 gallons water per minute.

CRIPPLE CREEK GENERAL MINING & EXPLORATION CO.

COLORADO

Cripple Creek, Colo. **Officers:** Geo. S. Ryan, pres.; S. N. Francis, v. p.; with H. T. Hartman, E. A. Ritter and O. H. Nelson, directors. **M. M. Belshe**, sec.-treas. **Inc.** in Colorado. **Cap.**, \$200,000; shares 10 cts. par. **Treasury** 1,250,000 shares.

Property: 5 claims, 25 acres, patented, on Bull, Raven and Ironclad hills at Cripple Creek, had been idle for some time previous to recent acquisition by present company. Developed by a 300' shaft, 3 shallow shafts and a tunnel, all on the Katie Hollis claim. Present management claims that prospecting work will be done in 1916.

The stock is being handled by Harry J. Newton, of "Dollars and Cents" fame, who is referred to in the Financial World as a promoter of fake mining propositions.

CRIPPLE CREEK GOLD MINING CO.

COLORADO

Victor, Tellur Co., Colo. Company is a close corporation. **Geo. Harris**, mgr.; **B. J. Corbett**, supt. **Property:** the Kohyneo mine at Victor, first worked about 14 years ago, operated unsuccessfully for a time, closed down and again reopened in 1914.

Ore: shows gold-quartz ore in veins 18" to 2' wide, in contact between black schist dike and granitic country rock.

Development: 220' shaft and drifts on the Strong vein, which traverses the property. Shaft is being sunk an additional 300'. Two levels are said to show large bodies of fair grade ore; a few shipments in 1915 said to have assayed \$15 per ton.

Equipment: hoist, air compressor and 80-h. p. boiler.

CROESUS GOLD & COPPER MINING CO.

IDAHO

Company apparently dead. See Croesus mine.

CROESUS MINE.

IDAHO

Reported sold, Dec. 1, 1915, to F. C. Robertson, Spokane, Wash. Formerly belonged to Croesus G. & C. Mng. Co. Mine, 4 miles west of Hailey, Blaine county, has an 800' three-compartment vertical shaft, on a 20 to 60' fissure vein of nearly vertical dip, in granite; pay streaks on both walls said to carry chalcopryite, with values mainly in gold. There also is a nearly vertical blind vein, apparently joining the main vein at depth, carrying silver-lead ore at depth of 600'.

Equipment: includes steam and electric power, and a 12-drill electric air compressor. The 100-ton concentrator has 10 stamps, crusher, rolls, and Huntington mills. Shipped some lead ore, 1915.

CROESUS MINING CO.

CALIFORNIA

Office: 747 Fifth Ave., New York. **Walter B. Pearson**, supt.; **Chas. W. Smith**, mill supt. **Property:** the old Plumbago and Oriental mines at Allegheny, Sierra Co., Calif.

Ore: gold-quartz in veins in granite and amphibolite schist. Veins

strike N. W.; dip N. to N. E. Ore usually occurs as small masses of high-grade in nearly barren quartz. See U. S. G. S. Bull. 580, pp. 176, 178. **Development:** by tunnels, the longest over 4,000'. **Equipment:** 15-stamp mill at Plumbago mine, put into commission July 5, 1915. A 10-stamp mill started operating for the Oriental mine in Dec., 1915. Employs about 35 men.

CROFF MINING CO.**UTAH**

R. R. Tanner, pres., Beaver, Utah; G. P. Norton, sec. **Cap.**, 1,000,000 shares; \$1 par; 295,000 shares and \$7,354 in treasury Jan., 1916. Listed in Salt Lake City.

Property: 5 claims patented, in Lincoln mining district, 12 miles east of Milford, Beaver Co., Utah. Ore is found along the contact of lime shale hanging-wall and limestone foot-wall and varies in width from 6" to 3'. It is said to carry silver, lead, copper and gold.

Development: 5 shafts, combined depth 750', and 665' of tunnels and drifts. Company is now sinking a 60° incline shaft on the contact. This shaft was down 80' March 1st, 1916, and a carload of ore taken from there is said to have yielded \$25 per ton in silver and lead.

Equipment: includes a gasoline hoist and air compressor. Management plans on a level at 100' depth. The property was examined by Breitung & Co., Ltd., in 1915.

CROWN CITY GOLD MINES CO.**ARIZONA**

Address: John C. Dalton, 6 Union Savings Bank Bldg., Pasadena, Calif. **Cap.**, \$1,000,000; shares \$1 par; 633,000 shares issued. **Property:** 9 lode mining claims and the Independent millsite, 185 acres, in the Tom Reed-Gold Road mining district, near Oatman, Mohave Co., Ariz. Company also owns the Pasadena Springs with 3½-mile pipe-line, furnishing water for the district.

Development: 3 shafts, deepest 360', and 500' of drifting. **Equipment:** 15-h. p. gasoline hoist, 50-h. p. steam-driven hoist and surface buildings.

CROWN POINT GOLD & SILVER MINING CO.**NEVADA**

Company merged in 1914 with Yellow Jacket and Belcher Silver Mng. Co., into Jacket-Crown Point-Belcher Mines Co., and described under that title.

CROWN POINT LEASING CO.**IDAHO**

Inc. April, 1915, in Idaho. **Cap.**, \$25,000; shares 50c par; 24,999 shares retained in treasury. Arthur Cooper, F. L. Rowley and C. R. Teel, of Kellogg, Idaho, incorporators. Company has a long-time lease on the Crown Point mine in Government gulch, near Kellogg, Shoshone Co., Idaho.

Ore: occurs in veins and is said to run 40 oz. silver and 48% lead. This vein is opened by tunnels and shaft. **Production:** 2 cars monthly in 1914. Mine is an old-time producer. Employs about 7 men. Company plans further development and erection of mill.

CROWN POINT MINING CO.**UTAH**

Knight Investment Co., Provo, Utah. John Roundy, pres. and gen. mgr., Knightsville, Juab Co., Utah. **Inc.** 1907 in Utah. **Cap.**, \$100,000; shares 10c par, assessable. Listed in Salt Lake City. An assessment of ½c a share levied March, 1915, to raise \$4,000 with which to resume work. **Ore:** silver-lead. Development by 500' shaft.

CROWN PRINCE CONSOLIDATED MINING CO.**COLORADO**

Office: 954 Gas & Electric Bldg., Denver, Colo. Mine office: Empire, Clear Creek Co., Colo. **Officers:** M. H. Block, pres.; J. E. Rinehart, v. p.; Thos. Williams, sec.; Wm. G. Krape, mgr. and treas.; with Daniel Erickson, directors. **Inc.** June 9, 1910, in Arizona. **Cap.**, \$3,500,000; shares \$1 par; outstanding, \$3,433,014.

Property: the Mint mine, 17 claims, 85 acres, near Empire. Gold-silver ore occurs in veins and is claimed to average from \$6 to \$12 per ton. **Development:** by 75' shaft and tunnels, longest 1,025', with total underground workings of 7,000'. Equipment includes electric hoist.

Production claimed to have been \$200,000 in the past. Operations in 1915 consisted of 400' of drifting.

CROWN RESERVE MINING CO., LTD.

ONTARIO

Offices: Dominion Express Bldg., Montreal, Que.; 59 Victoria St., Toronto, Ont., and Cobalt, Ont. **Officers:** John W. Carson, pres.; W. J. Gear, 1st v. p.; J. G. Ross, 2nd v. p.; Jas. Cooper, sec.-treas.; preceding officers, C. A. Smart, J. W. Ross, A. G. Gardner, R. W. Reford, F. S. Meigh-ton, Ziba Gallagher, directors; John Reid, asst. sec.-treas.; S. W. Cohen, gen. mgr.

Inc. Jan. 16, 1907, in Canada. **Cap.**, \$2,000,000; \$1 par; outstanding, Jan. 1, 1916, \$1,999,957, of which \$231,143 is held by trustees for the benefit of the company and bears no dividends. Crown Trust Co., Montreal and Toronto, transfer office and registrar. Annual meeting, fourth Wednesday in Jan. Listed on Montreal Stock Exchange. Dealt in on unlisted department of Toronto Stock Exchange and on New York and Boston charts.

Dividends: 20% in 1908; 71% in 1909; 60% in 1910-12; 48% in 1913; 24% in 1914; 8% in 1915; total dividends to Jan. 1, 1916, \$6,102,408.

Balance sheet for 1915 shows assets of \$2,839,957, which includes mining lands, plant and equipment, \$2,033,664; supplies, \$6,617; ore in transit and on hand, \$155,571; cash, \$61,216; investments in other companies and properties, \$522,799; accounts receivable, \$60,086. Liabilities show: accounts payable, \$28,287; royalty accrued and accruing government, \$17,774; surplus, \$793,938. The property accounts, which stand at \$2,033,664, have not been written down. It appears that, according to the last balance sheet, the company had net quick assets of something like \$760,258 applicable to the stock, or about 40c per share.

Income Account Essentials—Years Ended Dec. 31

	Ore Sales	Oper. Exp.	Net Earnings	Other Income	Total Income	Div.	Year's Surplus	Total Surplus
1915.....	\$ 339,425	\$328,189	\$ 11,236	\$172,878	\$ 191,814	\$ 106,128	\$ 22,227	\$708,938
1914.....	740,093	538,314	201,779	147,832	351,611	424,615	†72,904	771,712
1913.....	1,056,272	555,206	500,976	*518,213	819,189	795,066	23,223	84,461
1912.....	1,092,061	583,815	1,108,746	9,084	1,117,830	1,061,288	56,541	821,893
1911.....	1,833,517	677,681	1,155,836	10,318	1,166,154	1,061,288	104,865	764,852
1910.....	1,757,824	592,082	1,165,742	6,258	1,172,000	1,061,288	110,712	659,986

* Includes \$144,000 (1918, \$308,877) profit on Porcupine Crown, Ltd., investment.
† Deficit.

The Crown Reserve Co. owns 60% of the stock of the Porcupine-Crown Mines, Ltd., from which it received \$144,000 in dividends in 1915. It owns jointly with Kerr Lake Mining Co., Ltd., the Drummond Fraction property from which it received a profit of \$10,251 in 1915. It also operates the Silver Leaf mine of the Silver Leaf Mining Co., Ltd., from which it received 65%, \$16,140 net, of the operating profits.

The company has paid total royalty to the government of \$880,315; this was at a 10% rate. Beginning Jan. 1, 1916, only the regular tax of 3% will be levied.

Property: original holdings at Cobalt consist of 23 acres in Kerr Lake, developed by the Crown Reserve mine, which has been one of the heaviest producers in Cobalt, but the end of this property is in sight. The company co-operated with the Kerr Lake Mining Co. in the draining of Kerr Lake, but results were disappointing to Crown Reserve in that no new valuable veins were found. The pumping out of the lake made it possible to obtain ore containing over 2½ million oz. silver, which otherwise could not have been extracted, and the small veins discovered, not in themselves of great importance, are sufficient to pay for the whole cost of the operation. Total

amount of mud and water removed to Jan. 1, 1916, was about 700 million gallons. Development during 1915 amounted to 3,387' with total underground workings to Jan. 1, 1916, of 29,586'.

Production—Years Ended Dec. 31

	Ore Prod.		Silver Prod.		Results Per Ounce		
	Tons	Gross Oz.	Gross Value	Net Value	Gross Cents	Cost Cents	Profit Cents
1915	94.10	657,395	\$ 344,596	\$ 339,425	52.40	45.01	7.39
1914	307.70	1,425,320	740,093	722,873	51.92	28.95	22.97
1913	312.60	1,766,678	1,056,271	1,040,117	59.45	23.02	36.43
1912	512.00	2,714,766	1,692,060	1,638,191	62.32	14.02	48.30
1911	1048.59	3,430,902	1,833,516	1,751,300	53.46	10.67	42.79
1910	2753.00	3,248,196	1,757,824	1,633,716	54.10	11.97	42.13
1909	3093.00	4,034,325	2,080,156	1,895,484	51.56	10.31	41.25
1908	650.78	1,798,954	910,350	854,788	50.64	7.50	43.13

Totals 8,771.77 19,086,536 \$10,414,869 \$9,875,898 54.56 14.96 39.60

Development during 1916 should prove whether or not the conditions on the lower levels under the diabase sill will be of sufficient importance to give the mine a new lease of life. The mine should continue to show a small profit for some time to come; this, in addition to the assets on hand at the time of dissolution, would seem to warrant somewhat better prices for its stock than those now prevailing of between 50c and 60c per share. The future of the Crown Reserve Mining Co. beyond the life of the two mines it now controls, depends upon its ability to acquire new properties. It was in following this policy that in 1915 it exercised an option on the property of the Globe Cons. Mining Co. in Trinity Co., Cal. (see Globe Cons. Lease, Inc.). Under the agreement Crown Reserve will spend \$50,000 at the rate of \$4,000 a month; this to be returned out of the gross ore receipts, 60% going to Crown Reserve until the amount is paid. After this is paid the profits will go to liquidate debts of \$140,000 on a mortgage and \$112,000 in notes. For this expenditure Crown Reserve gets a 55% interest in the company on a 30-year lease.

CRUCIBLE STEEL CO. OF AMERICA (Tungsten) COLORADO

Office: 2 Rector St., New York. **Address:** A. V. Echternacht, editor Nederland Tungsten Light, Nederland, Colo., a lessee. Is an iron and steel manufacturer, but owns tungsten mines near Nederland, Colo., operated by lessees, D. Waren, J. J. Allen, B. Dawson and A. V. Echternacht.

CRYSTAL COPPER CO. MONTANA

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Basin, Mont. **Officers:** W. W. Clarke, pres.; Bowdoin S. Parker, v. p.; Eugene H. Walker, sec.; Walter Harvey Weed, treas.-managing director, with Geo. W. Clement, Louis H. Goddu, Paul A. Gow, John A. Cardow and John E. Allen, directors.

Inc. 1916, in Maine. **Cap.**, \$1,000,000; shares \$1 par; 610,000 shares outstanding, May 31, 1916. Stock listed on New York and Boston curbs. Federal Trust Co., Boston, Security Transfer & Registrar Co., New York, transfer agents; Old South Trust Co., Boston and Security Transfer & Registrar Co., New York, registrars. Annual meeting, April 1.

Property: 5 claims, 4 patented, 84.59 acres, in Cataract district, Jefferson Co., Mont., 8 miles N. of Basin, on the Great Northern R. R., located about 25 years ago. It lies within the quartz monzonite area extending northward from Butte to Helena, which is called the Boulder batholith. This is cut by fissure veins, showing chalcopyrite, bornite, pyrite and sphalerite, with galena and occasional arsenopyrite.

The Crystal vein is a typical compound fissure vein 30'-40' thick between granite walls; it extends for about 4,650' through the property, and where exposed for 900' in the mine workings contains orebands that yield 3-6% copper, \$8-\$9 gold and \$6-\$13 silver per ton. The nature of the vein appears to indicate persistence of its present character in depth and along its course. Developed by 900' drift tunnel and a new crosscut tunnel, in 400', is being driven 850' to cut the lead, 200' below the upper tunnel level.

For geology, see Eva May and Bullion mines, Bull. 527, U. S. Geol. Survey, pp. 122 and 124, 1913. Both tunnels are being advanced, shipments to the Anaconda smelter have been started and in the near future a compressor will be added to the equipment.

In the block of ground extending from the tunnel upwards for 50 to 100' there is a considerable tonnage of ore available for milling; this, however, does not show the real value of the property which rests in deeper development and extension of tunnel west to prove vein below the other claims whose surfaces show ore. In view of the size and persistence of the vein, its proven commercially valuable mineralization and the nature and continuance of values along the outcrop beyond the Crystal claim, the property fully warrants the proposed expenditure of \$100,000 for equipment and development. Considered an attractive mining proposition.

CUBA COPPER CO.

CUBA

Office: 2401-60 Wall St., New York. **Mine office:** El Cobre, Santiago de Cuba. Benj. B. Lawrence, pres.; Colgate Hoyt, v. p.; I. W. Hunter, sec.; W. T. C. Carpenter, treas.; Edw. H. Emerson, gen. mgr.; Edw. B. Nagle, supt. **Inc.** Jan. 5, 1907, in West Virginia, as successor of El Cobre Mines. **Cap.**, \$2,000,000, shares \$100 par, in \$1,500,000 non-cumulative 6% preferred and \$500,000 common stock. Annual meeting, first Tuesday in March. Property being operated, in 1916, by the Cuba Leasing Co., a temporary organization arranged for financial purposes with same management as the Cuba Copper Co. Offices with Beer Sondheimer Co., 61 Broadway, New York.

This was the first copper mine in the new world worked by white men; opened A. D. 1532 by the Spanish, the first copper from El Cobre mines having been used for casting Spanish cannon. Properties were taken over, about 1832, by a Hispano-English company, and ore was shipped to Swansea for reduction. The custom-house records of Santiago are said to show exports of 610,210 tons of ore, 1851-69, valued at \$50,186,225, probably in depreciated Spanish currency, the ore assaying from 12.69% upwards, and probably averaging about 16% in copper tenor. In 1844 El Cobre railway was built, the Queen of Spain being the principal shareholder. The property shows the remains of an old stamp mill. During the revolt of 1868-1878, the big Cornish pump was burned, flooding the mines, which remained idle until taken over, 1902, by the predecessor of this company. Immediately after the Spanish-American war, the property was denounced by F. D. Pagliuchi and financed by Wm. Astor Chandler and associates, who had much trouble handling the great amount of water and in opening up the orebodies.

The mine was finally unwatered in April, 1916, and the bottom level 1120' deep found to show unoxidized chalcopyrite ore, averaging 8% copper in substantial widths, besides a large amount of low-grade ore amenable to flotation treatment.

Lands: 8 miles west of Santiago bay, show a mineralized zone of 200' width, traceable 6,500', carrying 3 parallel veins with much altered intervening rock. The mine is in a hill of rhyolite tuff agglomerate, of variable texture and appearance; the nearby hills are limestone and diorite occurs

to the south. The veins are confined to the rhyolite, only 2 are worked, the main or principal one being also called the South or "Middle" vein. The veins run E. to a fault which throws them 350' to the north. Ore occurs in pockets and shoots up to 80' across, in a vein of breccia, lying against a fault plane or mud slip. The gangue is altered rock and quartz. The ore contains much anhydrite and gypsum at 640' depth and below. Ore carries chalcopryrite, associated with pyrite, in a quartz gangue, the grains of chalcopryrite frequently being coated with covellite. Ore occurs in lenticular shoots. The oxidized zone is of 50 to 75' depth only, succeeded by sulphide ores averaging 4 to 5% in copper tenor, without either gold or silver in important quantities.

In the mine workings the oxidized ore extends deeper, and is underlain by semi-oxidized or tarnished ore, which gave much trouble in flotation work. The deeper ore is fresh chalcopryrite with pyrite.

Development: old workings were extensive, including some 40 shafts, with numerous remains of hoists and boilers. The 4 deepest shafts were about 1,000' each, with 17 miles of workings, timbered mainly with mahogany. The mine was found in bad shape, requiring heavy retimbering, as many of the old stopes, up to 20' and 30' in width, had caved. During the rainy season the mine makes 500 to 1,200 gals. per minute of strongly acid water, requiring pumps of bronze, with lead or wood-lined pipes. The mine has pumps with a combined capacity of 5,000 gals. per minute. Water from the mine was formerly run over scrap iron, producing considerable cement copper, but this has been discontinued, owing to cost and because the mine water formerly carrying 400 grams copper per ton now carries only 50.

As a result of recent operations it seems certain that the mine was shut down 80 years ago, because of its great amount of water, as well as political disturbances.

The present company has sunk a 1,000' shaft at the footwall of the north vein and crosscut 400' S. to the vein. From this level winzes extend down to 1,300' in depth. Exploration consists in drifting along the vein with crosscuts at intervals to the hanging-wall.

El Cobre railroad, 9 miles long, connects the mine with Punta Sal, on Santiago harbor, and is equipped with 2 locomotives and 40 cars.

The reduction plant at Cobre includes a 600-ton concentrator with 4 largest size Hardinge mills for grinding the ore for the 700-ton flotation plant. Forces are about 450 men. Concentrates of about 16% copper tenor are shipped for smelting to the United States.

In this plant, "the ore is crushed dry by rolls, screened through 8-mesh and conveyed to the storage-bin. Four Hardinge and two ordinary tube-mills are fed from the storage-bin by individual Challenge feeders to insure equal distribution and regular feed, as the ratio of oil to ore is most important. Cresylic acid, carbolic acid, Mexican crude, and light asphalt oil are fed into the tube-mills by special machines. Grinding is done on a thick pulp, 25 to 30% moisture, until 65% will pass 60-mesh. The pulp goes to the M. S. box without classification or re-grinding. Fourteen stirrers with 13 spitz-boxes are used. Direct concentrate is taken from as many boxes as show a good concentrate, the poorer froth being returned to the first box. Number of boxes treated varies with this and is changed by the operator who judges by eye. All the coarse tailing is roughed over Wilfleys to recover the coarse pyrite carrying copper. Caustic soda and fuel-oil are added as needed in the stirring-boxes. The various concentrates go to the classifier, the coarser product passing direct to the bins with about 8% moisture. The overflow is thickened and drained by an

Oliver filter, giving about 20% moisture. The plant handles 600 tons per day and gives about 85% extraction of the insoluble copper in a 3% feed. It is interesting to note that with El Cobre ores using a cold neutral solution wood-products have not given any satisfaction. The concentrate carries 16% copper, 35% iron, 40% sulphur, and 9% silica." (Mng. Sci. Press, Jan. 22, 1916.)

Company is now milling about 600 tons of 3% ore daily besides shipping from 2,000 to 3,000 tons of 7% ore monthly. Property produces about 5,000,000 lbs. of copper annually and now after many years of difficulty, is attaining good results. (See "Mining in Oriente Province, Cuba," by Jos. T. Singewald and B. L. Miller, Eng. & Mng. Jour., April 1, 1916.)

CUBANA CONSOLIDATED COPPER CO. MEXICO

Idle. Mine near Arizpe, Sonora, Mex. Inc. Jan. 6, 1903, in Arizona. Cap., \$500,000; shares \$1 par. Lands: 244 hectares, bought for \$20,000, show 6 orebodies, of 4 to 20' width, of which 3, carry estimated values of 12% copper, 10 oz. silver and \$2 gold per ton. Development: 6 shafts, deepest 102', and a number of tunnels, longest 250' and 575', with a total of 1,415' of underground openings. Mine is about 30 miles from Cananea. Sample carload smelter shipments returned 23% copper, with fair gold and silver values. Property considered promising.

CULLOWHEE MINING & REDUCTION CO. NORTH CAROLINA

Idle. Cullowhee, Jackson Co., N. C. S. B. Ezell, pres.; D. D. Davies, v. p.; Thos. A. Cox, sec. and managing director; Chas. Davies, smelter supt. at last accounts. Inc. 1905, as successor of Cullowhee Copper Co.

Property: 1,300 acres, 12 miles from Sylvia, nearest rail point, shows a considerable body of sulphide ore, claimed to average about 5% copper and \$4 gold per ton, with occasional assays of 15% copper, which figures are probably correct for small lots of ore, but cannot be realized from a large tonnage. Equipment: includes hoists and a Sullivan air compressor, with steam and water power, latter with a plant 3 miles from works. The 30-ton smelter, near Sylvia, blown in Jan., 1909, with semi-pyritic smelting, suspended operations late 1910, and probably will remain idle until rail connections are secured.

CUMBRE MINING CO. COLORADO

Offices: 614 Ideal Bldg., Denver and Breckenridge, Summit Co., Colo. Officers: C. L. Colburn, pres.; F. W. Freeman, v. p.; P. E. Fields, sec.-treas.; with Carl A. Allen and Mrs. B. Maxwell, directors. Inc. in Colo. Cap., \$200,000, shares \$1 par; 100,000 shares outstanding. Annual meeting in Sept.

Property: 25 patented claims, 250 acres, at Breckenridge. Ore: gold, silver, lead and zinc in fissure veins in porphyry and slate, with E.-W. strike and dip of 56°. Orebodies occur as shoots with a maximum width of 4'. The company holds under lease and bond a large acreage on Nigger Hill, including the Juniata and Country Boy mines, the latter being a past producer of high-grade zinc sulphides. Some high-grade zinc ore is being shipped at present, also 3 or 4 cars weekly of low-grade zinc ore. Holdings also include leases on the Carpenter and 86 placers.

Development: by 400' incline shaft, and 1,075' of tunnels: In 1915 company sank the shaft to the 5th level and explored the vein, shipping some lead ore. Zinc ore was shipped from the Country Boy tunnel.

CUNNINGHAM PASS COPPER MINING CO. ARIZONA

Wenden, Yuma Co., Ariz. Without merit, even as a development proposition. See Vol. XI, Copper Handbook.

CUPRIC MINES CO.

UTAH

Office: 17 Battery Place, New York. Operating office: 206 Templeton

Bldg., Salt Lake City, Utah. F. A. Bishop, sec.; M. C. Morris, mgr. Inc. May 11, 1908, in New York. Cap., \$1,000,000, shares \$1 par, assessable; issued, \$500,000. Is affiliated in finances and is managed by the Horn Silver Mining Co.

Owens the Cupric, or Iron Devil mine, 16 claims, unpatented, in the Frisco district, Beaver county, adjoining the Peacock mine. Property is at the east end of White mountain and 2 miles S. E. of Newhouse. The mine is near the igneous contact, dikes and tongues of monzonite invading the limestone; there are numerous mineralized fissures carrying chalcopyrite, pyrite, specular hematite and magnetite with garnet, tremolite, muscovite, etc.

Development: by 2 old incline shafts and a new 425' two-compartment vertical shaft, sunk near the main tunnel of the Cactus mine. Equipped with gasoline hoist and 7 men employed. Property has good ore, but not in large enough quantity to make mine profitable.

CUPRITE COPPER CO.

ARIZONA

Inactive. Mine near Clifton, Graham Co., Ariz. N. W. Lord, pres.; Isaac N. Stevens, v. p.-pres.; L. B. Kauffman, sec.; Geo. B. Kauffman, treas.; Frank A. Ray, engr.; preceding officers and Frank B. Laine, directors. Inc. March, 1904, in Arizona. Cap., \$1,000,000, shares \$1 par.

Lands: 26 claims, 490 acres, in the Copper Mountain district, opened by shafts of 30' and 320' and tunnels of 150' and 260', showing orebodies of 5 to 100' width. Work has been done in the leached zone, which carries isolated pockets of rich ore, from which sundry small shipments have given returns of 15 to 30% copper, and up to \$5 gold per ton. Company also owns about 2,000 linear feet of strong hematitic outcrops, ranging 5 to 100' in width. It is likely that the copper veins, which are parallel with and similar to the Big Coronado vein of the Arizona Copper Co., are leached to very considerable depths, but prospects for developing large bodies of low and medium-grade sulphides at depth seem good. Property considered promising, but company inactive, awaiting developments on adjacent properties.

CUPRITE COPPER CO.

NEVADA

Property: 900 acres, 13 miles S. of Goldfield, and 2 miles from the L. V. & T. R. R., near Cuprite, Nev. Main vein in limestone is said to be 300' wide and to carry ore containing chalcopyrite, black oxide, cuprite, bornite, azurite, malachite and copper glance in small bunches.

Development: 150' shaft. Small shipments of picked ore made to smelters, show 17-48% copper and 40-60 oz. silver per ton, besides small values in gold. Was under option to W. A. Clark, 1915, but has been relinquished because sufficient ore was not found. The Rea mine is now under option to W. A. Clark.

CUPRITE COPPER MINING CO.

MONTANA

Mine near Marysville, Lewis and Clark Co., Mont. P. L. Reece, pres. and mgr., Helena, Mont.; J. B. Waltz, v. p.; F. J. Rixon, sec.-treas.; preceding officers, P. B. Moss, Geo. M. Siple, directors.

Property: 6 claims, about midway between Helena and Marysville, show copper and lead ores, carrying gold and silver values. **Development:** by 200' shaft, 100' of drifting on this level, and a winze 100' deep, with 140' of drifting on the 300' level. **Equipment:** includes a steam hoist and air compressor.

CURLEW MINE

MONTANA

Address: care A. M. Holter, owner, Helena, Mont. Mine office: Victor, Ravalli Co., Mont. Mine, formerly a silver producer, also shows zinc ores, and a vein claimed to be 12' wide, is said to show ore carrying 10% copper,

with some lead, silver and gold ores. A concentrating mill with flotation unit to treat 85,000 tons of tailings under construction in 1915; financed by Los Angeles capitalists.

CURTZ CONSOLIDATED MINES CO.

CALIFORNIA

Last address: 233 Bacon Bldg., Oakland, Cal. **Mine office:** Markleeville, Alpine Co., Cal. **J. G. Hanschildt**, pres.; **B. A. Snedker**, v. p.; **H. H. Jamison**, sec.; **Peter Curtz**, gen. mgr.; preceding officers and **H. F. Sack**, directors. **Inc.** April, 1906, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; issued, 915,000.

Property: the Curtz and Morning Star mines with 20 claims, 320 acres, including a 20-acre mill site, in the Mogul, or Loope district, 10 miles east of Markleeville and 28 miles from the Virginia & Truckee railroad. Claims, cover disseminated or "porphyry" copper deposits in porphyry with rhyolite and andesite near by. The ore zone is 40 to 60' wide, runs N. E., dips at 45° and is traceable 3,600'. Two orebodies under development extend to deepest workings, 350'. A large amount of ore blocked out is said to average 3% copper, 20 oz. silver and \$2 to \$20 gold per ton. **Development:** 300' shaft and 4 tunnels, with about 7,520' of workings, estimated to block out 2,000,000 tons of concentrating ore.

Equipment: includes 30-h. p. steam hoist, 100-ton 20-stamp mill, operated by 220-h. p. water power and several mine buildings.

CUSI CONSOLIDATED MINING CO.

MEXICO

Office: 1417 First Natl. Bldg., Chicago, Ill. **Officers:** **Donald B. Gillies**, pres.; **H. C. Ferris**, v. p.; **Fred E. Stevenson**, sec.; **Jas. G. McNary**, treas., with **Chas. Newman**, of El Paso, Tex., directors.

Property: Promontorio mine, at Cusiuhuiriacic, 90 miles S. W. of Chihuahua, Mex. Shows silver-lead ore in veins, developed by shaft and crosscuts. **Equipment:** includes steam hoist, compressor, etc. **Production:** about 300 tons of better than 60 oz. silver per ton ore daily, when working to capacity. Shipments made to the smelter at Chihuahua. Employs 500 men when operating at normal capacity. Idle at present due to Mexican revolution. **C. R. Watson**, the company's manager, was shot in the Villa massacre, Jan., 1916. Property controlled by the Potter Palmer estate, Chicago.

CUSTER CONSOLIDATED MINING CO.

IDAHO

Wallace, Shoshone Co., Idaho. Inc. July, 1910, in Nevada. **Cap.**, \$1,000,000. shares \$1 par. Property, near the Tamarack & Chesapeake mine, was acquired by stock control by the Day Bros. Property a good one.

CUSTER PEAK MILLING & ORE CO.

SOUTH DAKOTA

Office: Roubaix, S. D. **Burt Rogers**, sec., **Black Hills Trust & Sav. Bank Bldg.**, Deadwood, S. D. **D. Grupe**, pres.; **John O'Brien**, v. p., with **John Plunkett**, directors. **Cap.**, \$1,500,000; shares \$1 par; assessable; 100,-400 shares outstanding. Owns the Jungle mine at the southeast base of Custer peak, showing a porphyry dike cutting schist with 5' of copper ore on both walls.

Development: includes 65', 90' and 250' shafts, showing an 8" streak of nearly solid malachite on the 60' level. The older holdings of the company, 1½ miles from the Jungle mine and S. W. of Deadwood, are said to carry average values of \$6 per ton in oxidized ore to depth of 100', changing below to pyrite and chalcopryrite, showing on the 200' level, a vein of 85' width, assaying about 1% copper with \$1.60 in gold. **Equipment:** includes hoist, air compressor, pump and steam power. Proceeds of 2c assessment called Oct., 1914, were used for development work, erection of leaching plant and installation of machinery.

CUSTER SLIDE MINING & DEV. CO.

IDAHO

Officers: R. L. Holland, pres.; J. L. Nichols, sec.; Wm. H. Fitts, gen. mgr.; all of Colorado Springs, Colo. **Property:** 530 acres in Yankee Fork district, Custer Co., Idaho, including the Montana, Lucky Boy, and Sunbeam groups, also Lucky Boy and Sunbeam mills and the power plant and dam of the Sunbeam Cons. Mines Co. The Montana mine was operated during 1915 and some rich gold ore is said to have been found. Mine is an old producer, and is being operated under bond and lease by the present management. An aerial tram connects the mine with the Sunbeam mill.

CUYAHOGA MINING CO.

SOUTH DAKOTA

Care of Chas. Smith, mg. engr., Keystone, S. D. **Property:** the Old Spokane silver-lead mine, involved in litigation for some time, is to be unwatered and equipped in 1916.

CYGNI MINING CO.

MISSOURI

A. J. Burnham, mgr., Webb City, Mo. Operates a lead-zinc property near Webb City.

CYMRU COPPER CO.

ALASKA

Idle. Office: 117½ South Tenth St., Tacoma, Wash. Mine near Baldwin, Prince of Wales island, Alaska. J. M. Miller, Jr., pres.; F. P. Hicks, v. p.; Frank D. Nash, sec.-treas. Inc. 1905, in Washington. **Cap.**, \$50,000; shares \$1 par.

Property: 6 claims, 100 acres, on Moira sound, shows 3 lenticular orebodies, reported by company as of 40' aggregate width, assaying 6 to 10% copper, 4 to 6 oz. silver and \$2 gold per ton, mainly from chalcopryrite ores. Mine has a 100' shaft and a 187' tunnel, with hoist and 6-drill air compressor. A 4,000' surface tram conveys ore to a 1,000-ton ore bin.

Shipments in 1906 were 3,000 tons of copper ore, returning 4½% copper and \$1.25 in gold and silver. Idle since 1907, owing to litigation among the stockholders; reported under bond to a stock company organized by Geo. V. Bland, of Ketchikan, Alaska, in 1914.

DAILY COPPER MINING & SMELTING CO.

MONTANA

Wickes, Jefferson Co., Mont. Wm. W. Dailey, pres.; A. R. Robertson, v. p.; C. H. Dailey, sec. Inc. Feb., 1907, in Montana. **Cap.**, \$1,500,000; shares \$1 par; issued, \$870,000.

Property: the Atlas group of 4 claims, patented, 25 acres, said to show well-defined fissure vein of 12' estimated average width, carrying malachite chalcopryrite, bornite and chalcocite, estimated by management to average 4% copper, 15 oz. silver, and \$1 gold per ton, without lead or zinc. Mine has a 300' shaft, with 1,000' of workings on vein, estimated by management to show 60,000 tons of ore blocked out. Mine water, in small quantities, carries copper sulphate strongly in solution.

Former owners shipped about \$30,000 worth of ore. An independent source estimate ore to average about 3% copper, 7 oz. silver and 80 cts. gold per ton. No shipments have been made for several years and management claims it needs a larger surface equipment and a concentrator.

DAIRY FARM MINING CO.

CALIFORNIA

Van Trent, Placer Co., Calif. **Officers:** E. B. Braden, pres.-mgr., Merchants Exchange Bldg., San Francisco, Calif.; Edw. Brush, v. p.; H. B. Underhill, Jr., v. p.; W. C. Corbett, sec.; C. J. Durbrow, treas., with J. B. Rice and H. H. Eastman, directors. Inc. 1903, in Calif. **Cap.**, \$200,000; shares \$1 par; issued \$143,500. Is controlled by American Smelters Securities Co., through ownership of \$96,927 stock and the E. I. Dupont de Nemours Powder Co., owning a 40% stock interest.

Property: 160 acres, on the Southern Pacific railway, show a mineralized fracture zone of 25 to 50' average and 80' extreme width, in rhyolite

and andesite, having a N.-S. strike, with dip of 60°, and a hematite gossan carrying a little gold and silver. Upper workings at shallow depth show about 50,000 tons of oxidized ores, amenable to cyaniding, these changing, at depth of 85', to ore containing chalcopyrite associated with pyrite, estimated to average about 3.25% copper, and occasionally carrying as high as \$30 gold per ton. Apparently the lens does not extend below a depth of about 500'.

Equipment: includes a 750-h. p. electric plant, with a 140-h. p. electric hoist, good for 1,000' depth, and a 20-drill electric air compressor. Buildings, about 25 in number, include machine shop, carpenter shop, smithy, office, store, boarding house dwellings.

The small concentrator contains Chilean mills, and a 100-ton cyanide plant treats the auriferous gossan. A 9-mile railway to Sheridan was completed in 1915. Company is a close corporation, operated as a subsidiary of Am. S. & R. Co.

DAISY BELL GOLD & COPPER DEVELOPMENT CO. MONTANA

Dead. Described in Vol. XI. Mine near Renova, Jefferson Co., Mont.
DAKIN MINE CALIFORNIA

Now patented under title of Gray Eagle mine, which see.

DAKOTA CONTINENTAL COPPER CO. SOUTH DAKOTA

Office: 205 Calder Bldg., Harrisburg, Pa. Company is a reorganization of the Continental Copper Mining & Smelting Co. **Property:** near Sheridan, Pennington Co., S. D., in the Black Hills, known as the Dakota-Calumet, or Lilian, property, 52 claims, patented, 179 acres. Claims show quartz schist with a pyrrhotized zone, from 50' to 200' wide, traceable one-half mile. The mineralized zone shows bands of nearly pure pyrrhotite, with occasional traces of copper. At boundary between oxidized and unaltered material, a little copper is occasionally found, as a secondary concentration. Small amounts of rich ore were found at the surface and down to 25-30', but property is valueless as a copper mine. Extensive diamond drilling and exploration work makes this conclusion certain. A body of gold quartz ore of commercial grade was cut in diamond drilling.

Development: includes an 850' shaft, 1,170' crosscut tunnel and 9 drift tunnels. **Equipment:** includes 300-h. p. steam plant, with hoist good for 1,200', 7-drill compressor, all necessary shops and an old smelter of no present value.

DALLAS MINING CO.

MISSOURI

H. Wells, Joplin, Mo., mgr. of Little Bess mine. **Property:** Little Bess mine, on the Knight land at Carl Junction, Jasper Co., Mo., also 20 acres of the Nilson land. **Development:** on the Knight land, 2 shafts, deepest 170'. The Nilson land has a 195' shaft. **Equipment:** 300-ton concentrating mill and sludge mill for treatment of sand and slimes from large mill. Estimated to have sufficient ore blocked out for steady supply of mill.

DALTON & LARK GOLD, SILVER & LEAD M. & M. CO. UTAH

Dissolved by order of court, 1911. Bingham Mines Co. owns the claims of this company.

DALY-JUDGE MINING CO.

UTAH

Reorganized in 1916 as the Judge Mining & Smelting Co., which see.

DALY MINES CO.

ARIZONA

Probably defunct. Mine near Bouse, Arizona. See Copper Handbook, Vol. XI.

DALY MINING CO.

UTAH

Office: 163 S. Main St., Salt Lake City, Utah. **Officers:** Col. E. A. Hill, pres.; Geo. W. Parks, sec.

Inc. in Utah. **Cap.**, \$3,000,000, all issued; shares \$20 par, assessable. Farmer's Loan & Trust Co., New York, registrar. Listed on Salt Lake City Exchange. Paid in dividends, \$2,925,000.

Property: in Uintah district, Summit Co., Utah; 6 claims and an interest in 12 of the Ontario Silver Mining Co. claims; also an interest in 17 claims of the Daly West Co., and 195½ acres in joint ownership of the Ontario Silver Mining Co., total acreage 316, of which 116 are patented.

Ore: silver-lead-gold and copper in fissure veins in quartzite. The property is an old one, and at last accounts had 2,300' of shafts and much unexplored ground between the 800' and 1,700' levels. Work has been carried on intermittently during the past few years. In Jan., 1916, a small force was working and the mine was producing 6 cars a month. Ore assays from 45 to 80 oz. silver, 8 to 15% lead, and \$0.75 to \$1.50 gold per ton. Present production is said to more than cover running expenses.

DAILY WEST MINING CO.

UTAH

Office: 163 South Main St., Salt Lake City, Utah. Mine office: Park City, Summit Co., Utah. **Officers:** Frank J. Hagenbarth, pres.; H. G. McMillan, v. p. and gen. mngr.; Herbert S. Cohen, sec.; W. S. McCornick, treas.; F. L. Williams, Jr., gen. supt.; Edw. L. Talbot, mine supt.; Frederick W. Sherman, mill supt.; F. I. Williams, engr.

Inc. Feb. 14, 1902, in Colorado. **Cap.**, \$3,600,000; shares \$20 par, and has been once reconstructed. Owns a 20% stock interest in the Little Bell Mining Co., an adjoining property. Corporation Trust Co., New York, North American Trust Co., New York, and McCornick & Co., Salt Lake City, registrars; American Loan & Trust Co., Boston; North American Trust Co., New York, and McCornick & Co., transfer agents. Stock listed on Boston Stock Exchange.

Gross income to the end of 1913, \$407,224, and operating expenses \$434,296, a loss of \$27,072. Dividends: 30c quarterly in recent years, reduced to 15c in 1913; total dividends to date, \$6,606,000. Company's report for year ending Dec. 31, 1913, shows dividends paid, \$27,000 and cash on hand, \$23,648. During the year company purchased new ground for \$18,537. Property was idle 1914 to April, 1915, and no report has been published since 1913.

Company is a large silver-lead producer, copper being a by-product, with annual production of about 800,000 lbs., or a total of 16,000,000 lbs., from 1898-1913.

Property: the Daly West and Quincy mines with 50 claims, patented, 250 acres in the Uintah district. Extensive orebodies carry gold and silver-bearing chalcopyrite, galena and sphalerite, with silicious gangue, values being mainly in silver and lead, with small copper values, and still smaller gold values. Ores are declining in value with depth. Production formerly equally divided between smelting and concentrating ore, is now mainly the latter. The property has 3 principal veins, of 4 to 6' minimum and up to 40' maximum width. Upper workings are practically worked out, lower workings show concentrating ore.

Development: the main shaft is 2,300' deep, and the mine has about 15 miles of workings, an average of nearly 1 mile of new ground being opened yearly. Connection was made, Oct., 1909, with the 3-mile Ontario drainage tunnel, on the 2,100' level, for the use of which company pays \$750 monthly rental.

Ore mined in 1915 came mostly from the 1,400 to 2,100' levels; average assays were 25% lead, 24 oz. silver, \$2 gold, with copper values. In 1913, the concentrates shipped averaged 34¼% lead and 52 oz. silver, with 8,332 tons of lead concentrates and 1,598 tons of zinc concentrates. Production in

1913 was 60,788 tons of ore. The copper in the lead concentrates averaged 1.86%.

Equipment: includes hoists and air-compressor. The 350-ton concentrator was destroyed by fire Dec., 1913. A new 600-ton mill was built and went into commission Jan., 1915. Plant includes a flotation unit with capacity of 30 tons of dry slime per day. The mill is treating 200 tons daily.

Costs for 1913, producing 60,788 tons, were: \$5.28 per ton for mining; general expenses, \$1.56 per ton; milling costs, \$1.46 per ton of ore fed.

Property, though an old one, has much new territory yet to be prospected and the known ore shoots give indications of going to greater depths. 125 men employed in 1915.

DAN CREEK GOLD & COPPER CO.

ALASKA

Mine office: Nizina, Copper River district, Alaska. Howard Birch, mgr. Inc. 1907, in Washington. **Cap.**, \$1,000,000. **Property:** 28 claims, 1 fractional, 550 acres, with 6 placer claims, 560 acres, and two 5-acre mill sites, on Dan and Copper creeks and Nikolai gulch, 8 miles E. of the Bonanza mine. Lands, known as the Rosebud group of 11 claims, show a vein of 2 to 10' width, carrying bornite and chalcopyrite ore. The hydraulic plant was rebuilt in 1913 and has since been in operation.

DANTE GOLD MINING CO.

COLORADO

Office: 516 Exchange Bank Bldg., Colorado Springs. **Officers:** L. I. Aitken, pres.; W. Arthur Perkins, v. p.; A. D. Aitken, sec.; Thos. A. Dines, treas.; Edwin Gaylord, gen. mgr.; Wm. A. Reed, supt. **Cap.**, \$1,250,000; shares \$1 par; all issued. Company has no liabilities and had \$10,660 in the treasury, Jan. 1, 1916. Stock listed on the Colorado Springs Mining Exchange. Charter renewed Nov. 25, 1915, for 25 years.

Property: Dante mine, about 10 acres, patented, in Sec. 20 on Bull Hill, Cripple Creek, is under 5-year lease from April, 1916, to the Cons. Mines & Reduction Co. Said to show gold ore averaging \$2 per ton. **Development:** 750' shaft with 6,500' of crosscuts and drifts, 520' shaft with 3,800' of crosscuts and drifts. Shaft No. 3 is leased. **Equipment:** 75-h. p. hoist, air compressor, complete machinery plant, 1,000' of cable and surface buildings.

Production: (gross) to Jan. 1, 1916, \$1,120,080; gross production for 1915, \$3,559 from mine, and \$13,641 from mill. Mill was treating about 2,000 tons of \$2 gold ore per month when it was destroyed by fire in Nov., 1915.

DAVIS-DALY COPPER CO.

MONTANA

Office: 79 Milk St., Boston, Mass. Mine: Butte, Mont. **Officers:** H. M. Burton, pres.; Wm. Bloom, v. p.; Charles G. Schirmer, sec.-treas.; preceding with F. M. Kimball and F. A. Schirmer, directors; W. L. Creden, gen. mgr.; Wm. Frazier, mine supt. Federal Trust Co., Boston, transfer agt.; Paul Revere Trust Co., Boston, registrar. Inc. Sept. 14, 1908, in Maine, as successor of Davis-Daly Estates Copper Co. **Cap.**, \$6,700,000; shares \$10 par, assessable; issued, \$6,000,000; paid \$8.50. For the earlier chapters in the history of the company, readers are referred to description of the Davis-Daly Estates Copper Co., in Vol. VIII, and to a spicy account by Stevens in Vol. X, of the Copper Handbook.

General balance sheet to June 30: **Assets:** mining property, \$4,112,474 in 1914; \$4,106,680 in 1915; equipment, \$111,044 in 1914; \$110,159 in 1915; development, \$1,069,321 in 1914, \$1,359,366 in 1915; stockholders liability, \$900,000 in 1914, \$900,000 in 1915; current assets, \$175,721 in 1914, \$37,960 in 1915; cash on hand, \$116,272 in 1914, \$66,236 in 1915. **Liabilities:** capital stock, 600,000 shares, \$8.50 per share paid and \$1.50 unpaid, total \$600,000. Taxes, accounts payable and wages payable: \$19,667 in 1914, \$20,056 in 1915.

Income and expense account for fiscal year ending June 30, 1915, was: total income accrued (ore sales \$19,482), \$24,412; deduct cost of development and expenses (Colorado mine) \$175,870; mining cost \$5,017, general expenses and salaries, Butte office, \$12,252; Boston office, \$5,583; ins., taxes and misc., \$5,732; total \$204,454; deficit for year \$180,043, as compared with \$108,020 for the previous year.

In 1st quarter 1916 ore sales amounted to \$42,540; total disbursements, \$72,272; deficit, \$27,504.

Property: a small surface area and mineral rights of 320 acres under the city of Butte, adjacent to, but south and west, of the known productive area. **Development:** consists of the Colorado shaft, 2,542' deep, with drifts and crosscuts. Development work for fiscal year 1914-1915, amounted to 4,140'. The chief workings are on the 1,000', 1,200', 1,400', 1,500', 1,700', 1,900' and 2,500' levels.

Geology: two main veins have been developed, running in N. W.-S. E. direction corresponding to the Blue Vein system of which the Jessie, Edith May and other very productive fault veins belong. There are also several east and west veins on which but a small amount of development has been done until recently. The first ore developed was on the "Fisher stopes" on the 1,400' level, 350' west of the Colorado shaft, showing an orebody 400' long, 7½' thick and 100' high, averaging 2.9% copper and 5.6 oz. silver per ton. The same vein was extensively developed down to the 1,700' level.

The veins are frequently faulted and a careful study of geological conditions is necessary to successful recovery of veins beyond the faults. The shaft was sunk to depth of 2,035' in 1912, and new crosscuts showed ore in several small fault veins, barren on the 1,700' level.

The Hesperus vein, the principal ore producer of the mine, was opened 1913 by a crosscut 85' south from the old Heinze workings on the 1,400' level, where it showed 12' of high-grade ore beneath the Hesperus claim. Drifting on this, together with crosscuts at other points, proved an orebody 12 to 14' wide, averaging 4.43% copper and 7 oz. silver per ton, for 325' in length. This ore shoot thinned out to a non-commercial width a few feet below the 1,200' level. Efforts made to find the faulted section of the vein beneath the Rarus fault, on both 1,400' and 1,500' levels have so far been unsuccessful. The Hesperus ore shoot was mined in V form for a height of about 300' and an average length of 150' and produced more than 60% of the total tonnage mined by the company since its organization to 1913.

Results of mining operations on upper levels, 1913-1914, being disappointing, the company decided to discontinue mining and to sink the shaft 500' deeper, for which a 50c assessment was levied. Shaft sinking started in May, and was completed to 2,500' level in December, 1914. During fiscal year ending June 30, 1915, no development of any consequence was done above the 2,500' level and the ore extracted from drift development, came from this level. While driving the crosscut to the No. 1 Hesperus vein on the 2,500' level a vein of good ore was reported to have been found. No. 1 Hesperus vein was reached in Aug., 1915, 670' from the shaft. At this point, commercial ore, 10' wide, is said to have been cut and shipments made of ore coming from drift development work. Company owns 2,500' on the length of vein.

Shaft has recently been enlarged from 1,700'-1,900' level, making it 3 compartments from the 2,500' level to surface.

The Western half of the property is practically undeveloped. A long crosscut from the Original mine explored the ground, but failed to develop commercial ore. Upon the Silver King claim, 2,500' N. W. of the Colg-

rado shaft, the Sutton shaft, 310' deep, developed ore, shipments of 489 tons carried 3% copper, 2½ oz. silver and 86 cts. gold. As this western half of the property was entirely undeveloped, an arrangement was made with the Anaconda Co., to drive a crosscut south from the West Gagnon mine at a depth of 1,900'. The result was disappointing.

Besides the 2 shafts already mentioned, there are several old openings on the company property. The Smokehouse shaft, across the street and south of the Thornton hotel, is 700' deep and lost the vein on the 500' level. The Mount Moriah mine has a 640' three-compartment shaft and the ground is explored by a crosscut 2,000' long from the 1,800' level of the Original mine. When seen by the writer, the veins cut in this crosscut showed no payable ore, but not a foot of drifting had been done to disclose conditions along the strike of these veins. There are various other shallow workings on the property held by this company, which it must be remembered, is a tract 1¼ miles long by one-half mile wide. These old workings yielded considerably over \$1,000,000, principally in silver from the enriched surface ore.

Equipment: though extensive, is not adequate for deep work and a new hoist has been ordered (1916). There is an electric-driven air compressor, and a large battery of boilers ready for action, in case electricity is cut off. The ground around the shaft being limited, the output at the mine is conveyed several blocks over a narrow-gauge surface tram to ore bins alongside the Northern Pacific railroad.

Production: in 1st quarter 1916, output amounted to 4,208 tons ore, yielding 278,389 lbs. copper and 17,884 oz. silver.

The Davis-Daly ground has been generally considered to contain only low-grade and base, zinc-pyrite ores and to be outside the copper section of Butte camp. Recent developments indicate, however, that good copper ores exist and that the extensive area of unexplored ground may make this property a profitable one. Under Mr. Creden's management the property will certainly receive proper exploration and development, if funds are provided, and it is believed the company will eventually be successful.

DAY BRISTOL CONSOLIDATED MINES CO. NEVADA

Property sold Jan., 1915, and transferred to Consolidated California-Nevada Mining Co., which after a brief struggle, went into receivers' hands. The Day-Bristol mine then passed into the possession of the Uvada Copper Co. (operating company for the International & Intercontinental Mng. & Ref. Co., holding company), which see.

DAY STAR MINES CO. COLORADO

Pitkin, Gunnison Co., Colo. Inc. 1912, in Colo. Cap., \$1,000,000; shares \$1 par; 700,000 shares outstanding. Annual meeting in August. **Officers:** T. C. Clayton, Gunnison, pres.; W. M. Henderson, v. p.; John E. Clark, Marion, Ind., sec.-treas. and gen. mgr., with J. S. Stewart, and Bracken Wagoner, directors.

Property: 15 lode mining claims, 40 acres of placer ground and a mill-site in Quartz Creek, about 9 miles from Pitkin. **Ore:** gold, silver, copper and zinc in veins in limestone. Property is 2½ miles from the Mary Murphy mine, but company claims to own 8,000' of the Mary Murphy vein. Developed by tunnels. Management intends disposing of sufficient treasury stock to carry on development work, and perhaps build a concentrator. Property still in the prospect class.

DEADWOOD-HEIDELBERG MINING CO. SOUTH DAKOTA

Deadwood, S. D. **Officers:** Geo. V. Ayres, pres.; John Treber, v. p.; Jacob Goldberg, treas., with N. E. Franklin, A. T. Roos, mgr., and T. A.

Solinsky, directors. Wm. L. Treber, sec. Inc. Aug., 1914, in S. D., as a result of work of the Deadwood Business Club, in an attempt to promote the mining interests of the section. Cap., \$125,000; shares 25c par. Annual meeting, in June. Gross earnings, 1914-1915, were \$1,200 from ore sales. Operating expenses were \$6,000.

Property: 9 claims, unpatented, 185 acres, on Two Bit Creek, Lawrence Co., S. D., shows gold ore in a contact deposit between shale and porphyry, and is said to assay \$4-\$5 per ton. Ore reserves said to be 5,000 tons.

Development: 7 tunnels, 65'-380' long, with deepest workings at 193' from surface; total development, 1,426'. **Production:** to 1916 amounted to 147 tons ore, said to average \$20 per ton. Management plans development work for 1916 and sinking to the contact of the shale and underlying quartzite.

DEADWOOD MINING & MILLING CO.

NEW MEXICO

Mogollon, Socorro Co., N. M. Earle C. Cleveland, gen mgr. Ore: gold-silver-lead-copper, said to average \$10 to \$15 per ton. Orebody outcrops at surface and is traceable for about 500'. **Developed:** by 500' shaft, and equipped with 15-ton mill and cyanide plant treating company and custom ore. Made small shipments of bullion and concentrates in 1915.

DEEP MINES CO.

NEVADA

Geo. Wingfield, mgr., Goldfield, Nev. A \$10,000,000 holding corporation, owning control of the Goldfield Merger Mines Co., organized by J. Ross Clark, of Los Angeles, who is president. The Deep Mines and Merger companies were thrown into receivers' hands in February, 1915, on application of stockholders who opposed the sale of the Velvet claim to the Jumbo Extension Mng. Co.

DEER CREEK MINING & MILLING CO.

IDAHO

Forest, Lewis Co., Idaho. W. J. Orr, gen. mgr. **Property:** 17 miles S. W. of Winchester, in the Salmon River district, shows orebodies 10 to 20' wide, carrying copper ore with gold values. One vein has 4' of chalcopryite ore developed by a tunnel; \$150,000 reported to have been spent in development and equipment, latter including 2,000' of flume, water wheel, 100-ton concentrator and compressor. Company plans 1,500' tunnel to tap vein at 1,000'.

DEERFLY MINING CO.

WASHINGTON

Property, near Lucerne, Chelan Co., Wash., shows fissure veins carrying copper and lead ores. Developed by tunnels. Company operating intermittently for several years.

DEERHORN MINE

COLORADO

Victor, Colo. Worked under lease by W. Hobson and S. C. Sutton. **Property:** the Deerhorn mine on Globe Hill, belongs to the Stratton estate. Ore: quartz, carrying gold and sylvanite, occurs in veins, 4' wide at shallow depth, said to return from \$30-\$40 per ton in gold. Development by shafts and tunnels. **Production:** several carloads monthly in 1915. Developing and producing in 1916.

DEFENDER MINE

CALIFORNIA

F. B. Joyce, owner, 1023 Mills Bldg., San Francisco, Calif. **Mine office:** Defender, via Volcano, Amador Co., Calif. **Property:** 3 claims, unpatented, 5 miles S. E. of Volcano, Calif. Ore: base in character, carries gold and some silver in chalcopryite, galena and sphalerite, in a vein in granodiorite. The lode has strike of N. 15° W., dip 85° W., and an average width of 20". **Development:** 360' vertical shaft, with 1,500' underground workings. At 130' south of shaft on 200' level the vein is cut by a diorite dike 22' wide. Ore has not been found south of this dike.

Equipment: includes steam hoist, compressor, 10-stamp mill and a

10' Lane mill. Eight men are employed. **Production:** to date said to be 12,000 tons, yielding \$140,000. Work in 1914 and 1915 consisted of development work only.

DEGGE CLARKE TUNGSTEN MILL.

COLORADO

Nederland, Boulder Co., Colo. **Property:** a 100-ton concentrate mill in Boulder Canyon. Will start to operate July 15, 1916. Company is a purchaser of custom ores.

DELAWARE MINING CO.

NEVADA

H. H. Hunter, mgr., Lovelock, Humboldt Co., Nev. **Property:** 200 acres, in Seven Troughs district, near Vernon, Humboldt Co., Nev. Ore occurs in veins 5-7' wide, said to average \$18-\$20 per ton. **Equipment:** includes the Darby mill, 4½ miles from the mine, said to be treating 50 tons of \$20 dump ore per day. Management is planning to explore the Delaware veins at depth.

DELORO MINING & REDUCTION CO.

ONTARIO

Deloro, Ont., Can. **Officers:** M. J. O'Brien, pres.; Thos. Southworth, v. p.; S. B. Wright, gen. mgr.; S. F. Kirkpatrick, cons. metallurgist; F. A. Bapty, sec.-treas. Owns a smelting plant and refinery at Deloro. Output consists of bar silver, arsenic, nickel oxide and metal, cobalt metal and anodes, and the oxide and salts of cobalt.

Company aims to finish all products at the Delora plant. Employs about 125 men.

DELTA CONSOLIDATED GOLD MINES CO. (THE) CALIFORNIA

Office: Redding, Shasta Co., Cal. Mine on Dog creek, near Delta, Cal. **Officers:** Dr. Sherman T. White, pres.; C. Tracie, v. p.; S. D. Furber, sec.; A. Bystle, treas. **Inc.** Sept. 3, 1903, in So. Dakota. **Cap.,** \$2,000,000; shares \$1 par; outstanding 1,150,000 shares, assessable. **Property:** the Pioneer group of 11 patented claims, 115 acres, and 80 acres timber land, on Dog creek, 6 miles west of Delta, Calif., shows quartz veins in andesite, and ores contain gold, silver and a little copper. Ore shoots average 2' in width, with length of 300' and are said to have average assay of \$22.40. **Development:** by tunnels with 3,500' of workings. Management claims to have 20,000 tons ore blocked out. Was idle in 1915, but intends building a 50-ton stamp mill and cyanide plant in 1916.

Company has built a narrow-gauge railway connecting with the Southern Pacific tracks at Delta.

DELTA LEAD & ZINC CO.

MISSOURI

Inc. in Missouri. **Cap.,** \$3,000. Has a lease on 40 acres of land belonging to the McCown estate, in the Spring City-Beef Branch district, Mo.

Development: 3 shafts with average depth of 200'. Has 2 concentrators with a daily capacity of 250 tons. Output consists of galena concentrates and mixed blende and silicate concentrates, averaging 48-50% zinc.

DEMIJOHN CONSOLIDATED MINING CO.

NEVADA

Offices: 410 Savings & Trust Co. Bldg., Salt Lake City, Utah. Mine at Pioche, Lincoln Co., Nev. **Officers:** Fred W. Price, pres.; J. Thomas, v. p.; W. M. McCrea, sec.-treas.; with Owen A. Bailey, F. E. Parish, O. P. Soule and M. Thomas, directors. Chas. H. Gitsch, supt. Listed in Salt Lake City.

Property: 9 claims, 7 patented, 2 miles W. of Pioche, said to show lead-silver-gold ore in fissure veins, assaying 13% lead, 2.2% copper, 18 oz. silver, \$2.40 gold per ton. The main vein traversing the property has a N.-S. strike and dips to the E.

Development: 300' shaft, drifts, crosscuts and winzes. **Equipment:** hoist, air compressor and all necessary machinery. Small shipments made

in 1915. Plans further development on 200' and 300' level in attempt to reach the main orebody.

DEMOCRATA CANAENA SONORA COPPER CO. MEXICO

Office: Fourth National Bank Bldg., Cincinnati, Ohio. Mine at Cananea, Sonora, Mex. **Officers:** H. H. Hoffman, pres.-treas.; C. E. Hoffman, v. p.-gen. mgr.; W. H. Topie, sec.; preceding with R. C. Swing, Mrs. H. H. Hoffman, directors. Inc. May 8, 1905, in Arizona. **Cap.**, \$3,000,000; shares \$10 par; issued \$2,870,000. Bonds authorized \$271,000, but none issued. Central Trust Co., registrar. Annual meeting, last Tuesday in May.

Property: 18 hectares, 44.5 acres, lying between the Capote and Veta Grande, in the heart of the Greene Cananea mines. Orebody is of contact metamorphic origin, consisting of a breccia of fragments of altered limestone, cemented by quartz, bornite and copper pyrite, in a fracture zone 50' wide in limestone. The orebody lies about 300' north of the Democrat shaft and also outcrops in 2 patches of garnet rock surrounded by diorite porphyry, good carbonates being mined at the surface.

Development: comprises a 435' shaft and 1,300' tunnel, with 2 other shafts of 90' and 180', together with 3 tunnels of 300', 110' and 60'. aggregating 4 miles of underground workings. On the 500' level, the known orebody proved to be larger than previously estimated and the stopes yielded 8% ore. The East orebody near the Kirk mine, developed by tunnel workings, has also materially increased the proven ore reserves. Average assays at present are 2½% copper and 1.5 oz. silver per ton.

Equipment: includes electrically-operated hoist and air compressor, power being obtained from the Cananea Consolidated Copper Co. Smelter contains 2 blast furnaces of 150 and 300 tons daily capacity, making 33% matte.

Property was closed down Sept. 1, 1907, to Sept., 1912, since which time the mine operations have been intermittent due to the Mexican revolution. Work was resumed in 1915. When in full operation company employs 500 men.

Production: in 1912, 1,102,000 lbs. fine copper, 36,000 oz. silver and \$6,000 in gold for 4 months' operations with none reported since. Property is a valuable one.

DENN-ARIZONA COPPER CO. ARIZONA

Bisbee, Cochise Co., Ariz. **Officers:** Martin Pattison, pres.; Lemuel C. Shattuck, treas.; J. G. Williams, sec.; Byron M. Pattison, Thos. Barçon and H. L. Mundy, directors. Inc. Jan. 14, 1907, in Minn., as successor of Denn-Arizona Development Co. **Cap.**, \$3,500,000; shares \$10 par fully issued.

Property: 13 claims, patented, 200 acres, immediately east of the Junction shaft of the Superior & Pittsburgh. The Dividend fault traverses the company's ground for about 4,000', and big orebodies have been found on adjoining properties near this fault. Mine has a 1,600' shaft, started in conglomerate but penetrating limestone at 840', with upwards of a mile of workings. The 1,000' and 1,100' levels show considerable leached ore, with little commercial ore, though carrying occasional small bodies of rich cuprite. The 1,250' and 1,350' levels also show large areas of leached ore, with some low-grade sulphides on the 1,250' level, and a little native copper on the 1,350' level. The lower level has a little ore of 12 to 15% copper tenor. Management estimates the average tenor of ore developed, almost exclusively oxides and carbonates, at 8% copper. Apparently some good orebodies may be developed at 1,800' or deeper, though the ore is erratic. The mine is wet, and has two 1,000-gal. triple-expansion pumps on the 1,000' level, and five 800-gal. sinking pumps.

Equipment: includes a 1,600-h. p. steam plant, with 6-drill and 25-drill Sullivan air compressors, and an 18x36" Ottumwa Corliss first-motion hoist, raising double-deck cages. There is a railroad spur to the mine.

Last production, 1909, was 99,222 lbs. fine copper and 41 oz. gold. Development work was energetically carried on despite very heavy pumping expenses until 1912, when an unusual influx swamped the pumps and the mine has been idle since.

The Dean has an excellent chance of making a big mine, the claims covering an extension of the big ore zone of the camp, but the ore horizon at this point is lower than on the other properties. The deep development of the Junction, C. & A. and Saginaw properties will drain this ground as well as prove it, and further exploration will be easily and cheaply done. There is strong probability that this company and the Shattuck will be merged at some future time. Property is a splendid prospect. It may be several years before it makes a mine, but eventually, we believe, will be a valuable one.

DENNEMORA GOLD & COPPER MINING CO., LTD. MONTANA

Is a dormant corporation owning 6 lead-copper claims, one-half mile from N. P. R. R., near Taft, Missoula county, Mont. Described Vol. X. **DENNY DULIN GOLD & SILVER MINING CO. NEVADA**

Office: 223 Mohawk Block, Spokane, Wash. **Officers:** Fred N. Davis, pres.; A. E. Grant, v. p.; Thos. R. L. Harris, sec.; A. B. Railton, treas; preceding, with E. D. Doan, directors. Inc. Nov., 1910. **Cap.**, \$1,500,000; shares \$1 par, assessable; 18 assessments already called. T. R. L. Harris, transfer agent and auditor.

Property: 5 claims, 100 acres, unpatented, in Morning Star mining district, Nevada. Ore occurs in fissure veins in rhyolite, traversed by numerous porphyry dikes; vein runs east and west, dip 55° north, average width 4', proven depth 160', average assays, 12½% copper, 5 oz. silver, trace to \$12 gold per ton. **Development:** by shafts, 175' and 160' deep, and 150' tunnel. Company has let contract to continue shaft No. 2, 100', hoping to cut ledge dipping toward the shaft. Nearly 1 carload of ore blocked out. No recent returns secured.

DESCUBRIDORA MINING & DEVELOPMENT CO. MEXICO

Owned by El Rayo Mines Co., which see.

DESLOGE CONSOLIDATED LEAD CO. MISSOURI

Desloge, St. Francois Co., Mo. Inc. in Missouri. **Cap.**, \$1,000,000, with almost \$2,000,000 invested in land and plant. Controls 4,704 acres land, developed by several shafts, 2 of which are 300' deep and another 500' deep. Two of the shafts are near Deslodge, but No. 4 is near Leadwood. Company has a 1,500-ton concentrator equipped with Wilfley tables, Frue van-ners, rolls, Chilean mills and a 780-k. w. steam turbine; also a smelter equipped with Flintshire-Tarnowitz reverberatory furnaces.

DETROIT & COLORADO MINING CO. COLORADO

Address: care L. W. Partridge, sec., 517 Ideal Bldg., Denver, Colo. Inc. Nov. 10, 1903, in Colorado. **Cap.**, \$1,000,000; shares \$1 par, nonassessable.

Property: the Champion and Aletha groups, 5 claims, 4 patented, situated 1½ miles S. W. of Silverton, 9,700' elevation. Ore is a mixture of copper and iron sulphides with tetrahedrite, but Aletha ore is a silver-bearing galena with chalcopyrite. The Champion vein is a gold-silver quartz carrying copper pyrite. Ores are said to average 31 oz. silver, 4.5% copper and \$5 gold, with increasing values in gold as depth is attained. The main development is by tunnel, but extent of present development is not reported. Property now idle because of litigation.

DETROIT COPPER MINING CO. OF ARIZONA.**ARIZONA**

Office: 99 John St., New York. Mine and works office: Morenci, Ariz.
Officers: Dr. Jas. Douglas, pres.; Cleveland H. Dodge, v. p.; A. C. James, v. p.; Geo. Notman, sec.-treas.; M. H. McLean, gen. mgr.; J. S. Schroeder, chief chemist; W. A. Staab, assayer; D. J. Kelly, chief electrician; Chas. Legrand, cons. mech. engr., and C. A. Austin, purch. agt., 99 John St., New York.

Inc. in Michigan. Cap., \$1,000,000; shares \$25 par. Is controlled, through ownership of entire stock issue, by Phelps, Dodge & Co., Inc. Net earnings in recent years: \$543,456 in 1903; \$603,340 in 1904; \$532,684 in 1905; \$973,456 in 1906; \$814,874 in 1907; \$1,074,296 in 1908; \$1,153,269 in 1909; \$1,406,170 in 1912; \$1,112,870 in 1913; \$602,319 in 1914.

Dividends: 1897-1909, of $3\frac{3}{4}$ to 110% yearly, aggregated \$4,817,500; \$1,464,610 in 1912; \$760,000 in 1913; \$280,000 in 1914; \$920,000 in 1915.

Property: is extensive, including the Ryerson, Arizona Central, Copper Mountain, Yankee, W. Yankee, Montezuma and Santa Rosa mines, at and near Morenci.

The purchase of the mining properties of the New England & Clinton Copper Co., Standard Cons. Copper Co., Standard Copper Mines, and Clifton Copper Mines, Ltd., adds a large area of undeveloped, but promising mining ground. The mines of this company work varied types of copper deposits, all dependent upon and co-extensive with a big intrusive body of quartz porphyry and its dikes. The ores are chalcocite, chalcopyrite and pyrite with various oxidized products occurring either in altered limestones, or as fissure veins in the impregnated rocks adjacent to them, or in large masses of altered, impregnated, shattered porphyry. The geologic relations are fully treated in a monograph by Waldemar Lindgren, Prof. Paper 43, U. S. Geol. Surv.; see also Weed, "Copper Mines of the World," page 287.

Geology: ores are mainly sulphide with slight gold-silver values and high silica and lumina contents. The oxidized and limestone ores are still produced in small quantities, but 98.8% of the ores mined consists of small particles of chalcocite, associated with chalcopyrite and pyrite, in a leached and whitened, decomposed porphyry, averaging 3.08% copper, or about 47.67 lbs. of fine copper recovered. The high-grade ore from fissure veins carries 6 to 18% copper.

Development: is very extensive, with numerous shafts and long cross-country connections. The workings have thus far been shallow, 400' being for many years the greatest depth. In 1912, development on the 600 and 700' levels of the Yankee mine, north of the Yankee fault, opened up 194,939 tons of 2.36% ore and similar deep exploration in the Arizona Central mine upset previous ideas that ores would not go deeper. Total amount of development work in 1914 was 26,375'; in 1915, 14,709'.

About 90% of the output is now mined by the slicing system, costing about 81% of the square set and fill cost, which is necessarily still used in some parts of the mine. Block caving is still cheaper, uses but little timber and costs but 54.8% of the square set and fill method, but like the Gopher and fill method, which is slightly cheaper, can only be used where favorable conditions prevail.

Equipment: includes power house, of steel frame on concrete foundations, with one steam-driven blowing engine, 9,000 cu. ft. per min., one gas-driven blowing engine, 6,000 cu. ft. per min., one motor-driven No. 10 Connersville blower and one No. 9 Connersville blower driven by a 200-h. p. gas engine, two steam-driven air compressors, one of 4,000 cu. ft. capacity, the other of 1,300 cu. ft., one 600-k. w. turbo generator delivering 2,300 v., 2 phase, 60-cycle current, four 250-k. w. and one 100-k. w. belted generators

driven by gas engines, delivering 230 v., 2 phase, 60-cycle current, running in parallel with turbo generators through transformers.

The concentrator, designed by H. Kenyon Burch, has proved remarkably successful, running 95% of the time. It consists of two 650-ton units, is 166x240' in size, and cost about \$1,000,000. Equipment includes Chilean mills, 6 sets of 16x42" rolls, 28 revolving screens, 80 Frue vanners, 40 Wilfley tables, and Deister tables, the mill putting about 7 tons into 1.

A flotation plant was completed in Sept., 1915. The mill power plant has 3 gas engines of 200-h. p. and 2 of 175-h. p. each, in conjunction with electric motors driven from the smelter power house.

In 1915, the mill treated 361,970 tons of ore averaging 2.69% and produced 53,266 tons of concentrates, averaging 13.499% copper. One ton of ore is concentrated with between 500 and 600 gals. of water, which is a very reasonable figure. A pumping station 6 miles distant raises water from wells on the San Francisco river to a height of 600', whence it is fed by gravity to the mill, which uses about 4,400 gals. per minute, with a consumption of new water of only about 80 gals. per minute, new water being supplemented by clarified water from an ingenious and highly efficient settling system, designed by Mr. Hunt, that includes concrete tanks and settlers, a steel dam, and a pond for tailings. A 14,000' launder along Chase Creek cañon conveys tailings from the mill to impounding reservoirs on the slopes below the mouth of Morenci canyon. The tails form a solid compact mass almost as strong as cement and successfully solves the tailings problem.

The smelter has one 42x264" and four 54x144" blast furnaces, and a converter department. Flue dust is briquetted for resmelting. The smelter has 2,000-ton ore bins, surmounted by a steel railroad trestle.

In 1915, 77,870 tons of ore, concentrates and flux were smelted, making an output of 15,333,976 lbs. of copper with a saving of 94%, compared with 20,274,267 lbs. of copper in 1914 and a saving of 95.45%.

A 36" gauge railway connects the mines and smelters with the Arizona & New Mexico railroad, at Guthrie, this line having a maximum grade of 36", with 4 complete loops within an air-line distance of 1½ miles, near Morenci. A tunnel through Longfellow hill, completed 1909, gives direct rail connection with the mill.

The company operates a large department store, and an excellent hotel, and maintains a library, gymnasium and club room for its 1,438 employees.

Production: in 1915 was 376,604 tons of ore, averaging 2.83% copper, producing 15,333,976 lbs. of copper as compared with 472,194 tons of 2.899% copper produced in 1914. The property is managed with great skill, in all departments, and is an exceptionally fine example of a successful low-grade mine.

The New England Clifton Copper Co. holdings, now owned by the Detroit Company comprise 78 claims, 1,006 acres, lying mainly near the Shannon, 5 miles N. W. of Clifton, on the northern side of the San Francisco river, including the New England, Clifton, Antietam and Copper King mines. Development on former shows a fissure vein in granite of 5' width, with an ore shoot 400' in length, carrying silicious sulphide ores, with chalcocite, chalcopyrite and occasional oxides and carbonates, all slightly auriferous and argentiferous, said to average 12% copper to depth of 350', the ore shoot declining rapidly in grade below 350', running to silicious sulphides of about 2.5% copper on the tunnel level. Ore bunkers, about 2 miles below the mines, receiving ore by wagons and aerial tram, are connected with the Arizona railway by a 3-mile surface tramline.

Development: at the New England mine includes 2 shafts, deepest 750',

and a 2,000' tunnel. The Clifton mine has 7 shafts, of 70 to 315' depth, with tunnels of 220', 450', 700', 800', 1,000' and 1,700'.

The Antietam mine, 3 claims, has a 2-compartment shaft, developing an orebody of 15 to 35' width, carrying chalcocite and chalcopyrite, giving assays of 4 to 10% copper, 1 to 7 oz. silver and \$2 gold per ton, and has been said to have about 40,000 tons of ore in sight.

The Copper King mine is as yet but slightly developed, but has been claimed to show about 40,000 tons of ore. An aerial tram from the Copper King mine was completed 1909.

Equipment: includes steam, gasoline and electric power, with hoists, an air compressor, and a number of mine buildings. The properties were idle in the summer of 1915 on account of a strike, but resumed operations in the winter.

DETROIT COPPER MINING CO.

UTAH

Samuel A. King, agent, Judge Bldg., Salt Lake City, Utah; V. W. Kelly, pres., Deseret, Utah. Inc. Jan., 1916, in Utah. Cap., \$1,000,000; shares \$1 par; 400,000 in treasury. Holds 5-year \$100,000 bond and lease, from Nov. 24, 1915, on 40 claims, locally known as Ibex mine, and owned by Ibex Gold Mng. Co.

Property: the Ibex mine (see Ibex Gold Mng. Co.), situated in Detroit district, Millard Co., Utah, 35 miles from Oasis, and 20 miles west of end of Delta branch line. Claims were located 35 years ago, work began 1894, and the Ibex Co. was formed and smelter put up at Leamington, Millard Co., Utah, treating 50 tons per day. In winter of 94-95, company failed and property was idle till 1906, when Jesse Knight took it up and reorganized the Ibex Co., patented the claims and sank two shafts. Worked until panic of 1907. Idle till 1915, when lease and bond was taken from Mr. Knight by local farmers who organized the Detroit C. M. Co. and shipped ore.

Claims cover two horizons of limestone; one blue and hard, the other light and soft, both cut by porphyry dikes and intrusives. Ore occurs in veins and bedding offshoots, the veins being 25'-100' in width. Ore: carries 2%-20% copper, with trace to 3 oz. per ton silver and \$1 to \$20 per ton gold. Elevation of mine 5,500' to 6,500' above sea level.

Development: 600' shaft on Keystone claim, a tunnel on Ibex, with 500' vertical depth at face and a 500' shaft on E. P. H. claim. Good auto road from Delta to Oasis. Reported on May 6, 1916, by Wm. A. Farish.

Freight to Oasis, \$6 (to R. R. terminal \$4); R. R. to Salt Lake, \$2.50; smelter treatment, \$4.

DETROIT & LAKE SUPERIOR COPPER CO.

MICHIGAN

Waterbury, New Haven Co., Conn. Is a half owner of the stock of the Lake Superior Smelting Co., which bought the plants of the Detroit & Lake Superior Copper Co. at Hancock and Dollar Bay, Houghton Co., Mich. Built a smelter at Detroit, 1850, and shortly after built another at Hancock, being the pioneer in Michigan smelting.

DEVELOPMENT COMPANY OF AMERICA

ARIZONA

Reorganization committee: Room 514, 49 Wall St., New York. Company's affairs are in the hands of a bond and stockholders' committee (See Copper Handbook, Vol. X, for officers and organization.) Inc. Nov. 23, 1901, in Delaware, as a holding company. Controlled through stock ownership, the Tombstone Consolidated Mines Co., Ltd., Imperial Copper Co., Congress Consolidated Mines Co., Ltd., and Poland Mining Co. Company also owned large stock interests in the Gila Copper Sulphide Co.; the Lookout Copper Co.; controlled the Southern Arizona Smelting Co. through Imperial Copper Co., and owned a large block of stock in the London-Arizona Copper Co., which company had a large interest in the

London Range Copper Co. Company organized the Arizona, Mexico & Gulf of California Railroad Co., 1910, planning to build a railway from the Arizona Southern railway, which is owned by the Imperial Copper Co., a subsidiary, to Port Lobos on the Gulf of California, a distance of approximately 200 miles. The authorized bonds and stock of the Arizona, Mexico & Gulf of California Railroad Co. were never issued.

The Tombstone Co. owned, or controlled, practically all the mines of Tombstone, Ariz., that once wonderful camp, closed down in the 80's when a heavy influx of water drove the miners from the workings. The Tombstone Co., installed enormous pumps and succeeded in controlling the water, the Development Co. supplying nearly \$2,500,000 in addition to funds realized by the sale of its special contract bonds, before it came to the end of its resources, when, being unable to meet its bills, the company suspended operations.

Failure of the Development Co. to supply further funds to the Tombstone Co. and subsidiaries in 1910, with a loss of credit at various banks and indeed of its own stock and bondholders is, it is said, directly due to responsible financial interests in New York refusing to carry out their pledged word and agreement, a contract upon the strength of which the Development Co. implicitly relied and therefore made no effort to raise money elsewhere, until such refusal when it was too late to make other arrangements to meet its interest charges and other pressing obligations.

One of the most promising subsidiaries was the Imperial Co., whose property had to shut down because development work was not sufficiently advanced to supply the smelting plant with 700 to 800 tons per day of smelting ore, of high enough grade to yield a profit with 12½% copper. An important shaft lost by fire, would, in a few feet more depth, have entered a large body of sulphide ore, which would have supplied the necessary tonnage and flux for the smelter. The Imperial Copper Co., temporarily needing assistance, could not get it from the Development Co. for the reasons above stated and as it could not do development work, repair the burned shaft, or sink a new shaft, it too, had to shut down.

In 1913 the securities behind the bonds were sold at public auction, and purchased by Wallace Fairbank, Frank M. Murphy and Thomas W. Synnot, acting as a bondholders and stockholders committee. The securities included 250,000 shares of the Imperial Copper Co., and 400,000 shares of the Tombstone Consolidated Mines Co., Ltd., both without value. The stock of the Poland Co. and \$1,211,340.91 certificates of indebtedness, control that company, and the Congress Co. having no bonded debt, is controlled by its stock. The stock and certificates of indebtedness of the Poland Co., and the stock of the Congress Co. were also purchased by the committee.

All the securities purchased by the committee were placed in the treasury of the Congress Co. with the exception of such Congress stock as was set aside to be exchanged for the bonds of the Development Co., on the basis of 50% in stock for 100% in bonds. The committee hopes, even though it has not received much support, to get something worth while for the bondholders.

The Development Co. has brought suit against the Southern Pacific R. R. Co. for \$15,000,000 alleging that loss of its property is directly due to the refusal of the corporation to fulfill its pledged agreement to loan the \$500,000, thus bringing about insolvency to both the parent company and its various subsidiaries.

DEXTER GOLD MINING CO.

A close corporation controlled by Eastern capitalists. **COLORADO**
Property: the

Dexter mine, on Bull hill, Cripple Creek, under lease to C. W. Benkleman, of Denver, and Anderson Bros., of Victor, Colo. Gold ore occurs in veins, 4' wide and proved for 175'.

Development: by 1,200' shaft, crosscuts and tunnel. Has been a steady producer for several years. Average output 600 tons monthly, showing values from \$10-\$30 per ton. **Equipment:** compressor, power plant and surface buildings. Employs about 15 men. Plans further development below the 600' level.

DIAMONDFIELD BLACK BUTTE REORGANIZED MINING CO.

NEVADA

Office: 406 No. Columbia St., Goldfield, Nev. **Officers:** L. K. Koontz, pres.; L. L. Patrick, v. p.; Harry B. Ruhl, sec.-treas., with T. C. Damskey, directors. Andrew J. Canavan, supt. **Inc.** 1905, in Nevada, reinc. April, 1910. **Cap.**, \$2,000,000; shares \$1 par; 1,300,000 outstanding. Transfer office; U. S. Corp. Co., New York, and home office. Annual meeting, July. Listed on Salt Lake Stock Exchange. Two assessments, $\frac{1}{4}c$ in April and 1c in August, 1914, have been called, to meet operating expenses.

Property: the Black Butte mine, 60 acres, in the Goldfield district, Esmeralda Co., and a controlling interest in the Orizaba mine, 6 claims, about 35 miles north of Millers, Nye Co., Nev., belonging to the Orizaba Min. & Dev. Co., and described under that title.

Ore: gold, in numerous veins in fine grained andesite. Up to the present time the main producers have been the "Quartzite" and the "Flat" veins. The former is said to have produced \$500,000 under early lease operations, but values ended within 150' from surface. The "Quartzite" ore-body was cut off by a fault and its downward extension has not been found. The "Flat" vein apparently ends at the tunnel level.

Development: tunnels and shafts; the main shaft is 300' deep and the old Dortch shaft, 350' south of the main shaft, is 200' deep, but little work has been done below the 110' level. Recent work has been on the 300' level of the main shaft and on the 110' level of the Dortch shaft; on the former level a vein is said to have been cut late in 1915 that is 43' wide and assays \$4 to \$12 per ton. Lessees on the 110' level are said to have opened up a body of ore which assays \$40 per ton over a width of $1\frac{1}{2}'$ on the hanging-wall side, with remainder of face of drift in milling ore. This is claimed to have developed later into ore that assayed much better. **Equipment:** includes two 15-h. p. gasoline hoists and a 3-drill air compressor. Future of the company is entirely dependent upon results of development.

DIAMONDFIELD DAISY GOLD MINING CO.

NEVADA

Goldfield, Nevada. **Inc.** 1910, as reorganization of the Goldfield Daisy Mng. Co., of Goldfield, Nev. Property worked under lease by the Justice Gold Mines Co., which see.

DIAMONDFIELD MINING & MILLING CO.

NEVADA

Company operated a lease on the property of the Goldfield Great Bend Mining Co. Practically merged into the Great Bend Co. in 1915.

W. A. DICKEY COPPER CO.

ALASKA

Office: 31 Nassau St., New York. Mine office: Ellamar, Alaska. **W. A. Dickey**, pres.-gen. mgr.; Duncan Edwards, v. p.-treas.; **H. C. Bryan**, sec. **T. W. Blakney**, supt. **Cap.**, \$50,000. Is a close corporation.

Property: 2 miles from tide water at Irish Cove, Prince William Sound, Alaska, is developed by tunnels and has over 1,000' of workings. Ore contains chalcopyrite in lenses along shear zones, in greenstone, with

gold and silver; lenses of gold ore have been developed to a depth of 300'. Shipments of 400 to 600 tons monthly of 12% ore were made to the Tacoma smelter in 1912.

Company is reported to have 800 tons of 15% ore in bins at the mine and is building ore bins and wharf at Irish Cove, preparatory to shipping in 1916. Company bought the Mason-Gleason group, on Fidalgo Bay for \$15,000. The latter group shows high-grade ore, but nearest shipping point is Irish Cove, 3 miles distant.

DIG-GOLD MINING CO.

COLORADO

Inc. 1915. **Cap.**, \$150,000. B. Burke, pres.-gen. mgr.; Chas. Bender, supt. **Property:** the Alpha and Omega mines, on Gold Hill, near Cripple Creek, Teller Co., Colo.

Ore occurs in a vein, 5' wide on 200' level, and is said to assay from \$9-\$60 per ton in gold. Surface work said to show a number of veins containing low-grade ore. **Development:** by 150' shaft. Mine is drained to 200' level by the Roosevelt tunnel. **Equipment:** includes hoist and air compressor. Property is still in the prospect class.

DIVIDEND MINING & MILLING CO.

NEW MEXICO

Moved from Journal Bldg., Boston, Mass., left no forwarding address. Mine near Estey, Socorro Co., N. M. **Officers:** J. M. Bryson, pres.-gen. mgr.; J. E. Simpson, v. p.; B. F. Coburn, sec.-treas.; preceding with F. B. Street, J. Wm. Rice, Samuel Porter, A. B. Spear, Jas. B. Putnam and Halbert E. Parkhurst, directors; W. E. Morong, supt., at last accounts. **Inc.** Sept., 1902. **Cap.**, \$3,000,000. Authorized a \$150,000 five-year 7% bond issue.

Property: 2,000 acres, also coal lands about 16 miles distant. It has been claimed that about \$250,000 has been expended on the mine, which shows some sulphide ore, carrying good values in copper, with a little lead, and small values in gold and silver.

The company has been very free with "estimates" and promised that by merely producing 14,400,000 lbs. of copper yearly, millions of dollars could be earned. Company's advertising was indefensible, and the statement that "there has been no such opportunity for investment since the Calumet & Hecla and United Verde were first put on the market" leads to the conclusion that the promoters of the company were sadly lacking either in sense or truth. At last accounts was endeavoring to settle with bondholders by giving them the property.

DOBIE MINES, LTD.

ONTARIO

Porcupine, Ont. **Officers:** Frank C. Armstrong, pres., 25 Broad St., New York; S. J. LeHurray, sec.-treas. **Directors:** F. C. Armstrong, Geo. C. Loveys, Donald D. Fish, B. Osler, and W. A. J. Chase.

Inc. March 27, 1911, in Ont. **Cap.**, \$1,500,000; outstanding \$1,200,000. Of the issued stock, \$1,100,000 was given to the owners in payment of the property and \$100,000 stock was purchased by the Tisdale Gold Mng. Co., to provide funds for development purposes. Transfer agents: Toronto General Trust Corp., Toronto; Investment Trust Co., Montreal. Listed on Toronto Standard & Mining Exchange, and traded in on the unlisted department of the Toronto Stock Exchange, and on the New York and Boston curbs.

Property: 17 claims, crown patented, in Tisdale Twp., Ont., taken over from the Tisdale Gold Mng. Co., Ltd. Extensive development work is being carried on.

DOCTOR JACK POT MINING CO.

COLORADO

Offices: First Natl. Bank Bldg., Cheyenne, Wyo. and Cripple Creek, Colo. **Officers:** A. E. Carlton pres.; J. A. Hayes, v. p.; V. H. Mann, sec.-

treas., L. G. Carlton, mgr., with H. L. Shepherd, Ira Harris, F. H. Gay, A. M. Stevenson, directors. Inc. Aug. 31, 1905, in Wyo. Cap., \$75,000; shares $2\frac{1}{2}$ c par; \$71,083 outstanding; nonassessable. Colorado Title & Trust Co., Colorado Springs, transfer agents. Annual meeting, 2nd Wednesday in June. Listed in Colorado Springs and Denver. Balance sheet Jan. 1, 1916, shows cash \$114,742, accounts receivable \$486. No liabilities.

Gross production by present company, Sept. 1, 1905, to Dec. 31, 1915, \$1,330,280; under former owners about \$2,480,000. Gross earnings 1914-1915, \$89,483, of which \$87,333 was from ore sales; operating expenses, \$28,341. Dividends: to Jan. 1, 1916, \$90,000; last dividend, \$15,000, paid March, 1910.

Property: 15 claims, 99.3 acres, patented, on Raven hill, Cripple Creek, said to show gold ore in fissure veins. **Development:** tunnels and vertical shafts, amounting to several miles of underground workings with deepest at 900'. The Raven tunnel is over 3,000' long. During last half of 1915 company is said to have done 939' of work at a cost of \$10,000, while lessees did 500' at a cost of \$3,500.

Equipment: includes a 52-h. p. electric hoist and air compressor. Electric power is used. **Production:** in 1915, 14,719 tons gold ore, average grade \$19.98 per ton.

DOE RUN LEAD CO.

MISSOURI

A subsidiary of the St. Joseph Lead Co., and described thereunder.

DOLORES MINES CO.

MEXICO

Subsidiary of the Mines Co., of America, which see.

DOLORES MINING & DEVELOPMENT CO.

MEXICO

Address: care J. E. Dawson, pres., Oakland, Cal.; J. F. Torney, sec. Inc. Jan., 1910, to take control of the Empire Mining Co., S. A., a company protocolized in Mexico, which owns the Major Domo claim, 5 miles from Cananea, Sonora, Mexico, and 7 other properties, including the Golden Cross silver mine, Magdalena district, Sonora, Mex. See Empire Mining Co.

DOLPHIN MINE

ARIZONA

Prof. W. H. Temme, c/o Temme Engineering Co., Evansville, Ind., mgr. and engr. **Property:** in Turkey Creek, 5 miles from Poland, Yavapai Co., Ariz., said to show gold quartz ore. Developing in 1915-16. **Equipment:** 20-stamp mill and steam hoist.

DOME EXTENSION MINING CO.

ONTARIO

South Porcupine, Ont. **Officers:** W. S. Edwards, pres.; Alex. Fasken, sec., with J. S. Wilson, Jas. Playfair, and S. B. Morris, directors. H. C. Anchor, mine mgr. Inc. Jan., 1911, in Ont. Cap., \$3,000,000; par \$1; 2,300,000 shares issued. Annual meeting in May. Listed in Toronto and on New York curb.

Property: 5 claims, adjoining Dome Mines, Ltd., on the east, in the Porcupine district. Reported that the Dome Mines, Ltd. has taken an option on the property, effective until Oct. 15, 1917. Basis of exchange is 50 shares Dome Extension for one of Dome Mines, the Dome Extension to be allowed to develop on its own account.

Development: 3 shafts over 200' deep and about 10,000' of underground workings, said to have opened up considerable ore of too low grade to be treated profitably at that time. The mine was closed down for some time, but results obtained on the Dome Mines property indicated a continuation of its orebodies into Dome Extension ground and work has been resumed. Dome Extension is reported to be planning on diamond drilling to test a number of veins at depth, and Dome Mines, Ltd., on driving east on the 850' level from its No. 3 shaft into Dome Extension ground.

DOME LAKE MINING & MILLING CO., LTD. ONTARIO

New Liskeard, Ont., and South Porcupine, Ont. **Officers:** Geo. Taylor, pres.; A. A. McKelvie, v. p.; with Thos. McCamus, S. S. Ritchie, and Chas. J. Sherrill, directors. F. L. Hutchinson, sec.-treas.

Inc. Aug. 26, 1912. **Cap.**, \$2,500,000; shares \$1 par, reduced to 500,000 shares, Feb., 1913; increased to \$1,000,000 in Feb., 1914, and to \$2,000,000 in 1915. Outstanding Feb. 10, 1916, \$1,247,077. **Trusts & Guarantee Co., Ltd.**, Toronto, transfer office. Annual meeting 2nd Monday in Feb. Listed in Toronto and on New York curb. The Hudson Bay Mines, Ltd., purchased 540,000 shares of Dome Lake stock for \$119,375, and holds an option on the balance of treasury stock; Hudson Bay Mines, Ltd., in Oct., 1915, owned 460,900 shares.

Property: 3 claims, patented, 120 acres, in Tisdale Twp., Porcupine. Gold ore occurs in shoots as replacement deposits. Veins have strike of N. 10° E. and dip of 70°. Recent work is said to prove that the mineralized zone traverses the company's property instead of dipping into property on the north. Country rock is basalt.

Mine No. 1 was closed down, June, 1914, practically all the ore having been extracted. In 1915 underground work at Mine No. 2 amounted to 837' and was done near the Cobalt Lake fault. Diamond drilling revealed a large extent of conglomerate rock in which the silver veins occur.

Development: by 400' shaft with lowest workings at 446' and total underground workings of about 1,000'. In raising from the 300' to the 180' level, Feb., 1916, it is claimed that a 6' body of \$8 ore was found. Work at Mine No. 2 was discontinued Mar., 1916, to be resumed in the summer. **Equipment:** includes a Vulcan hoist, air compressor and 180-ton stamp mill.

Production: since Dec., 1914, when the mill was started, to Sept. 1, 1915, amounted to 12,975 tons of ore yielding \$63,738 in bullion and \$8,776 in concentrates. Recovery was 79.8%. Loss in tailing was heavy and the company is now building a cyanide plant to get a better extraction. Average grade of ore milled was \$9.12 per ton. Total mine operating costs over this period were \$3.90 per ton.

The property has not been as successful as hoped for, but the management believes that continued active development will prove the mine to be valuable.

DOMINE MINES, LTD. ONTARIO

Executive and financial departments: 43 Exchange Place, New York City. **Head office:** 36 Toronto St., Toronto, Ontario, Canada. Mine and works: South Porcupine, Ont. **Officers:** J. R. De Lamar, pres.-treas.; W. S. Edwards, 1st v. p.; C. D. Kaeding, 2nd v. p.-gen. mgr.; H. P. De Pencier, 3rd v. p.; Alex. Fasken, sec.; A. H. Curtis, asst. treas.-sec., preceding, except H. P. De Pencier and C. D. Kaeding, with Andrew V. Stout, G. C. Miller and J. S. Wilson, directors.

Inc. March 23, 1910, in Ont. **Cap.**, authorized \$5,000,000; outstanding \$4,000,000; shares \$10 par. Guaranty Trust Co., New York, and Trusts & Guarantee Co., Ltd., Toronto, transfer agents. Bankers Trust Co., New York, and Toronto Genl. Trusts Corp'n, Toronto, registrars. Annual meeting, last Tuesday in May. On June 23, 1915, the New York Stock Exchange listed \$3,500,000 of the capital stock with authority to add \$500,000 on official notice of issuance and payment in full.

Dividends: present rate, 20%, payable quarterly, March 1st, etc. On July 30, 1915, an initial quarterly dividend of 50c per share was declared, payable Sept. 1, 1915. Total dividends to March 1, 1916, \$600,000.

Comparative General Balance Sheet: years ending March 31:

	Assets					
	Bldg. Equip., Construction, Etc.	Inven- tories	Current	Ins. Unexpired	Int. Accrued	Total
1916	\$4,050,798	\$172,518	\$806,794	\$102,348(a)	.....	\$5,132,458
1915	3,724,070	102,921	377,623	1,642	\$1,854	4,208,110
1914	3,753,878	97,025	232,039	1,796	1,143	4,085,884

Liabilities

	Liabilities					Total
	Cap. Stock	Accts. Pay.	Taxes Accrued	Accident Fund	Surplus	
1916	\$4,000,000	\$93,050(b)	\$14,636	.....	.....	\$5,132,458
1915	3,500,000	42,212	800	.....	\$665,098	4,208,110
1914	3,500,000	92,580	2,308	\$4,476	486,520	4,085,884

(a) Includes undistributed development expenditures, \$98,506. (b) Includes payrolls, \$37,670.

Profit and Loss Statement: years ending March 31:

	Gross		Int., Disc. and Exch.	Balance	Dev. Deprec. & Improv.	Surplus
	Earnings	Net Earnings				
1916	\$1,778,959	\$889,365	\$23,015	\$912,380	\$370,518	\$541,861
1915	1,055,497	481,620	6,878	488,498	309,920	178,578
1914	1,204,597	750,633	2,695	753,328	295,631	457,696

Property: 6 claims, 240 acres, in Tisdale Twp., Ont. The geology is fully described in report of Ont. Bureau of Mines, 1915. Ore is white quartz carrying free gold and auriferous pyrite, occurring in a stockwork of veins and stringers netting schists of pre-Cambrian age. The orebody is large, being over 100' across in places and has been proven by diamond drill work for 500' or more. The original outcrop, a dome-shaped hillock about 30' high, showed so much free gold at one place that it was called the Golden Stairway. Has option on adjoining property of Dome Ex. M. Co.

Development: by 9 shafts, No. 2 shaft, 477' deep, is the main working shaft. A new central shaft is now being sunk to the 850' level; its location was thought to be out of the ore zone, but at 625' in depth \$15 ore was found. There is a level at 45' and 6 levels below this; numbering of levels beginning at the 100', or first level. The 6th level is at depth of 553'. Development work has been distributed over a zone 1,500' long and 400' wide. In year ending March 31, 1916, underground work totaled 11,705' compared with 6,223' the previous year, and diamond drilling footage totaled 5,654' compared with 5,875' the previous year. Of the 5,654' of drilling done 235' was drilled from surface. Total underground work March 31, 1916, was 32,436', besides 23,524' of diamond drilling.

Ore reserves: estimated April 1, 1916, as 2,600,000 tons, average grade \$6.20 in gold per ton, or a total value of \$16,120,000 compared with the estimate of previous year of 2,782,811 tons of \$4.15 ore. Work done since March 31, 1915, has greatly increased the ore reserves. Diamond drill hole No. 52 drilled from the 6th level horizontally from a point 40' S. W. of No. 2 shaft, showed 5 intersections of ore totaling 127' and averaging \$4.42. Hole No. 53 drilled horizontally and 75' E. of No. 52, showed 2 intersections of ore totaling 233' and averaging \$7.28. This ore was not included in estimate of ore reserves in 1915.

Equipment: includes a crusher on the 5th level, automatic loading hoppers, 5-ton cars and 4-ton skips. Shrinkage stoping system is used.

The company owns a mill and cyanide plant. The mill originally had 80 stamps with a monthly capacity of 28,000 tons, but through the substitution of ball mills for stamps it is expected to increase the capacity to 45,000 tons by the middle of 1916. Milling was started in 1912.

Water is obtained from Porcupine Lake by means of 2 electrically-driven 4-stage turbine pumps. Electric power is obtained from Wawaitin Falls, 13 miles from the property. Three-phase current is supplied over the Company's transmission line at a pressure of 12,000 volts, stepped down to 550 volts by three 600-k. w. Westinghouse transformers.

Production and costs since milling started, March 23, 1912, for fiscal year ending March 31st:

Year	Tons Milled	Value Per Ton	Rec. %	Costs Per Ton			Total
				Mng.	Reduct.	Gen.	
1916.....	347,640	\$ 5.50	92.88	\$1.22	\$1.01	\$0.32	\$2.56 (b)
1915.....	248,550	4.68	90.6	1.38	1.12	0.46	2.97 (b)
1914.....	145,305	8.77	94.51	1.86	1.69	0.64	4.19
1913.....	101,812	10.72	95.63	1.31(a)	2.35	1.29	4.95

(a) Does not include development. (b) Reduction due to larger units of operation, improved methods, and greater efficiency.

DOME MINING CO.

ARIZONA

Office: 805 H. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Ariz. **Directors:** C. P. Campbell, pres.; C. C. Spicer, v. p.; A. M. Wheelock, sec.-treas. **Inc.** Oct. 9, 1915, in Arizona. **Cap.**, \$100,000; shares 10c par; nonassessable; 500,000 shares in treasury. Annual meeting last Saturday in Sept. Listed on Los Angeles Exchange. Company reports \$1,000 in treasury, April 17, 1916.

Property: 32 acres, unpatented, at Oatman, Mohave Co., Ariz. Developed by 40' shaft and a little trenching. Management states that a hoist will soon be added. Property is a prospect.

DOMINION GOLD MINING CO.

MANITOBA

(See Calumet-Corbin Co.) **Office:** 802 Pioneer Bldg., St. Paul, Minn. **Officers:** Bernard Noon, pres.; J. P. Fetsch, v. p.-treas.; Jas. E. Liebe, sec.; with N. L. Watson and George Warner, directors.

Inc. Oct. 5, 1915, in Ariz. **Cap.**, \$2,500,000; outstanding Dec., 1915, \$1,500,000; shares \$1 par. Registrar & Transfer Co., New York, registrar and transfer agt. Cash on hand, Nov. 8, 1915, \$5,500. Listed on New York curb as a prospect. Outstanding shares 1,500,000, used in the purchase of property. Of this amount 1,000,000 shares were set aside to be given to stockholders of the Calumet-Corbin Mines Co., of Maine, in exchange for stock of that company, received by them in exchange for stock of the old Calumet-Corbin Mining Co., of Ariz., when the reorganization was effected early in 1915. "Reason for the gift of this stock to the stockholders of the Calumet-Corbin Mines Co. is stated by those giving it to be because they feel a certain measure of responsibility for the failure of the old Calumet-Corbin Mining Co., to make good, and because their efforts to bring it to a successful issue through its reorganization into the Calumet-Corbin Mines Co. failed." If the whole 1,000,000 shares are exchanged it will make the Dominion Gold Mining Co. a stockholder of the Calumet-Corbin Mines Co. to that extent.

Property: 6 claims, 280 acres, held by location, not contiguous, in the Gold Lake mining district, 100 miles N. E. of Winnipeg, Manitoba. Nearest P. O. is Manigotagan, at mouth of Manigotagan River, on eastern shore of Lake Winnipeg. Mine reached by boat to Manigotagan from either Selkirk on Red River, 23 miles north of Winnipeg, or from Gimil, or Icelandic Riverton, on the Gimil branch of the C. P. R. R.

The Gold Seal and Gold Pan claims, which were said to belong both to this company and to the Calumet-Corbin, are reported "abandoned 1915" the office of the New York curb.

The property is practically undeveloped. The country generally is covered by a swamp. Claims are said to show quartz veins "well exposed at the surface, except where covered by the swamp," and to contain considerable free gold. Management intends to do development work on the veins, ascertaining if veins and values continue to depth. Stock is a rank gamble.

DOMINION MINING CO.**NOVA SCOTIA**

Tangier, Halifax Co., N. S. W. J. Prinsk, mgr. Company owns a gold mine at Tangier. Production, 1914, amounted to 419 tons ore, yielding 57 oz. gold.

DOMINION NICKEL-COPPER CO., LTD.**ONTARIO**

Property taken over by British-American Nickel Corporation, which see.

DOMINION REDUCTION CO., LTD.**ONTARIO**

Offices: 42 Broadway, New York City, Cobalt, Ont. Officers: D. M. Steindler, pres.; Mortimer B. Davis, v. p.; E. P. Steindler, sec.-treas., with A. A. Allen and A. G. Kirby, directors. A. G. Kirby, supt. Inc. 1912, in Ont. Cap., \$2,000,000; shares \$1 par; \$1,600,000 outstanding. All the stock is held by the directors.

Company took over the Nova Scotia mill at Cobalt. Mill has 40 stamps, rated capacity 200 tons per day, and treats custom ore, including low-grade ore from the Kerr Lake and Crown Reserve mines, with which the mill is connected by an aerial tram. All ore is purchased outright and reduced to bullion; payment is made in cash or in bullion. Company also owns and operates the property of the Croesus Gold Mines, Ltd., in Munroe Twp., 50 miles E. of Porcupine.

DONNA DORA MINING CO.**NEW MEXICO**

Organ, Donna Ana Co., N. Mex. Reorganized as Mineral Hill Mining Co., which see.

DOUGLAS COPPER CO.**ARIZONA**

Office and secretary: Fred L. Mason, P. O. Box 421, Globe, Ariz. T. C. Hendricks, pres.; H. M. Foster, v. p.; Chas. Davis, supt. Inc. Aug., 1910. in Arizona. Cap., \$1,125,000.

Property: 35 claims, about 30 miles from Globe on the wagon road, and midway between the towns of Ray and Superior, Pinal county, Ariz. Lands are traversed by several N. W.-S. E. fissure veins of limestone and quartzite, carrying gold, silver and copper in oxidized ores or as bornite and chalcopyrite. Development: by 2 tunnels, a shallow shaft and a number of open cuts, all on one large vein. Management expects to sink shaft to 500' in depth. Property lies west of the limestone uplift in which the Newman group is located. From personal inspection, the claims are regarded as of highly speculative value.

DOUGLAS, LACEY & CO.**NEW YORK**

Company was notorious promoter of numerous mining and oil propositions and was in hands of a liquidating organization, known as the Amalgamated Properties, Inc., at last accounts. Mr. Steven's opinion of this firm and their clever scheme for obtaining money from small investors is fully described in Vol. X, under the title given above and that of the Amalgamated Gold & Copper Co. of Arizona.

DOUGLASS COPPER CO.**MICHIGAN**

Office: 705 Sears Bldg., Boston, Mass. Property north of Allouez and west of Ahmeek holdings in Allouez township, Keweenaw county, Mich. Officers: Charles J. Paine, Jr., pres.; George P. Gardner, v. p.; Arthur E. Coe, sec.-treas.; preceding with R. S. Shelden, C. C. Douglass, W. A. S. Chrimes and A. S. Knight, directors. Inc. 1912, in Michigan. Cap., \$2,500,000; shares \$25 par; assessable; 50,000 shares given for land, marked \$10 paid in value.

Property: 440 acres in a compact tract, being E. $\frac{1}{2}$ of Sec. 30 and W. $\frac{1}{2}$ of Sec. 29, embracing eleven 40-acre tracts formerly owned by the Sheldon Douglas and the Northey estates, and the St. Mary's Mineral Land Co. This tract covers the underlay, or deep extension of the Kearsarge lode into which the rich oreshoot now worked in the Ahmeek, pitches. To open this ground a 3,300' vertical shaft must be sunk. Company reported to have acquired 40 additional acres between Ahmeek and Allouez in 1916.

Management plans selling treasury stock to raise necessary funds for development work.

DOWN TOWN MINES CO.

COLORADO

Offices: Chemical Bldg., St. Louis, Mo., and Leadville, Colo. **Officers:** J. L. Goff, pres.; J. C. Waldeck, v. p.; Chas. J. Walker, sec.-treas., with C. W. Chamberlain, W. T. Nardin, directors. Jesse F. McDonald, mgr. Inc. March, 1914, in Colo. **Cap.**, \$400,000; shares \$10 par. Company has 20-year leases on several of the downtown mines at Leadville.

Property: 400 acres, includes a number of old mines which have produced several millions. The mines have been idle for a number of years; it was thought that all the valuable ore had been extracted, but in former mining no zinc ore was taken out. The present company was formed to unwater the mines and resume mining operations. As underground workings are estimated to be 30 miles in extent the task of unwatering is a large one. Pumping, which started in May, 1915, is done at the Penrose shaft with 4 electric vertical, centrifugal pumps. Property will be drained to the 875', the lowest level, and mining will then be resumed.

DOYLE CONSOLIDATED MINES CO.

COLORADO

Mine office: Mancos, Montezuma Co., Colo. **Officers:** Hon. Jas. Doyle, pres.; Earl P. Hopkins, v. p.; E. R. Marden, sec., 1426 You St., Washington, D. C.; D. T. Thompson, treas.; preceding with Wm. W. Fry and J. J. Butler, directors; R. J. Doyle, mine supt.; R. C. Morrison, mill supt.; C. F. Doyle, engr. **Inc.** Oct. 21, 1907, in Arizona, as consolidation of the Mancos Mining & Development Co., the Cliff Dwellers Gold Mining Co. and the White Quail Copper Co. **Cap.**, \$10,000,000; shares \$1 par; nonassessable; issued about \$3,000,000.

Property: 31 claims, in 3 groups of about 300 acres in Rush basin, part of the California mining district, Montezuma and La Plata counties, in southeastern Colorado. Claims are in a high part of the Sierra La Plata, $3\frac{1}{2}$ miles from La Plata city and 4 miles from the Colorado Southern railroad. The White Quail group shows a copper-bearing "dike" of monzonite, porphyry, said to be 150' across and to average $2\frac{1}{2}\%$ copper and \$4 gold across its entire width. Other claims cover about a mile of the apex of the Sundown (or North Star) vein, a flat, dipping fissure in red quartzite, carrying milling ore with gold and silver values. Company developed properties for several years, through Columbus tunnel. Had 10-stamp mill in 1910 and erected a new 150-ton mill, operated July, 1912. Company advertised for lessees in 1914.

Property has thus far failed to fulfill the extravagant claims and promises of the White Quail promoters, or their successors.

DRAGON CONSOLIDATED MINING CO.

UTAH

Office: care Knight Investment Co., Provo, Utah. Mine near Tintic, Juab Co., Utah. **Officers:** Jesse Knight, pres.; J. Will Knight, v. p.; W. Lester Magnum, sec.-treas.; R. E. Allen and L. E. Ritter, directors; E. R. Higginson, supt. **Inc.** 1911, in Utah. **Cap.**, \$2,000,000; shares \$1 par; issued 1,750,000; 250,000 in treasury. Stock listed in Salt Lake City. Annual report for year ending Dec. 31, 1915, shows assets, \$2,006,266, which includes: mining property, \$1,636,931; cash and accounts receivable, \$40,000.

and liabilities, \$6,266. Receipts totaled \$103,982 from ore sales, and operating expenses \$78,285, leaving a net gain for the year's operations of \$25,697, and a total gain to date of \$68,857.

Property: 28 claims, patented, 122 acres, comprising the Dragon and Governor groups in Tintic district. The Governor group has 2,000' or more of the big Iron Blossom fissure in limestone, from which the great production of that and the Sioux mines has come. The Dragon group shipped 100 tons per day of iron ore to the U. S. smeltery, for a long time. The Governor ground has a rich orebody of copper-silver ore developed by drifts from the Iron Blossom on the 300', 600', 800' and 1,000' levels, showing a 20' vein with 0.5 to 10% copper and 20 to 50 oz. silver. Part of the property is worked through the Black Jack shaft.

In 1915 development work consisted of 1143' of drifting, 983' of tunneling and about 400' of raises, winzes and opencuts. In the tunnel connecting the workings with the Iron Blossom property, large bodies of low-grade ore were encountered. Work is being prosecuted on the 800' level, in 1916.

Equipment: includes electric pump on 1,000' level which secures water supply of the Knight-Christensen mill, and a hoist installed in 1915.

Production: 1,743 tons in 1914, yielding 44,006 oz. silver, 135,814 lbs. copper, 57,552 lbs. lead and 432.37 oz. gold; 7,804 tons in 1915, yielding 102,143 oz. silver, 490,750 lbs. copper, 14,766 lbs. lead and 2,559 oz. gold.

DRUID GOLD MINING CO. COLORADO

Office: 420 Equitable Bldg., Denver, Colo. **Officers:** J. F. Vaile, pres.; W. N. Vaile, v. p.; C. A. Chisholm, sec.-treas.; Geo. E. Collins, E. M., mgr., with H. N. Berry, directors. Inc. in Colorado. Cap., \$1,000,000; shares \$1 par; nonassessable; all issued

Property: 11 claims, 95 acres, in Russell mining district, Clear Creek & Gilpin Co., Colo., has a complex system of fissure veins, carrying gold, silver, lead and copper in Archean schist. Developed by 1¼ miles of underground workings, including 1,200' tunnel and several shafts, deepest 650'. Equipped with steam hoists.

Production: in 1914, 457,565 tons smelting ore and 369,837 tons crude milling ore; in 1915, 259,916 tons smelting ore and 220,060 tons crude milling ore, latter averaging \$29.78 per ton. Gross earnings for 1915 were \$14,293 from ore sales and operating expenses were \$16,391, resulting in a loss of \$2,097 to the company. Property operated continuously for past 12 years.

DRUMMOND FRACTION ONTARIO

Property: 6 acres, at Cobalt, sold by Cobalt Comet Mines, Ltd., to Crown Reserve Mining Co., Ltd., and Kerr Lake Mining Co., Ltd., and operated jointly by them until Aug. 1, 1915, when the ore in vein No. 1 was all stoped out. Development in the future will be carried on from the workings of one of the above companies.

Production: 1915, to Aug. 1, was 89,968 oz. silver, with operating profit of \$20,502.

DRY CANYON CONSOLIDATED MINING CO. UTAH

Property: 29 claims, 12 patented, 400 acres, in Dry Canyon, Ophir mining district, Tooele Co., Utah. **Officers:** C. J. Garber, pres.-treas.; L. L. Travis, v. p.; J. E. Darmer, sec., with V. C. Anderson and Violet S. Scribner, directors. Inc. 1900, in Utah. Cap., \$100,000; shares 5c par, assessable; 1,800,000 shares outstanding. Annual meeting, Jan. 15th.

Property: 29 claims, 12 patented, 400 acres, in Dry Canyon, Ophir mining district, Tooele Co., Utah, said to show gold, silver, copper, lead and zinc ore, but not in commercial quantity at present. Miners said to have produced a little ore before present company acquired it. **Development:** by tunnels with a total of 7,500' underground workings. Company is developing.

DUBUQUE MINING & TUNNEL CO.**COLORADO**

Idle. Office: Colburn Bldg., Denver, Colo. Mine near Idaho Springs, Clear Creek Co., Colo. Officers: E. A. Colburn, pres.; W. W. Kirby, v. p.; J. A. Wright, sec.-treas.; preceding with B. L. Gorich and D. C. Waugh, directors. Inc. Dec. 4, 1905, in Colorado. Cap., \$2,000,000; shares \$1 par. Property: 2 claims, known as the Dubuque mine, opened by a 460' tunnel, said to show a 6' vein with a 3' paystreak carrying copper carbonates and melaconite, with good gold values.

DUCKTOWN SULPHUR, COPPER & IRON CO., LTD. TENNESSEE

Office: 1 Gresham House, Old Broad St., London, E. C., Eng. Mine office: Isabella, Polk Co., Tenn. Officers: J. G. Gordon, chairman and managing director; L. G. Mortimer, managing director; preceding with Col. J. Le G. Daniell, H. G. Palmer, Edward Dexter and Col. H. B. Mortimer, directors; Windsor Berry, sec.; William Young Westervelt, 17 Madison Ave., New York, cons. engr. Executives at the mine: C. W. Renwick, gen. mgr.; W. F. Lamoreaux, asst. gen. mgr.

Inc. in Great Britain, Feb. 16, 1891. Cap., £75,000; shares £1 par, in £74,800 ordinary shares and £200 founders' shares. Increased 1907, to £200,000 shares, increase subscribed to by the old stockholders at par, except £48,799 ordinary shares sold to the public at 25s. Stock is fully issued and fully paid. Profits are divisible on the basis of 7%, plus, one-half of the net remaining profits, to ordinary shares, balance of profits going to founders' shares. £120,100 first mortgage, 6½%, debentures outstanding, against which special redemption fund of £10,000 has been set aside, in addition to a general reserve fund of £45,000, previously accumulated.

Recent Dividends:

	Shares Ordinary	Shares Founder's		Shares Ordinary	Shares Founder's
1907.....	82½%	£249:3	1912.....	10 %	£29:19:5
1908.....	55 %	108:18	1913.....	12½%	54:18:11
1909.....	10 %	16: 0:8	1914.....	12½%	54:18:11
1910.....	10 %	21:17	1915.....	8 %	9: 9:10
1911.....	10 %	28: 4:5			

Total dividends including 1915, paid to all classes of shares, £492,129. Of this, £323,587, amounting to 355 5/6% on shares outstanding at the times of payment, was paid to the ordinary shares, and £168,532, amounting to 84,266% was paid to the founders' shares, the latter constituting the world's record for profitable copper-mining investment.

Property: nearly 7,000 acres, bought for £68,057, includes the Mary, East Tennessee and Isabella mines, which are active, and the Calloway and Cherokee mines which are idle. Country rocks consist largely of very tough highly metamorphosed, silicified mica schists, of ancient origin. The ores are exclusively sulphide, averaging about 2½% copper and containing minute quantities of gold and silver, sufficient however to be appreciable to the matte.

The Mary mine, which is the principal producer, has heretofore yielded largely through the 3-compartment 350' Baxter shaft, and from the 2-compartment 375' No. 2 shaft. The new Gordon, 3-compartment 1,180' shaft is however, the principal producer. The richest ore in the mine is on the lower levels. Ore actually blocked out in the Spring of 1916 is in excess of 1,000,000 tons, averaging over 2% copper and 17% sulphur.

The East Tennessee mine, idle since early days, did not commence to produce until 1910. The Thomas, or operating shaft, is 700' deep, has 2 compartments and yields from 50 to 75 tons per diem of ore containing

about 3½% copper and 10% sulphur. Reserves of over 30,000 tons of average ore had been proven in the spring of 1916.

The *Isabella* mine has thus far yielded but a few thousand tons of ore a year. The ore, averaging about 0.8% copper and 29% sulphur, has as yet been used for little else than experimental purposes. 5,600' of systematic diamond drilling, however, has already revealed over 2,500,000 tons of average ore with excellent prospects beyond, so that doubtless the property will, eventually, be worked on a considerable scale for acid and iron manufacture.

Equipment: the power plant at the smelter was enlarged in 1910 and changed from direct to 440-volt, 60-cycle, 3-phase, alternating current, two 500-k. w. Westinghouse-Parsons turbine generator units being installed, including air compressor for acid plant, etc., totaling about 1,500 h. p. The smelter, which is located at *Isabella* on the company's private, standard-gauge railway, about 2½ miles from the *Mary* mine, consists primarily of two 500-ton, sectional water-jacket blast furnaces. These furnaces are operated by induction motor Connersville blowers of 300 cu. ft. per revolution aggregate capacity, charged with Freeland patent electrical charges and served with electrical traveling crane for the mattes and belt bucket elevators for the granulated slag. Since 1905, when heap-roasting was abandoned, semipyrritic smelting, introduced into this country from Tasmania by this company, has been employed. The first fusion gives a matte containing from 15 to 20% copper and disposes of the bulk of the non-valuation material of the ore in a slag containing from 0.2 to 0.3% copper. This coarse matte is then raised to 50% copper content by a second fusion in the same furnace, usually undertaken once a week. A small percentage of coke, with cold blast of from 20 to 30 oz. pressure is used in both fusions. The 50% matte is sold to the American Metal Co., of New York, and treated for them at the Laurel Hill, L. I., or the Carteret, N. J., smelters.

In 1915, investigations were undertaken to determine the possibility of making sulphuric acid from the smelter fumes. In 1906, an experimental contact plant was erected but proved unsuccessful, and in 1908, work on the present chamber acid plant was commenced. This plant, which cost over \$600,000, was put into operation in less than a year from the time of breaking the ground for its erection and has since been producing at the rate of from 40 to 50 thousand tons per annum of 60° Beume sulphuric acid. It was the first acid plant to successfully convert sulphuric gases from pyritic smelting into concentrated acid. In 1915 a 50-ton acid concentrating plant was installed.

The credit for the successful development of the company is due primarily to the chairman and managing director, Mr. Gordon, himself a technical man, to the consulting mining engineer, Mr. Westervelt, who developed the mines, to the former manager, Mr. W. H. Freeland, assisted by the present manager, Mr. Renwick, who developed the pyritic smelting process employed, and to Mr. N. L. Heinz, chemical engineer, who designed and erected the present acid plant.

Production:

Year	Pounds Copper	Tons 60° B. Sulphuric Acid
1915.....	5,500,000	41,000
1914.....	5,862,000	46,900
1913.....	5,811,000	48,800
1912.....	5,213,000	48,100
1911.....	5,040,000	45,600
1910.....	4,409,000	46,800

Company is managed with commendable financial probity, technical

ability of a high order, and is heartily endorsed as worthy of confidence and investment.

DUENWEG LEAD & ZINC CO.**MISSOURI**

Webb City, Jasper Co., Mo. Inc. in Mo. **Cap.**, \$3,000. Has \$12,000 invested in land and plant. Operates a lease on 20 acres of J. I. Walker land; has one 180' shaft and a 200-ton concentrator. Output is lead and zinc concentrates.

DUGWAY COPPER MINING & SMELTING CO.**UTAH**

Office: 54 East 4th South St., Salt Lake City, Utah. Mine office: Clover, Tooele Co., Utah. **Officers:** O. F. Peterson, pres.-gen. mgr.; P. C. Kittle, v. p.; A. V. Peterson, sec.; O. F. Peterson, treas.; preceding with A. E. H. Peterson and H. B. Windsor, directors. Inc. June 13, 1902, in Utah. **Cap.**, \$30,000; shares 10 cts. par, assessable; issued, \$22,506.20. Annual meeting, third Tuesday in July.

Property: 6 claims, patented, 118 acres, in the Dugway district, 43 miles from a railroad. Shows an ore zone, reported by company, to be 300' long on the 200' level, containing a number of orebodies that carry chalcocopyrite, bornite and argentiferous galena, giving assays of 1 to 15% copper, up to 30% lead, up to 7% zinc, up to 66 oz. silver, and \$1.60 gold per ton. **Development:** by a 333' incline shaft, with about 1,000' of workings, showing considerable ore of good average assay tenor. Mine has no power equipment. Has been idle for several years.

DULUTH & CHIRICAHUA DEVELOPMENT CO.**ARIZONA**

Reorganized, 1912, as Sullivan Development Co., which see.

DULUTH-LEMHI MINING CO.**IDAHO**

Office: 416 Lonsdale Bldg., Duluth, Minn. Mine office: Baker, Lemhi Co., Idaho. **Officers:** Capt. J. H. Lanyon, pres.-gen. mgr.; A. R. Anderson, v. p.; W. H. Locker, sec.-treas.; preceding with C. H. Bird, H. P. Gill, and P. J. Blais, directors. Inc. Aug., 1910, in Minnesota. **Cap.**, \$250,000; shares \$1 par, nonassessable; issued, \$130,000. Annual meeting, first Tuesday in August.

Property: 6 claims, 120 acres, said to carry 1,000,000' of standing white pine, also a 7-acre mill site, 3 miles from a railroad, in the Wimpey Creek district. Mine shows diorite-porphry carrying 2 orebodies, of 4' and 16' width, traceable 1,800', carrying cuprite, azurite, malachite, and chalcocopyrite, estimated by Capt. Lanyon to average 6% copper, 4 oz. silver and \$8.50 gold per ton. Property is independently reported to have a 2' vein with an orebody assaying about 3% copper. The mine has a 140' tunnel, planned to be driven 427'. Management planned continuous development by tunnel. No recent reports received.

DULUTH-MOCTEZUMA MINING CO.**MEXICO**

Office: Room 610, Lonsdale Bldg., Duluth, Minn. **Officers:** Geo. H. Crosby, pres.; Cassius Bagley, v. p.; A. O. Rabideau, sec.; all of Duluth. Inc. 1909, in Minnesota. **Cap.**, \$500,000; shares \$10 par; \$300,000 issued. Company owns 5 undeveloped claims, with showings of lead, zinc and silver, in the Moctezuma district, Sonora, Mex. It lost the Monte Cristo, its only producing property, on which a payment of \$50,000 had been made.

In 1912, company took a lease on a 30-ct. royalty basis on 40 acres of iron land in the Cuyuna range, Minn. Drilling proved about 1,000,000 tons commercial ore and 500,000 of 40% ore on a small part of this tract. The lease was sold and the only holdings of the company are those in Mexico. Company is practically moribund.

DULUTH-SONORA COPPER CO.**MEXICO**

Office: 809 Sellwood Bldg., Duluth, Minn. Mine near Cananea, Sonora, Mex. **Officers:** James W. Norton, pres. and gen. mgr.; B. Silberstein, v. p.;

R. P. Burgan, 2nd v. p., with W. D. Underhill, sec.; Theron H. Hawkes, treas.; preceding with Geo. M. Tallant and A. F. Norton, directors. P. C. Probert, mine and smelter supt. and purch. agt.

Property: about 3,621 acres, embracing a part of the former holdings of the Calumet & Sonora Co., and the South Cananea, or Mitchell, property. The latter shows a strong vein with wide silicious outcrop and has been developed by a 400' shaft and some underground work, but an examination of dumps fails to show ore. Norton shaft, one-fourth mile distant, now filled with water, is said to be 293' deep and to show good ore, but none is seen and outcrop is unpromising. Remainder of property considered of questionable value. Property has been examined by Verne A. Hart and Walter Harvey Weed. Idle since 1910. Is a prospect only.

DULUTH & UTAH DEVELOPMENT CO.

UTAH

Idle. **Office:** 503 Utah Savings & Trust Bldg., Salt Lake City, Utah. E. J. Raddatz, pres.-treas.; Peter Porter, v. p.; Harvey J. Jones, sec. **Inc.** in Utah. **Cap.**, \$500,000; shares \$10 par, as successor of No-U-Dont Mining & Milling Co.

Property: 4 fractional claims, about 50 acres, near the Honerine tunnel and next north of the Honerine mine, which carries copper, at considerable depth. Mine has 2 shafts, deepest 500', with about 3,000' of workings, and under former ownership, produced silver-lead ore from above the 500' level, shipments said to have returned 35 to 60% lead and 20 to 30 oz. silver per ton, and to have aggregated \$250,000 in value. Copper ore is expected at depth.

Property will be absorbed by Bullion Coalition Mining Co. upon completion of payment of the \$15,000 purchase price. Part payments in 1914 and Feb., 1915, have already been distributed as dividends among the stockholders.

DUNDEE-ARIZONA COPPER CO.

ARIZONA

Phoenix, Ariz. **Officers:** Alex. Mackay, pres.; W. C. Foster, v. p.; with Chas. M. Shannon, L. H. Chalmers and F. S. Stephen, directors. J. W. Crenshaw, sec.-treas. **Inc.** March 21, 1916, in Arizona. **Cap.**, \$500,000; shares \$1 par; outstanding 425,000 shares, of which 225,000 belonging to F. S. Stephen and Alex. Mackay, former owners, are in escrow until Sept. 20, 1917. Equitable Trust Co., New York, transfer agent. U. S. Corporation Co., New York, registrar. Listed on New York curb as a prospect.

Treasurer's statement of May 1, 1916, shows assets: \$643,750, which includes, cash, \$55,294; accounts receivable (contracts sale treasury stock), \$86,300; mining property, \$499,995; machinery, \$1,003; general expense, \$1,158.

Property: 2 claims, the Greenup and Greenflower, lying between United Verde Extension on the east and Jerome Verde on the west, at Jerome, said to have a 1,000' showing of conglomerate ore. **Development:** 264' tunnel, in conglomerate for about 200', then enters limestone; from this tunnel level a 100' raise to surface and a 100' winze constitute a 200' shaft. Management expects to mine 5% copper ore from this conglomerate. Was preparing to drift on the ore and install compressor and hoist, March, 1916.

DUNKIN MINING CO.

COLORADO

Breckenridge, Summit Co., Colo. Owns the Dunkin Mine, worked under long-time lease by O. K. Gaymon, Theo. H. Knorr and W. W. Whar-ton of Breckenridge, and J. A. Summer of Salt Lake City.

Property: on Nigger hill, 1½ miles from Breckenridge, shows lead-sulphide ore carrying good gold values. Several rich pockets of ore were reported found in 1914-15 and to have netted the lessees \$15,000, \$30,000

and \$35,000. The Wolfstone vein, under development, is said to carry lead-carbonate ore, valued at \$40-\$50 per ton, at a depth of 500'. **Development:** to depth of 600' by shaft, tunnel and crosscuts. Producing 1 carload monthly.

DUNLAP COPPER MINE

NEVADA

Idle. Mina, Mineral Co., Nev. R. W. Hadden, cons. engr., 1807 Harvard Blvd., Los Angeles, Cal. **Property:** 10 claims, 200 acres and mill site in Silver Star mining district, 10 miles east of Mina. Claims show quartzite and quartzite breccia with mineralized zone 700' wide and 2,000' long, carrying ore-bearing reefs with oxides, carbonates, and native copper, values ranging from 1½ to 20% copper.

Development: by several thousand feet of tunnel, open cuts and winzes, mostly in ore, but none showing sulphide, as water level is not reached. Concentration test on 10 tons yielded product with 44% copper, \$8 gold and 8½ oz. silver. **Equipment:** includes compressor, blacksmith shop, etc. 250,000 tons of ore said to be available, but not blocked out. No recent returns secured.

DUPLEX MINING CO.

NEVADA

Office: 501 P. E. Bldg., Los Angeles, Cal. Mine office: Searchlight, Clark Co., Nev. Geo. L. Craig, Long Beach, Cal., pres.; C. W. Ennis, v. p.; Geo. R. Colton, sec.; G. F. Colton, treas. **Inc.** May 7, 1915, in Nevada. **Cap.**, \$500,000; shares \$1 par. All stock issued is assessable.

Property: 7 patented claims, 101 acres, is a well-known gold mine, with veins in quartz monzonite, carrying gold-silver ores, changing to copper, lead and zinc at depth.

Orebodies from 2.5' to 5' in width. **Development:** by 600' vertical shaft, a 45° incline shaft 400' deep, and a 74° incline shaft 300' deep, with about 2,500' of underground workings. Assay results from carload lots are 0.9 oz. gold, 4.9 oz. silver, 8.6% lead, 2.3% copper, 1.3% zinc. Company claims that on the lower levels the amount of lead is diminishing and copper increasing. The first-copper ore mined in commercial quantities in the district was shipped from this mine in Aug., 1913. Gross earnings from ore sales in 1914-1915 were \$7,500, with operating expense of \$10,500. Property equipped with stamp mill, which will resume operations when property is opened up between 500' and 700' levels. Company planning to remodel mill and install an oil flotation plant.

DUPONT COPPER MINES CO.

CALIFORNIA

Officers: Samuel J. Kistler, pres.; G. S. Fenwick, v. p.; J. E. Costegan, sec.-treas. **Inc.** 1915. **Cap.**, \$2,500,000; \$1,000,000 stock in treasury. Stock traded in on New York Curb.

Property: 31 claims in Trinity district, Trinity Co., Calif. Mine reported by company to be fully equipped and to have produced \$750,000 to date. Company also reported to have an option on properties in Nevada and Colorado. The stock was manipulated to \$3.50, May, 1916, and the enterprise closely resembles a stock-jobbing promotion pure and simple.

DUQUESNE MINING CO.

ARIZONA

Address: care T. A. Luckhart, sec., DuBois, Pa. Mine near Globe, Gila Co., Ariz. Geo. M. Luckhart, pres. and mgr. **Inc.** 1909 in Arizona. **Cap.**, \$1,000,000; shares \$1 par.

Property: 10 claims, in Gold gulch, about 3 miles south of the Arizona National and 15 miles west of Globe, in the Pinal mountains. Mine has a 10' vein, carrying mainly silver-lead ore with copper expected at depth. Opened by 3 tunnels, 2 of 200' and 300', showing ore assaying well in gold. A 50' shaft on the East End claim shows ore giving assays of 5% copper,

3 oz. silver and \$4 gold per ton. **Equipment:** includes a 25-h. p. gasoline hoist. Only assessment work done in 1914-15.

DUQUESNE MINING & REDUCTION CO.

ARIZONA

Maine office: Westinghouse Bldg., Pittsburgh, Pa. **Mine office:** Duquesne, Santa Cruz Co., Ariz. **Officers:** Geo. Westinghouse, pres.; W. D. Untergraff, sec.-treas.; Chas. A. Bankerd, agt.; H. T. Herr, v. p.-gen. mgr. **Property:** 84 claims, patented, 1,000 acres, near the Pride of the West and several miles south of the Mowry, in the Washington camp, Patagonia mining district, Ariz. Shows a contact deposit between limestone and granite-porphry, carrying argentiferous and auriferous chalcopryrite, sphalerite, galena and pyrite, opened by a shaft 650' deep. Ores being complex sulphides, are very refractory.

Property sometimes called the Washington mine, is said to have large bodies of complex ore which have been the subject of numerous experiments in wet, electrolytic, magnetic, dry and other systems of concentration for many years past. At present the workings on the Bonanza mine are 650' deep and the Duquesne shaft 120' deep. The Bonanza shaft is equipped with a 50-h. p. steam hoist and an Ingersoll compressor. The Duquesne shaft has a 12-h. p. gasoline hoist.

Mill and oil-flotation unit being installed, 1916.

The mine is shipping to the Douglas-Arizona smelter since Aug., 1912. Ore is hauled by wagon 23 miles to Patagonia, shipments running about 14% copper and 5 oz. in silver per ton.

DURANGO SMELTER.

COLORADO

Owned by San Juan Smelting & Refining Co., which is controlled by the American Smelting & Refining Co., at Durango, La Plata Co., Colo.

DURANT MINING & SMELTING CO.

MONTANA

Address: Spring Gulch via Martinsdale, Meagher Co., Mont. C. M. Durant, supt. **Property:** 14 miles from Martinsdale, shows fissure veins carrying copper sulphide ore with gold values. Developed by 200' two-compartment shaft. No recent returns secured.

DUTCH MILLER MINING & SMELTING CO.

WASHINGTON

Inactive. H. P. Fogh, pres. and agent for majority stockholders, 1403 Howell St., Seattle, Wash. Geo. H. Law, sec.-treas. **Cap.**, \$2,000,000; shares \$1 par; all issued; 1,000,000 shares in escrow for 5 years. Majority of stock is held by an ore contract association, which made a 5-year contract for output, the Dutch Miller to get 40% of earnings as royalty, one-half to apply to payment on 500,500 shares optioned to the ore contract association.

Property: 2 patented claims, on summit of range, 12 miles south of Skykomish, Wash., formerly worked by the Seattle-Boston Copper Co. Claims show an ore body in a vein in granodiorite. Ore is chalcopryrite with tourmaline and quartz and is high-grade. Mine lacks transportation facilities and rope tramway must be installed to get ore to the wagon road.

DUTCH-SWEENEY MINING CO.

CALIFORNIA

Quartz, Tuolumne Co., Calif. **Officers:** W. G. Devereux, pres.-gen. mgr., c/o Melones Mining Co., 131 State St., Boston, Mass. C. G. Segerstrom, v. p.; J. L. Brooks, supt.; with Albert Burch as manager for Bewick, Moreing & Co.

Property: formerly owned by the Dutch Cons. Gold Mining Co., comprises the Dutch mine, 70 acres, including the 200' Sweeney shaft, at Quartz Mt., 2 miles south of Jamestown. Company also has an option on the adjoining App mine, which is described under that title. Mines are on the Mother Lode. On the Dutch claim the vein splits into 2 veins about 75' apart; the east vein is irregular, breaking up into stringers running in all

directions, while the west vein is more regular. General course of veins is N. 35° W., with dip of 65° N. E. Both walls are of Calaveras slate.

Development: by incline shafts. Main working shaft, 1,800', is sunk on 65° incline, with levels to the 1,200' level at 100' intervals, remaining levels at 150' intervals. Work is being done from the 1,000' level down; on the 1,650' level the orebody has an average width of 16'.

Equipment: includes 150-h. p. double-drum electric hoist, one 450-cu. ft. Leyner and one 1,000-cu. ft. Rand Duplex air compressor. Water is pumped from 1,000' level by a Dean triplex pump.

Mill: 40 stamps, weight 1,050 lbs., drop 6", 106 drops per min., crushing 5 tons per stamp through 20-mesh; stamps are driven by two 50-h. p. motors. Pulp from batteries flows over Johnson and Frue vanners. Extraction assay \$36 gold per ton. Total operating costs are \$2.30 per ton. Company employs about 65 men.

EAGLE & BLUE BELL MINING CO.

UTAH

Office: 60 Congress St., Boston, Mass. **Operating office:** 404 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. **Officers:** Jas. P. Graves, pres.; Henry N. Sweet, v. p.; Imer Pett, asst. treas.-gen. mgr.; Geo. E. Davis, sec.; preceding with Fred H. Williams, Duncan MacVichie and Fred R. Sands, directors; Sidney S. Millett, treas.; Wm. Owens, mine supt.

Inc. Sept., 1898, in Utah. Cap., \$250,000, increased, March, 1910, to \$1,000,000; shares \$1 par; issued 893,146 shares. Dividends: 4 of 5c each in 1913; 3 of 5c each in 1914; 1 of 10c and 1 of 5c in 1915, amounting to \$446,573 for the three years.

In March, 1910, issued 644,347 shares of new stock at 50 cts. to take up a floating debt of \$269,925 and put \$50,000 in the treasury, for working capital. Is controlled, through stock ownership, by Bingham Mines Co. First National Bank, Boston, registrar; Federal Trust Co., Boston, transfer agent. Stock is listed on the Boston curb. Annual meeting, first Saturday after first day of October.

Annual report for year ending Dec. 31, 1915, shows total receipts, \$281,755; expenditures include: operating expenses, \$101,705, and mine development, \$27,595. Net operating gain was \$143,345, as against \$121,536 in 1914. Assets amounting to \$1,035,976, include mining properties and real estate, \$893,702; mine construction and equipment, \$97,801; cash, \$16,860. Liabilities include: outstanding stock, \$893,146; surplus, \$142,800.

Property: 17 patented claims, 73 acres, includes a 9-acre mill site carrying the water right to a spring having a flow of about 30 gals. per minute. Lands lie between the Centennial-Eureka, Victoria and Chief Consolidated mines, on the Victoria-Grand Central ore zone, in the Mammoth Limestone.

Geology: ore occurs as chamber deposits in limestone, carrying gold, silver, lead and some copper. The lime is cut by numerous fissures, at all angles, with mainly vertical dip, carrying pipes, shoots and erratic deposits of ore at the intersections of fissures and bedding planes, in massive blue limestone. The mine has considerable bodies of silicious copper ore, lead sulphides and carbonates. Pay shoots vary from 6-100' in width. Average assays of dry ore: .230 oz. gold; 12.99 oz. silver; .31% copper; lead ore assayed: .13 oz. gold, 16.81 oz. silver and 17.05% lead.

Development: has been extensive in the last few years; the 3-compartment shaft is now 1,700' deep, with levels at 700, 1,000, 1,350, 1,550 and 1,700', and blind levels at 1,100, 1,200, 1,300, 1,425 and 1,538'. On 700' level a large body of silver-lead has been opened up. On the 1,300' an orebody, 10 to 70' wide and 20 to 50' high, has been developed for 600' north and south, occurring in a fractured zone as replacement of country rock and

has yielded silicious ore carrying gold and silver. On 1,350' level good ore was encountered and followed down 170' by a winze.

Development for 1914-15 amounted to 3,350' of drifts, crosscuts, raises and winzes, mainly on the 1,550' and 1,700' levels. No. 1 orebody, opened on the 1,500' level, reported to average 60' in width and proved continuously for 400' in length, extends from a point 120' above the 1,550' level down to 100' below the 1,700' level, with a N. S. course. Mine has about 4 miles of underground workings, deepest at 1,800'. Management plans development of unexplored sections in 1916. Reported in August that in sinking to the 1,850' level a first-class lead-silver orebody had been found 130' below the 1,700' level.

Equipment: includes a 180-h. p. Hendrie & Bolthoff double-drum hoist, good for 2,000' depth, a 100-h. p. tubular boiler and a 4x6' electric Triplex pump. The mine was electrically equipped throughout and a 250-h. p. Ingersoll-Rand air compressor and 225-h. p. electric hoist installed in 1916. Electric power is supplied by the Utah Power & Light Co.

	Tons	Oz. Gold	Oz. Silver	Lbs. Lead	Lbs. Copper
1915.....	26,744	1,226	441,263	8,275,734	3,806
1914.....	32,736	1,444	554,411	8,588,565	31,443
1913.....	35,244	7,514	417,279	4,664,362	129,062

Total shipments to date since 1908, 131,094 tons. Average grade of ore shipped in 1915 was (dry ore) \$8.13 per ton gross value; lead ore, \$15.07 per ton gross value. Gross value of total ore shipments in 1915 was \$492,-488, giving net smelter returns of \$280,135. Shipments are made to Salt Lake Valley smelter.

Property in favorable condition, physically and financially, and management able.

EAGLE COPPER CO.

CALIFORNIA

Taylorville, Plumas Co., Cal. Owns group of claims covering low-grade pyrite deposit with limited development. Company built small smelter. 1912.

EAGLE COPPER-GOLD MINING CO.

ARIZONA

Dead. Described Vol. XI, Copper Handbook. Property now owned by J. L. Zesiger, former treas., 2072 E. 40th St., Cleveland, O.

EAGLE COPPER MINING CO.

UTAH

Mine office: Santaquin, Utah Co., Utah. **Officers:** Armon Cravens, pres.; C. W. Higginson, v. p.; C. E. Snell, sec.-treas.; L. F. Peterson, supt. Inc. May, 1907, in Utah. Cap., \$1,000,000; shares 10 cts. par. Last assessment of ½ ct. delinquent, April 11, 1914. Mine, on Mount Nebo, east of Santaquin, has shipped a little high-grade lead and copper ore. Developing with a small force.

EAGLE GOLD & COPPER MINING CO.

ARIZONA

Address: care W. J. Riley, First National Bank, Clifton, Ariz. Mine near Morenci, Greenlee Co., Ariz. **Officers:** Wm. M. McCoy, pres.-mgr.; E. V. Horton, J. R. Hampton, J. R. McRea, M. H. Kane and E. C. Bunker, all of Clifton, directors. J. J. Hall, mine supt. **Property:** 20 claims, 4 miles N. W. of Morenci, carries veins with copper, lead and gold ores, developed by a 40' shaft on 1½' vein of rich silver lead ore. Shipped 7.4% copper ore, 1912, to the Shannon smelter. **Equipment:** includes 5-stamp gold mill. Idle since 1912.

EAGLE METALLIC COPPER CO.

PENNSYLVANIA

Address: care H. D. Deschler, Belvidere, N. J. Branch office: 208 Haas Bldg., Allentown, Pa. Mine office: R. F. D. 3, Fairfield, Adams Co., Pa. **Officers:** F. H. Cuyle, pres.; Dr. P. A. Stem, v. p.; A. L. Wickert, sec.; Thos. Zellner, treas.; Owen H. Nagle, gen. mgr.; preceding with

A. V. Diefenderfer, directors. Inc. 1903 in New Jersey. Cap., \$500,000; shares \$1 par, and reinc. Dec. 9, 1910, in Pennsylvania; \$150,000 in treasury after raising \$60,000 to build a smelter in 1911.

Property: 500 acres in Jacks Hollow, on the Maryland border, one-half mile from and crossed by the Western Maryland railroad, near Charmian. **Development:** by open-quarry work from pit 200' across, connected with smelter by 750' aerial rope tram. The mine is apparently a large open-cut filled with water. Careful examination of exposed rock and surface material said to show no indication of copper whatever. It is also reported that a pile of crushed ore in smelter bins, 1915, did not contain the minutest particle of mineral. Samples of matte from furnace said to run 2% copper, which evidently came from the pyrite used for flux.

Equipment: includes a 250-h. p. steam plant, 150-h. p. engine and a 2½" core drill, with office and laboratory. Smelter built in 1911. Regarded as a valueless property.

EAGLE MINE.

CALIFORNIA

G. H. Goodhue, owner, Indian Falls, Plumas Co., Cal. **Property:** near Genesee, Plumas county, consists of 15 claims, 300 acres, covering 8 outcropping orebodies, discovered, 1908, and occurring at contact between limestone and porphyry and as lenses in schist. Ore zone runs N. 27° W., dips 55° S. W. Ores contain chalcopryrite and bornite and are said to average 2% copper, 1½ oz. silver and \$2.40 gold per ton.

Development: 342' of workings, including 9 shallow shafts, 12 to 18' deep and a 210' tunnel, all in ore. Property 20 miles from Western Pacific railroad. No recent returns secured.

EAGLE MINING CO.

MONTANA

Care Harper McDonald Co., Lewisohn Block, Butte, Mont. Hon. Patrick Mullins, Arthur V. Corry and Thos. Bryant, directors. Inc. March 10, 1906, in Montana. Cap., \$150,000; shares \$1 par; is supposed to have increased capitalization, April 29, 1907, to \$250,000, shares 50 cts. par. **Property:** north of Walkerville, has a 250' shaft, showing a 5' vein, was formerly a silver mine, shipping ore running up to 1.7% copper and 186 oz. silver per ton. Mine dismantled, but claims show large vein, are well located and worthy of further prospect work.

EAGLE MOUNTAIN COPPER CO.

ARIZONA

Col. P. T. McGrath, gen. mgr., but his whereabouts unknown at Kelvin, Pinal Co., Ariz. **Property:** 27 claims, known as the Copper Queen group, in the Riverside district, is slightly developed. Idle several years and lands of doubtful value.

EAGLE PEAK COPPER MINING CO.

WASHINGTON

Mine office: Longmire, Pierce Co., Wash. Main office: Tacoma, Wash. **Officers:** R. H. Wheelock, pres., Ashford, Wash.; Bakier Long, v. p.-mgr.; M. A. Long, sec.-treas.; preceding, with G. W. Anderson and Chas. Metzler, directors. Inc. 1908 in Washington. Cap., \$150,000; shares \$1 par, fully paid and nonassessable; issued, 130,000. Annual meeting, April 21.

Property: 2 claims, 40 acres in Cascade mining district, 14 miles from railroad, in the heart of the Tatoosh range, near Mt. Tacoma. Claims show fissure veins in granite with ore carrying bornite and chalcocite and said to average 17% copper, \$4 in gold and some silver. **Development:** by shaft and tunnel. **Equipment:** includes 25-h. p. power plant, air compressor and 4 buildings.

EAGLE-PICHER LEAD CO.

MISSOURI-OKLAHOMA

Office: Continental & Commercial Natl. Bank Bldg., Chicago, Ill. **Officers:** O. S. Picher, pres., Joplin, Mo.; R. W. Evans, v. p.; S. M. Evans, v. p.; Jos. Hummel, Jr., sec.; T. S. Brown, Jr., treas.; above, with J. B.

Swift, chairman, F. L. Perin, J. E. Webb, Fred Hertenstein, directors. Inc. June, 1916, in Ohio. **Cap.**, \$9,000,000 com. and \$1,000,000 6% non-cumulative Pfd.; \$100 par; \$7,000,000 Com., and \$1,000,000 Pfd. outstanding. Pfd. dividends payable quarterly; initial dividend of 1½% paid July 12, 1916. Central Trust & Safe Deposit Co., Cincinnati, transfer agent. Annual meeting in January.

Company is a consolidation of the Eagle White Lead Co., of Cincinnati, O., and the Picher Lead Co.

The Picher Lead Co. is one of the oldest concerns in the Joplin district, having been chartered in 1867. Today it is one of the largest lead producing companies in the State. For many years the product was white lead and soft pig lead. During last 3 years company has entered the mining field, taking over extensive leases in Oklahoma.

Property: original Oklahoma lease consisted of 3,000 acres of Indian lands in North Miami district, about 1 mile from Cardin and 8 miles N. E. of Miami, Ottawa Co. After sinking 40,000' of drill holes, eight 40-acre tracts of the prospected territory were retained for further development. The property is owned by A. J. McConnell and the new townsite is called Picher.

Ore: occurs in a semi-sheet formation and is reported to average 11% in zinc and lead, the former predominating by a ratio of 3 to 1. Three veins were intersected in development work at 75', 130' and 200'. The White Bird tract has been leased to the W. M. Sheridan Co., Inc., of Chicago, and the Crawfish tract to the Ortt & Buchanan Mining Co. Both companies are developing and sinking shafts on their respective ground. Two 300-ton concentrating mills erected by the Picher Co. on these tracts were started up early in 1916.

The Picher Co. is sinking 3 shafts and erecting a 4th plant of 600 tons capacity at Henryetta, Okla., in 1916. The 3rd or Bingham plant was nearly completed in April, 1916. A. E. Bendelan is superintendent.

Company also operates a plant at Galena, Kansas, and has a 3-year lease on the zinc smelter of the Collinsville Zinc Co., at Collinsville, Ill.

EAGLE RIVER MINING CO.

ALASKA

Address: care D. C. Jackling, Hobart Bldg., San Francisco, Calif., who with his friends controls the company. **Property:** a group of gold quartz claims is 4 miles from Echo Harbor and 25 miles from Juneau, Alaska, adjoining and on same belt as the Yankee Basin and Cottrell groups. Gold ore occurs in 8 small shoots of high-grade quartz in black slate zone, broken by an elaborate faulting system and reported to average \$20 per ton.

Development: by various old tunnels abandoned 1913, when new tunnel, 2,000' long in 1914, tapped ore shoots beneath and beyond faulted section, at a depth of 700'. In 1915, 2,000' of diamond drilling in 7 holes was done. Property worked since 1903, producing upwards of \$500,000, according to reports.

EARL & EAGLE MINING CO.

UTAH

C. W. Earl, supt., American Fork, Utah Co., Utah. W. E. Evans, sec., Lehi, Utah. **Cap.**, \$10,000; shares 1 ct. par; \$5,600 issued. Listed in Salt Lake City.

Property: 120 acres, south of the Live Yankee and Globe Cons. properties in American Fork district, is said to have the continuation of the Live Yankee vein. A tunnel is being driven to cut the vein. Property is in the prospect class.

EAST BUTTE COPPER MINING CO.

MONTANA

Office: 85 Devonshire St., Boston, Mass. Mine and works office: Butte, Silver Bow Co., Mont. **Officers:** Robt. H. Gross, pres.; Hon. Jas. H. Reed,

v. p.; Wm. P. Everts, sec.; Frank P. Son, treas.; Oscar Rohn, gen. mgr.; preceding, with F. Ward Paine and Daniel C. Noble, directors; Andrew J. Ray, mine supt.; John E. Rothwell, mill supt.; G. G. Vivian, smelter supt.; Julius H. Warner, engr.

Inc. Oct. 14, 1905, in Arizona. **Cap.**, \$3,000,000; shares \$10 par, increased, May 11, 1909, to \$6,000,000, shares \$10 par, non-assessable; issued \$4,110,000. Has about 2,500 shareholders. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock is listed on the Boston Stock Exchange and N. Y. Curb. Annual meeting, first Monday in April.

The East Butte Copper Mng. Co. has no indebtedness. It owns \$910,716 of outstanding bonds and all preferred stock of the Pittsmt Copper Co., the latter amounting to \$1,000,000 par value; also $\frac{4}{5}$ of the common stock, amounting to \$4,000,000 par value. East Butte Co. works the property of the Pittsmt Copper Co. under an operating agreement.

Annual report for year ending Dec. 31, 1915, shows net surplus on operations of \$782,997 as compared with \$222,252 in 1914 and \$531,772 in 1913.

Financial statement of Dec. 31, 1915, shows cash and copper, \$318,385; accounts receivable \$14,755, with accounts payable of \$371,005.

Property: the Dutton group, 134 acres, held by placer patent, is in the S. E. part of the Butte camp near the Pennsylvania mine.

Principal production is from one strong E. W. vein in which an ore shoot 500' long by 3' wide is being mined between the 800' and 400' levels, averaging 4%-5% copper ore. Below the 800' level the major portion of this vein will dip outside of property owned by the East Butte Co. At present, operations are confined to territory adjacent to the Dutton No. 1 shaft, 900' deep, from which 100 to 150 tons daily are being hoisted. This shaft is equipped with electric hoist and compressor plant.

Geology: the Pittsmt claims cover 280 acres of flat valley bottom, about $1\frac{1}{2}$ miles east of Butte and extending outward from the footslopes of the continental divide mountain ridge. The ground is a filled-in valley, the sandy wash and debris being in places several hundred feet deep, so that no outcrops of any kind exist on the ground. The underlying rock is the normal Butte granite (quartz monzonite) which is cut by 3 systems of veins: Northwest, corresponding to the Blue Vein series of Butte; Northeast, and an East-West vein series. Ore shoots occur in veins of each series.

Development: 2 shafts, Nos. 2 and 3, 1,830' and 1,240' deep, respectively. Shaft No. 2 is the working shaft. Levels are opened from it at 800, 1,000, 1,200, 1,500 and 1,800'. The 1,500' level is but partially opened and work is only commencing on the 1,800' level. The zone of oxidation and leaching of copper values extends from 500' to 700' below the surface. Underground workings amount to about 16 miles. There are some 12 principal veins on the property that have been productive. While these veins are not wide, usually under 5', the ore shoots are long and persistent. At least 2 veins on the 800' level have been stoped almost continuously for 1,500' in length. Though the 800' level has been the most productive level opened to date, due both to an intense primary mineralization and secondary enrichment which has affected the lower levels to a much lesser extent, the lower levels continue to yield strong ore shoots of commercial grade, though lower in values than ore from upper levels. Development for 1915 consisted of 6,226' of drifting and crosscutting, and sinking No. 2 shaft from 1,770' to 1,828'.

Miscellaneous holdings include the Swissmont group of 6 claims, near

Elkhorn, Jefferson Co., Mont., and the Chamounix group near Austin, Lewis & Clark Co., Mont., including the Christina group of 6 claims and the Fannie Parnell group of 33 claims. The Swissmont group has developed a considerable tonnage of low grade oxidized gold ore carrying an excess of iron over insoluble material, which ore has had value from its combined fluxing character and gold content. During 1915 and first three months of 1916 continuous shipments of this ore have been made to the Pittsmont smelter, amounting to 50 tons daily in March, 1916. The Chamounix group has shipped some silver-copper ore in the past, but is now idle. Company also has timber operations at Feely, Mont.

Equipment: consists of hoisting plant, milling flotation plant and smelter. The above includes a 2,000-h. p. steam plant, 2,000-h. p. electric plant, 600-h. p. steam hoist good for 2,000', and 50-h. p. steam hoist good for 1,500'; a 25-drill Nordberg and 25-drill Rand air compressor, and 50 power drills. Electric power is used for practically everything except hoisting. There are about 20 buildings, which include the smelter, sinter plant, 2 engine rooms, change house, boiler room, concentrator, flotation plant, carpenter, machine and electric shops, sampling mill, laboratory and office building. The smelter building contains one 600-ton blast furnace and one 300-ton furnace with 3 basic lined converters. The sintering plant contains one 42" Dwight-Lloyd sintering machine. Concentrator is equipped with crushers, jigs, tables, etc., and flotation plant is equipped with tube mills and Janney flotation machines. The capacity of concentrator is 600 tons and of flotation plant 800 tons, the additional capacity of flotation plant to be used in reworking tailings.

The mine is served by the Northern Pacific railway, which makes connections at Butte with other lines, and the company has about 3 miles of private track, connecting the shops, mill and smelter, with 1 locomotive for switching.

A limestone quarry, 275 acres, bought, 1910, at Lime Spur, east of Whitehall and about 40 miles east of Butte, in Jefferson county, furnishes flux for the smelter.

The Pittsmont reduction plant is the only operating smelter in Butte and does a considerable amount of custom business, treating ore from several independent mines.

	1915	1914	1913	1912
Tons ore mined.....	150,911	72,853	105,071	99,458
Av. assay value.....	4.28%	4.72%	5.16%	5.78%
Cost min. per ton, incl. develop..	\$4.37	\$5.39	\$5.08	\$4.14
Tot. tons ore tr'd.....	181,063	110,992	186,815	143,045
Lbs. copper prod.....	12,542,058	9,175,579	14,401,108	14,709,460
Oz. silver prod.....	318,124	242,347	506,897	396,524
Oz. gold prod.....	2,696	2,219	8,803	17,959
Gross inc.....	2,753,587	1,455,454	2,645,568	2,184,758
Total costs.....	1,699,602	1,048,856	1,881,112	.....
Balance	1,053,985	406,597	764,455	1,728,563
Less add. to equip., expl. & devel.	214,691	136,101	188,619	51,317
Net surplus	782,997	222,252	531,772	256,643
Lbs. copper produced.....	12,542,058	9,175,579	14,401,108	12,167,363
Price per lb. rec.....	19.3143c	13.5685c	15.085c	13.21c
Cost prod. per lb.....	11.8538c	11.11c	11.04c	9.46c

Normal operations for 1915 amounted to practically 7½ months out of 12, or a total of 230 out of 365 days. During 1914 the property operated 220 days.

Production 1916 has run higher than in 1915, though the ore is in cop-

per content, about 1% less than 1915, or approximately 3½% copper in addition to gold and silver values. The output of blister copper for the first half of 1916 has been 8,301,620 lbs. July output was 1,893,120 lbs. copper and 49,802 oz. silver.

EAST BUTTE EXTENSION COPPER MINING CO. MONTANA

Idle. Office: 113 Hamilton St., Butte, Silver Bow Co., Mont. Officers: Chas. J. Schatzlein, pres.; Philip A. Breen, v. p.; Frank H. Cooney, sec. and gen. mgr.; Dr. C. E. Blackburn, treas.; preceding, with Chas. N. Joyce, directors; A. F. Munroe, engr. Inc. April 10, 1906, in Arizona. Cap., \$1,000,000; shares \$1 par; issued, \$550,000. Paid, Oct. 1, 1906, a 1% dividend, amounting to \$2,486.

Property: various fractional claims, 4 acres, lying between the Belmont, Pennsylvania and Ground Squirrel mines of the Anaconda, developed by 6 shafts, deepest the 250' two-compartment No. 6 shaft, begun 1909, with about 500' of crosscuts. The Westlake and Wall mines are said to have produced, under former ownership, about \$300,000 worth of ore. The two-compartment No. 1 shaft is 170' deep, and the 200' No. 2 shaft shows ore assaying up to 13% copper and 1 oz. silver per ton. No. 3, formerly known as the Westlake, has a small precipitation plant.

A little ore was produced, 1907, by lessees, shipments reaching 40 tons daily, with net smelter returns of \$37,360.21, yielding the company a net royalty of \$12,881.83 in 1907. Company also owns a divided one-half interest in the Centerville claim, and undivided interests as follows: one-half in Malone; eleven-sixteenths in Little Evelyn; one-sixth in Valley Forge one-half in Gregory; one-fourth in Simon; one-eighth in Eureka First; three-fortieths in Lost Fraction, and three-fortieths in Katy T. Inactive since July 20, 1909.

EAST CALEDONIA MINES CO. IDAHO

W. A. Barter, sec., First National Bank Bldg., Kellogg, Idaho. Officers: Herman J. Rossi, pres., Wallace; W. H. Nichols, v. p., Butte; W. A. Barter, sec.-treas.; with W. I. Hall, Kellogg, and Frank Pferman, Wallace, directors. Geo. H. Jennings, supt. Inc. March, 1915, in Idaho. Cap., \$1,000,000.

Property: 130 acres, including the Keating mine at Wardner, Shoshone Co., Idaho. Ore: silver-lead in 4 known veins, from 9-26' wide. Assays said to run from 1½% to 36% lead, with good silver values. Company claims to own or control 2,300' of the Silver-King-Caledonia vein system for a length of 4,500'.

Development: several tunnels and the Keating 416' vertical shaft, which present company unwatered to the 200' level. The mine had been worked intermittently for several years before present company acquired control. Recent development is said to have opened up 15% lead ore on the 100' level. Width of vein is 2½' to 3'.

Equipment: hoisting plant, 60-h. p. engine, air compressor, pump, cable, shaft house and blacksmith shop. Plans development at depth after de-watering old workings.

EAST CANADA SMELTING CO., LTD. QUEBEC

Property acquired by the Weedon Mining Co., Ltd., which see.

EAST COEUR D'ALENE MINING CO. MONTANA

Address: care Harry Hogan, pres., Mullan, Idaho; T. A. Westervelt, sec. **Property:** a group of claims a few miles north of Haugan shows a 30' vein carrying a 2' pay streak of copper ore reported to carry 8% copper and good gold values. Development by short tunnels and drifts.

EAST SNOWSTORM MINING CO. IDAHO

Mine near Larson, Shoshone Co., Idaho. A fraud order was issued,

1911, by the postal authorities against C. E. Mitchell, promoter of this company, and also against the company. The title was changed, 1911, to "The Snowstorm Deep Mines, Ltd.," which has also been branded fraudulent. Property described Vol. X, Copper Handbook.

EASTERN BELLE MINE.**MONTANA**

See Helena Mining Bureau, Inc.

EASTERN CANADIAN COPPER CORPORATION, LTD.**NEW BRUNSWICK**

Office: 14 St. John St., Montreal, Quebec, Canada. **Officers:** Howard R. Richey, pres.; E. A. Baynes, v. p.; with Chas. Brandeis, A. M. Vici and E. A. Reilly, directors; A. H. Thomson, treas.; Geo. W. Dow, sec. **Inc.** Dec. 28, 1915, in Ottawa. **Cap.**, \$990,000; shares \$10 par; 30,000 shares deposited in escrow with Security Trust & Registrar Co., New York, transfer agt. and registrar, for the benefit of the company. Listed on New York Curb.

Statement of March 1, 1916, shows assets of \$990,000 mining rights in St. John Co., inclusive of buildings and equipment. Free of debt.

Property: covers 1 sq. mile, including the Vernon copper mine on the north shore of the Bay of Fundy, St. John Co., New Brunswick, reached by both the Intercolonial and C. P. R. R. to Sussex and thence by driving 32 miles to Goose Creek. Can also be reached from St. John, N. B., by boat, being 45 miles E. of St. John and $1\frac{1}{4}$ miles from Goose Creek Harbor. Holdings on a steep mountain rising 550' above the bay are said to show copper ore. Country rock is diorite, schists and slates, crossed by diabase dikes.

Development: 7 tunnels, from 50' to 170' long, said to show a quartz-calcite vein, containing bornite and chalcopyrite, 45' long where exposed in lower tunnel, 6'-10' wide, and assaying 13.4% copper; tunnel No. 4, 45' E. of No. 1, is said to show several quartz veins, "ramifications of the vein exposed in the above 3 tunnels." The other 3 tunnels are inaccessible at present. **Equipment:** includes a shipping dock, blacksmith shop and quarters for the men, but little mining equipment.

Company is planning to renew development work in 1916 with the object of attaining "an average daily output of 100 tons of ore," a feat which will hardly be accomplished in 1916.

EASTERN CANANEA DEVELOPMENT CO.**MEXICO**

Mine about 18 miles N. E. of Cananea, Sonora, Mex. John Martin, supt. Property said to show copper sulphide ore, developed by shaft. Property is held under lease and bond from M. L. Fay, of Duluth, Minn., who controls the Fay Cananea Copper Co., which owns the mine through the Cananea Eastern Mining Co., S. A., a Mexican corporation. Idle. No returns secured.

EASTERN PRINCE GOLD & SILVER MINING CO.**NEVADA**

Cap., \$100,000; shares 10c par. Listed on Salt Lake Exchange. Owns 8 claims adjoining Prince Consolidated in Ely mining district, Pioche, Lincoln Co., Nev. Believed to have extensions of the Prince Consolidated low-grade, iron-manganese deposits, carrying a little silver, lead, zinc and gold.

EASTERN STAR MINING CO.**NEVADA**

Office: Winnemucca, Humboldt Co., Nev. **Officers:** E. Reinhart, pres.; Chas. F. Spilman, v. p.; L. G. Campbell, sec.-treas.; above, with Daniel Craig and R. S. Bolam, directors. **Inc.** 1911 in Nev. **Cap.**, \$1,500,000; shares \$1 par; outstanding, 1,200,000.

Property: 5 claims, 70 acres, in Gold Circle mining district, Elko Co., Nev., said to cover 4,000' on the strike of a gold quartz vein, average width

4½', in andesite. The promoters in their lavish advertising campaign in 1914 claimed, "This quartz is heavily mineralized, much of it carrying values from \$500 to several thousand dollars per ton"; also, "As the mine stands today there are fully 20,000 tons of ore developed on the three levels and awaiting extraction. As nearly as can be estimated this ore will average not less than \$30 per ton."

Development: 280' incline shaft with levels at 75', 160' and 240', and a total of 1,700' underground workings. **Equipment:** includes 25-h. p. gaso-line hoist.

In Nov., 1914, the mine closed down with the announcement that the "owners are getting ready for large operations next year. A 50-ton mill is to be installed on the property." In 1915 it was reported that the mill would be built, but to date this office has no information that anything has been done.

The "Thousand Member Gold Mining Association" was "founded" upon the Eastern Star mine. This company was organized to acquire control of a number of gold mines in Colorado, Nevada and other sections of the West and participation in it would assure the investor of returns fivefold within a year. It is not known how many persons got caught; those who invested deserve no sympathy for falling for such rank misrepresentations as were made in the lurid advertising sent out.

ECHO GOLD MINING CO.

SOUTH DAKOTA

W. L. Mason, sec.-treas., Manchester, N. H.; A. J. Simmons, gen. mgr., Deadwood, S. D. Inc. 1892 in South Dakota. **Property:** 62 acres, in the Maitland district, 5 miles N. W. of Deadwood, Lawrence Co., S. D., said to show gold, silver and lead, are in fissure veins. Developed by 200' vertical shaft, and several tunnels, with total workings of 2,270'.

Equipment: includes a 25-h. p. electric hoist, air compressor and sinking pump. Management claims company is well financed, and is yet in the prospective stage.

ECLIPSE-ARGO MINING CO.

MONTANA

Address: E. G. Hoffman, sec.-treas., New Britain, Conn. Mine near Argo, Broadwater Co., Mont. Bondholders foreclosed and in April, 1913, deeds were given to trustee for entire property.

ECLIPSE CONS. MG. & INVESTMENT CO.

WASHINGTON

Address: John E. Newell, supt., Silverton, Snohomish Co., Wash. O. Robert Dahl, pres., Seattle, Wash.; S. Hilmar Dahl, v. p.; H. M. Dahl, sec.; preceding officers, Andrew Chilberg and John E. Newell, directors. Inc. 1906 in Washington. **Cap.**, \$3,000,000; shares \$1 par, nonassessable; giving \$2,000,000 in stock for the property.

Lands: 10 claims, unpatented, and a mill site, in 2 groups, including the mill and claims on the Stillaguamish river, formerly held by Copper Independent Consolidated Mining Co.

Mine has 5 tunnels, longest 1,100', on a fissure vein in slate, carrying a little copper, but mainly gold and silver values. Water power from the Stillaguamish river develops 830-h. p. by turbine. The concentrator, rated at 300 tons daily capacity, has tank room for cyanide treatment. A compressor of 1,000 cu. ft. capacity to be installed.

ECONOMIC MINING & MILLING CO.

NEW MEXICO

George Hopkins, pres. and mgr., Carrizozo, N. M.; Ed. Monroe, sec.; A. V. Swearingin, treas. **Property,** 7 claims, in White mountains, 8 miles east of Carrizozo. Ore carries copper with silver and gold values in iron gangue, averaging \$12 per ton. Developed by shafts, tunnels and open cuts, exposing orebodies of low-grade copper ore with gold values. Man-

agement plans sinking tunnel and acquiring adjoining properties, said to have promising showings of high-grade ore.

ECONOMY GOLD MINES CO.**MONTANA**

East Helena, Mont. **Officers:** S. Rosenfield, pres. and mgr.; Chas. Ludwig, sec.-treas. **Inc.** in Mont. **Cap.**, \$100,000; shares 50 cts. par.

Property: 180 acres, patented, 6 miles S. E. of Helena, shows fissure vein in diorite, andesite and granite. Vein has an E.-W. strike, with 75° dip. Ore, containing gold, silver and copper, occurs in shoots said to average 2' in width and from 35' to 75' in length.

Development: 2 shafts about 100' deep. Ore was stoped out from the 100' to the 50' level and mine was idle during winter of 1915-16. It was reopened early in 1916 and management is sinking shaft. **Equipment:** includes gasoline hoist and 8-stamp mill. Shipments, 1915, amounted to 400 tons of \$24 ore.

EDEN MINING CO.**NICARAGUA, C. A.**

Controlled through ownership of 55% of capital stock, by Tonopah Mining Co., of Nev. **Office:** 572 Bullitt Bldg., Philadelphia, Pa., and Bluefields, Nicaragua, C. A. **Officers:** J. S. Austin, pres.; J. H. Whiteman, v. p.; W. W. Charles, v. p.; P. S. Bickmore, sec.; C. A. Higbee, treas. **Directors:** J. S. Austin, J. H. Whiteman, C. A. Higbee, Chas. R. Miller, C. A. Daniel, Henry D. Moore, Samuel Bell, Jr., Geo. S. Munson and Wm. I. Forbes. J. L. Phillips, gen. supt.

Inc. Nov. 24, 1914, in Delaware. **Cap.**, \$1,000,000, all outstanding; shares \$1 par, non-assessable. Company office, transfer office, Fourth St. National Bank, Philadelphia, registrar. Annual meeting, first Wednesday in May. Option on the property was exercised by Tonopah Mining Co. in Jan., 1915.

Property: 9 square miles in the Pis Pis mining district, Nicaragua, C. A. Only a comparatively small amount of development and construction of power and milling plants has been done; not yet operating or treating ore. Net average value of ore reported to be \$12 to \$15 gold per ton, with mining and milling costs estimated under \$6 per ton. **Development:** mainly by tunnels.

First unit of the mill will have a daily capacity of 100 tons. Electric power obtained from the hydro-electric plant of the Tunkey Trans. & Power Co., which was organized to acquire and operate the power plant, railroad and river transportation. The entire stock of that company is owned by the Eden Mining Co.

EDISON MINING & MILLING CO.**NEW MEXICO**

Idle. Property, near Red River, Taos Co., N. M., carries gold-silver-copper ores. Equipment includes a steam plant and 10-stamp mill.

E. & F. MINING CO.**NEVADA**

Idle. **Address:** care Walker Bros. Bank, Salt Lake City, Utah. Mine office: Pioche, Lincoln Co., Nev. **Officers:** A. C. Ellis, Sr., pres.; A. Levy, sec.; Walker Bros. Bank, treas. Arthur Murphy, mgr. **Inc.** March 17, 1902, in Utah. **Cap.**, \$100,000; shares 50 cts. par; assessable.

Lands: 12 claims, 11 patented, 240 acres, in the Bristol and Jackrabbit districts, 1½ miles from a railroad. Mine has a 450' incline shaft and 2 tunnels, one of 350', with several hundred feet of lateral workings. **Equipment:** includes a 25-h. p. gasoline hoist and necessary mine buildings. Mine produced a little copper ore, with excess of iron, but was shut down 1907. Development work in lower tunnel resumed in 1914 and shipments of ore on dumps, said to run \$20 per ton, planned, 1916.

85 (EIGHTY-FIVE) MINING CO.**NEW MEXICO**

Office: Moline, Ill. Mine P. O.: Lordsburg, Grant Co., N. M. **Officers:** Jas. Barclay, pres., Hot Springs, Ark.; C. H. Warner, sec.; A. P.

Warner, treas.; Wm. H. Kinnon, managing director; A. J. Interriden, mgr. Inc. Sept. 23, 1909. in New Mexico. **Cap.**, \$1,000,000; shares \$1 par. Annual meeting, second Wednesday in December.

Company purchased the Superior mine of the Superior Mining Co. in 1912. **Property:** 6 claims in Shakspeare camp, about 4 miles from Lordsburg, in the Virginia district, includes a mine, in rhyolite, developed by 600' tunnel and a 300' blind shaft, with a 300' air shaft to surface. Vein is estimated by company to average 10' in width and to carry 3.5% copper, 6 oz. silver and 0.1 oz. gold per ton.

Equipment: includes 100-h. p. electric motor, hoist, an 85-h. p. Fairbanks-Morse crude-oil engine, as an auxiliary, and an Aldrich electric pump. Company employs about 300 men and ships 300 to 400 tons per day to the smelter at Douglas or El Paso. Management competent and property promising.

The Atwood mine, purchased, in 1915, for \$100,000, is 3 miles from Lordsburg. **Development:** by 310' shaft with drifts on the 75 and 148' levels, and about 600' of drifts and crosscuts on the 210' level exposing 2 veins of 4' and 12' average width, carrying copper ore with some gold and silver values. Has a small steam plant. Shipping to the Copper Queen smelter at Douglas, 1916, at the rate of 2 cars daily. Ore averages \$9 per ton. Plans diamond drilling to 1,000'.

A shaft has been sunk to a depth of 570', 2 tunnels driven for 600' and 900', and there is about 900' of drifting said to expose 200,000 tons of silicious ore, continuous from the surface down and carrying gold, silver and copper.

EL CENTRO MINING & MILLING CO. NEW MEXICO

Lordsburg, Grant Co., N. M. **Officers:** E. S. Eno, pres.; Geo. M. Peck, v. p.; R. F. Fitz, sec.-treas., P. O. Box 275, Los Angeles, Cal.; with Henry Muntz, Alfred Cole, D. D. Culver and J. A. Rovelstad, directors. Inc. in Ariz. **Cap.**, \$200,000; shares \$1 par; outstanding \$100,000. Company in 1915 bought the Last Chance mine, owned by the Sutton Consolidated Mining Co., and claimed to have produced \$135,000 in the past.

Property: 4 claims, patented, 68 acres, in the Pyramid mining district, near Lordsburg, said to show shoots 9-30' wide of silver-copper ore in a fissure vein in andesite. **Ore reserves:** claimed to be 10,000 tons of ore assaying \$4 to \$12 per ton.

Development: 275' vertical shaft with 2,000' of underground workings. Mine idle in 1915, but present management planned to resume operations, March, 1916.

EL CLIFF MINING CO. NEW MEXICO

Hermosa, Sierra Co., N. M. No returns secured. See Vol. XI, Copper Handbook.

EL EDEN; COMPANIA MINERA y BENEFICIADORA. MEXICO

Idle, owing to revolution. Mine at El Eden, Zacatecas, Mex. Francisco Llamasa, pres. and gen. mgr.; Enrique Gutierrez, sec.; Luis Colina, supt. Inc. 1905, and reorganized 1907. in Mexico. **Cap.**, 600,000 pesos; shares 100 pesos par. **Property:** 102 hectares, is a silver-gold mine with incidental copper. **Development:** by 8 shafts, deepest 210', and 2 tunnels aggregating 1,120' in length, with considerable underground workings, developing ores of gold, silver, copper, lead and zinc.

Equipment: includes 40-stamp mill with 2 Krupp tube mills, 6 Wilfley tables and 6 Johnson tables, and it is planned installing a cyanide plant, to treat a large amount of tailings accumulated, the dump being estimated to average 400 to 500 grams silver and 3 to 5 grams gold per metric ton.

EL FAVOR MINING CO.**MEXICO**

Offices: Makeever Bros., Journal Bldg., Boston, Mass., and 170 Broadway, New York. Mine at El Monte, Hostotipaquillo district, Jalisco, Mex. **Officers:** Sanford Makeever, pres.; Dr. H. D. Meredith, v. p.; J. L. Makeever, treas.; M. M. Makeever, sec.; Walter Neal, gen. mgr. **Inc.** July, 1906, in Ariz.; protocolized, 1906, in Mexico. **Cap.**, \$3,500,000; shares \$1 par. After 6 years of development work, mine paid total dividend of \$210,000 in 1913-1914. Property said to represent investment of \$1,000,000.

Property: 476 acres mineral land and extensive surface areas at El Monte, 75 miles N., W. of Guadalajara, Jalisco, Mex. A branch line of the Southern Pacific R. R. runs to Quemada, near the mine, and the Chapala Hydro-Electric Co. furnishes power for \$50 per h. p. Mine shut down May 24, 1914, owing to Mexican revolution.

Vein reported as 10' to 14' thick with shoots of bonanza silver-gold ore workable to 1,300' by tunnels. Mine said to have 3 miles of underground workings open to 800' level. Mining costs reported to be 24c per ton.

Mill reported to be a modern 150-ton silver cyanide plant, equipped with 20 stamps, crusher, tube mills, Dorr classifiers and thickeners, Oliver filters, Pachuca-tanks, Wilfley tables. Extraction was only 54% of \$18 gold-silver ore, owing to manganese, but recent improvements are claimed to ensure nearly 90%. Total production to date reported as \$1,500,000. Mine presumably good, though it is a Makeever promotion and stock is not listed.

EL GLOBO MINING & MILLING CO.**MEXICO**

Mine near Nacozari, Sonora, Mex. **Officers:** Chas. A. Romadka, pres. and mgr.; C. P. Romadka, v. p.; W. S. Dixon, sec.-treas. **Inc.** 1905 in Arizona. **Cap.**, \$400,000; shares \$10 par.

Property: 80 hectares, about 20 miles east of Nacozari, the nearest rail point. Mine has a shallow shaft and a 1,600' crosscut tunnel, cutting a vein with a back of about 1,000'. Ore values are mainly gold and silver. **Equipment:** includes a 25-h. p. electric plant, with a 15-stamp mill having 2 Wilfley tables and a small cyanide plant. Presumably idle.

EL MAGISTRAL COPPER CO.**MEXICO**

Mine office: Choix Fuerte, Sinaloa, Mex. **Officers:** H. L. McNair, pres.; Hon. C. F. Wright, v. p.; A. G. Nash, sec.-treas.; preceding, with Hon. W. S. Lieb, Thos. H. Carvin, H. R. Woodward, John J. Dowdle, John P. Fiebig, John G. Whitmore and Hon. G. E. Green, directors at last accounts. **Inc.** June 15, 1906, in Maine. **Cap.**, \$1,000,000; shares \$10 par. Owns the entire capital stock of San Lucas Copper Co. No returns secured. Probably closed down owing to revolution.

EL ORITO MINING & MILLING CO.**MEXICO**

Officers: Wm. Grote, pres., Elgin, Ill.; A. W. Church, v. p.; C. R. Hopson, sec.; J. A. Waterman, treas.; with J. A. Rovelstad, E. S. Eno and F. H. Ackemann, directors. Robt. F. Fitz, mgr., P. O. Box 275, Los Angeles, Cal. **Inc.** May 10, 1910, in Ariz. **Cap.**, \$500,000; shares \$100 par; outstanding, \$432,500. Annual meeting, third Monday in May.

Properties: 233 pertenencias, free milling gold property, at Penon Blanco, and 144 pertenencias, copper property, at Velardena, Durango, Mex.

Development: one vertical and one incline shaft, depth 375' with deepest workings at 475'. Total underground workings 1,500'. **Equipment:** includes a 17-ton 3-stamp mill. Mines closed down owing to revolution, but management states operations will be resumed as soon as permissible.

EL ORO MINING & RAILWAY CO., LTD.**MEXICO**

Offices: 24 Lombard St., London, E. C.; 61 Broadway, New York. T. Dundas Pillans, sec. **Directors:** R. T. Bayliss, chairman, H. W. Barnett, Capt. H. V. Hart Davis, Alfred Naylor, L. Breitmeyer, P. L. Foster, J. H.

M. Shaw, R. M. Raymond, managing director in Mexico; A. F. Main, gen. mgr.; F. Jenkin, asst. mgr.

Registered, July 27, 1899, in London, to acquire the capital stock of the American Mng. Co. and the American Railroad & Lumber Co., the former owning the El Oro Gold & Silver mine in the El Oro district of Mexico, and the latter owning the railroad connecting the mine with the Mexican National Ry. Purchase price was £886,072; paid £820,084 in cash and £65,988 in stock. The two American companies have since been dissolved. **Cap.**, £1,150,000; outstanding, £1,147,500; shares £1 par. Annual meeting in Oct. Listed on London Stock Exchange.

Accounts for fiscal years ending June 30:

	Bullion	Railway	Loss	Deprec.	Profit
	Recovered	Receipts	Deprec.	on Exch. of Invest's	
1915....	£ 75,541	£ 7,944	£25,000	£20,444	£ 78,398 (d)
1914....	415,436	35,497	25,000	23,242	103,690

(d) Deficit, which, with £34,229 provision for income tax and £1,202 written off improvements, deducted from credit balance forward, left £77,240 carried forward; cash, £120,238; treasury bills, £19,805; bullion, £2,171; debtors, £7,203; investments, £26,643; creditors, £50,483.

Dividends: Aug., 1900, from profits to June 30, 1900, 5%; 1900-01, 11¼%; 1901-02, 15%; 1902-03, 15%; 1903-04, 7½%; 1904-05, nil; 1905-06, 12½%; fiscal years ended June 30, 1907, to 1911, inclusive, 15% each; 1911-12, 12½%; 1912-13, 10%. Nil since, due to political disturbances. Total dividends to July, 1913, £1,783,625.

The El Oro Mng. & Ry. Co., Ltd., owns 42,687 shares (par £1) of the stock, and £14,000 7% debentures of the Suchi Timber Co., Ltd., which declared a dividend of 5% on June 30, 1913.

Property: the San Antonio, San Rafael, Trianon, Diamante, Ofir, and Carmen No. 2 claims, 786 acres, at El Oro, 100 miles northwest of Mexico City. In 1912-1913, the adjoining Ofir claim, 11½ acres, was bought for £130,000 cash. This claim controls the rights of the San Rafael vein in depth.

Ore: values are mainly in gold. Orebodies vary in width from 10' to 60'. **Development:** by shafts from 1500' to 1600' deep. **Ore reserves:** June 30, 1913, estimated as 448,053 tons, value \$8.11 gold and 3 oz. silver per ton, total value \$9.90 per ton; compared with 301,934 tons, value \$9.26 per ton, on June 30, 1912.

Equipment: includes a 200-stamp mill, 8 tube mills and a cyanide plant. Crushing was continued with 100 stamps until April, 1914, when, owing to revolutionary disturbances in the district, all operations were suspended. Milling on a small scale was resumed Oct. 1, 1914, but had to be again suspended in Feb., 1915.

Recent production for fiscal years ending June 30:

Year—	Tons Milled	Value	Costs	Profit	Yield
1913.....	433,708	\$5.04	\$3.59	\$1.45	\$2,188,723
1912.....	387,157	5.75	3.79	1.96	2,228,190
1911.....	360,294	6.63	3.90	2.73	2,389,340
1910.....	316,138	8.10	5.17	2.93	2,562,705
1909.....	285,181	8.56	5.42	3.14	2,442,374

EL PASO CONSOLIDATED GOLD MINING CO. COLORADO

Offices: 20 Broad St., New York; Cripple Creek and Colorado Springs, Colo. **Officers:** H. McGarry, pres.-gen. mgr.; Fred. W. Bailey, v. p.; Geo. N. Miller, 2nd v. p.; Daniel Thatcher, sec.-treas.; preceding, with J. K. Corbiere, W. C. Sherwood, Geo. W. Gano, R. M. Rankin, and A. E. Carl-

ton, directors. **Executive Committee:** H. McGarry, F. W. Bailey, and R. M. Rankin. J. J. Darnell, mine supt.

Inc. Feb. 27, 1893, in Colo. **Cap.**, \$2,450,000; shares \$1 par, changed 1913 to \$2,500,000, shares \$5 par; outstanding 490,000 shares. No bonded debt. Stock transferred at office of secretary, Colorado Springs. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, 2nd Monday in April. Fiscal year ends March 31. Listed in Colorado Springs and on New York Curb.

Dividends: (on stock of \$1 par) 1903, 2 $\frac{1}{2}$ c; 1904, 13 $\frac{1}{2}$ c; 1905, 23c; 1906, 7c; 1907 and 1908, 2c each; 1909, 1c; 1910, 2c; 1911, 2 $\frac{1}{2}$ c; 1912, 5c; dividends on stock of \$5 par: March 31, 1913, 12 $\frac{1}{2}$ c; Feb. 25, 1914, 10c; none in 1915. Total dividends \$1,707,545.

Balance sheet of Dec. 31, 1915, shows: assets, \$2,808,266, which includes: mining property (stock) \$2,500,000; mining property (cash) \$91,262; stocks and bonds \$11,457; notes receivable \$215, accounts receivable \$4669; ore in transit \$4108; cash, \$5353. Liabilities show: working capital \$50,000; surplus \$221,522; vouchers payable, \$7744; notes payable \$29,000.

Profit and loss account for 1915 shows: ore sales and royalties, \$129,546; other income \$4466; total income \$134,012; mining and general expenses, \$118,189; net profit for 1915, \$15,823. Company's indebtedness was reduced by the year's operations from \$70,000 to \$22,500 and the mine was being operated at a monthly profit of about \$5000, March, 1916.

Property: 70 $\frac{1}{2}$ acres in the Cripple Creek mining district, developed by 3 shafts to a depth of 1350'. Has been a prominent operator for a great many years. For geology of the Cripple Creek district, see 16th Ann. Rept of Colo., also U. S. G. S. Bull. 260, 1905, pp. 85-98.

In 1915, after careful investigation it was found by a new management: that very little ore was in sight and it was mostly low grade; that during 1914-15 the company had made no profits, had exhausted its treasury surplus, was about \$70,000 in debt and doing business largely upon credit; that general expenses amounted to \$1500 per month and mining operations were being run at a loss of \$3000 to \$4000 per month.

Development: new work for year ending March 1, 1916, totaled 4230', resulting in the finding of several small orebodies. On the 8th level of the C. K. & N. vein, tributary to No. 1 shaft, an ore shoot 470' long was found which has produced 1,170 tons a month for about 9 months, average grade of this ore is \$9.50 gold per ton. Sixteen sets of lessees are working in the mine, and shipping 40 tons per day.

Ore reserves: estimated March 1, 1916, amounted to 7,000 tons broken ore and 12,000 tons ore in sight. **Production:** for year ending March 1, 1916, amounted to 28,448 tons by the company and 9,994 tons by lessees.

The lower levels of the mine, including the tunnel level on the C. K. & N. vein, which has been the heaviest and best producer, appear to be low-grade as far as exposed. There are possibilities of high-grade ore being opened in the upper levels where the management intends to prospect. A flotation mill for treating dump and low-grade ore is proposed if the experimental work now being done at the Portland and Vindicator mines proves successful. The future of the El Paso depends entirely upon results of new prospecting work.

EL POTOSI MINING CO.

MEXICO

Control obtained in Jan. 1916, by Howe Sound Co., which purchased 53,800 shares out of a total outstanding capitalization of 60,000 shares. **Property:** in Santa Eulalia district, Chihuahua, adjoins property of Chihuahua Mining Co., nearly all of whose stock is owned by El Potosi. Is one of the oldest producers of silver-lead ore in the district, said to have

paid dividends for many years, and to have large ore reserves. Idle at present due to disturbed conditions in Mexico.

EL RAYO MINES CO.**MEXICO**

Subsidiary of the Mines Co. of America, which see.

EL TIRO COPPER CO.**ARIZONA**

Drexel Bldg., Philadelphia, Pa. El Tiro, Pinal Co., Ariz. **Officers:** C. D. Bouton, v. p.; J. D. Goff, sec.; C. J. Schlaechter, treas.; W. H. Buehman, acting gen. mgr.; preceding, with G. W. Barnes, William Greif, L. O. Bailey, H. D. Moore, directors. **Inc.** May 22, 1907, in Arizona, as successor of the Cleveland-Arizona Mining Co. **Cap.**, \$4,500,000; shares \$10 par; fully issued. Funded debt outstanding July 1, 1916, \$1,291,000 (authorized \$1,500,000) first mortgage 6% 10-year \$500 and \$1,000 gold coupon bonds. Dividends 6% per year until all bonds are retired. Company controlled by American Finance & Securities Co., through ownership of majority of stock issue. Annual meeting third Thursday in April, at Tucson, Ariz.

Property: 14 claims, 255 acres, including a 5-acre mill site in the Silver Bell district, adjoining the Imperial mine, 70 miles west of Tucson. Claims show contact deposits between quartz porphyry and limestone, carrying cuprite, melaconite, chalcocite and chalcopyrite with a gangue of decomposed porphyry and limestone. Two orebodies under development are irregular in shape, of about 10 acres in combined area and proven to depth of 400'.

Development: by several shafts and tunnels, including the 283' three-compartment Kurtz shaft, and a 432' transportation tunnel connecting the Kurtz shaft with the railroad. There is about 15,000' feet of development work disclosing large quantities of concentrating ore and several large bodies of high-grade ore. Mine is said to have considerable 3% ore on the dumps. Not operating March 1, 1916.

Equipment: includes a 600-h. p. steam plant, 150-k. w. electric plant and a 120-h. p. gasoline plant, with a 16x20" 250-h. p. double-drum hoist, good for 1,000'; 3 gasoline hoists, and Nordberg and Sullivan air compressors of 18 drills aggregate capacity. There are 18 buildings in all.

A 50-ton concentrator, built for experimental purposes, and increased later to 100 tons daily capacity, is equipped with a 7x10" Blake crusher, 30-ton Huntington mill, 2 rolls, a Vezin automatic sampler, 1 vanner, 5 Wilfley tables and 1 Richards pulsator and hydraulic sizer. Railroad crosses land.

EL TRIUNFO CONSOLIDATED MINING CO.**MEXICO.**

Idle. **Mine office:** Bacoachi, Arizpe, Sonora, Mex. **Officers:** A. C. Charlot, pres.-gen. mgr.; Dr. S. Newton Leo, v. p.; A. L. King, treas.; preceding, with T. B. Johnstone, Albert Reineman, Julius G. Miller, Henry Stern, Wm. H. Freystadt, I. Neuberger, A. H. Wand, D. Powdermaker, Dr. Moritz Gross, Adolph Oltmann and John H. Brown, directors; John Martin, supt. **Inc.** in Arizona. **Cap.**, \$2,000,000; shares \$1 par. Property is held through a Mexican corporation with cap. of 10,000 pesos, shares 100 pesos par, entire stock issue of which is owned by El Triunfo. Annual meeting, first Monday in October.

Property: 136 acres, in 12 different groups, principal property, about 4 miles from the Picacho mines, about 8 miles S. W. of Bacoachi, 2 miles from the Sonora river and about 75 miles by wagon road from Cananea. Lands carry 5 orebodies, of 2 to 5' average claimed width, said to be traceable 2 miles, and to carry azurite, malachite, bornite, chalcopyrite and chrysocolla, all silicious, and occasional native silver, with a claimed average value of 5% copper, 25 to 600 oz. silver and \$3 gold per ton.

Development: about 7,000' of workings, main shaft 400' deep, con-

necting with a tunnel, for extraction. There are 5 shafts, 6 tunnels and various open cuts. The main vein is a fissure of 4 to 5' width, and practically vertical dip, carrying oxidized ores to shallow depth, succeeded by sulphides.

Equipment: includes a 90-h. p. steam plant at the mine, small saw-mill, 50-ton reverberatory furnace and 26 buildings. Wells provide water for boilers and potable use.

A 50-ton mill has a 25-h. p. steam engine and 4 Behrend tables, with a 3-mile pipe line to the Sonora river, where there is a small pumping station.

Company paid a dividend of 1% in Aug., 1911. During 1912, company operated its smelter (reverberatory), shipping matte to El Paso, running \$625 per ton. Closed down since 1913 on account of unsettled political conditions and insecurity of property rights during revolution.

Smelter was blown in in 1908 and shut down after a few days; again blown in in 1911. Transportation facilities are poor, nearest railroad station being at Cos, 38 miles distant by mule trail.

EL VAN COPPER CO., S. A.

MEXICO

Mine near Nacozari, Sonora, Mex. Property not operated for several years and several claims forfeited to government for non-payment of taxes.

ELECTRIC MINING & SMELTING CO.

OREGON

Mine at Idanha, Marion Co., Ore., in the foothills of the Cascade range, said to show chalcopyrite and bornite ore, associated with pyrite with high values in free gold. Property controlled by Hugh Freeland, through ownership of 85% of the capital stock. No record of operations secured.

ELENITA DEVELOPMENT CO.

MEXICO

Office: 1400 Alworth Bldg., Duluth, Minn. **Officers:** Henry B. Paull, pres.; E. J. Maney, v.-p.; F. R. Kennedy, sec.-treas.; preceding, with Thos. F. Cole, C. d'Autremont, Jr., I. B. Joralemon, directors. **Cap.**, originally \$200,000, was increased, 1907, to \$400,000; shares \$10 par; paid in, \$7; issued 27,310 shares. Owns entire stock issue of the Lomita Mining Co., S. A., a Mexican corporation that holds direct title to the land.

Property: the Bonanza de Cobre mine, 1,628 acres, at Cananea, lies north of the smelter and extends to a point nearly opposite the Puertecitos mines of the Greene Cananea. **Development:** by 2 shafts and 5 tunnels, mine being wet at slight depth and giving, as far as developed, mainly silver-lead and zinc ores with a little copper. Property inactive since early in 1913.

ELEPHANT HEAD MINING & MILLING CO.

ARIZONA

Address: Ben Daniels, pres., Nogales, Ariz. Copper-lead property near Mt. Hopkins, Santa Cruz Co., Ariz. **Inc.** 1910. **Lands:** about 40 miles from Tucson, and 6 miles from the Calabasas railroad, near Elephant Head Butte, in the Santa Rita mountains. A vein, said to have a 40' out-crop, carries a complex of argentiferous lead, copper and zinc sulphides, of low average grade, and there also is a 20' vein of quartzite, said to give surface assays of \$10 gold per ton. Reported to be working a force of 25 men and to be shipping good ore. Plans to erect reduction plant.

ELIZABETH GOLD HILL MINING CO.

WASHINGTON

North Yakima, Yakima Co., Wash. **Officers:** L. L. Matterson, pres.; P. J. Eschbach, v.-p.; Frank X. Nagler, sec.-treas.; preceding, with Jos. Feser, Thos. Hope, E. P. Sanford and Rudolph Mayer, directors. **Inc.** 1900, in Washington. **Cap.**, \$1,000,000; shares \$1 par, nonassessable. Annual meeting, second Monday in March.

Property: 14 claims, unpatented, 200 acres, adjoining the Blue Bell mine on the north, about 65 miles N. W. of North Yakima, in the Summit district. Shows a number of orebodies in granite, carrying gold-silver-lead-copper ores, with 1,600' of workings. **Ore reserves:** estimated by management, 150,000 tons of ore, with 100,000 tons blocked out for stoping, averaging \$40 per ton, which figures are excessive.

Equipment: includes steam and water power, and a small sawmill, with material for a 10-stamp mill on the ground. Idle.

ELKHART MINE.

WYOMING

Owned by Walcott Copper Mining Co.

ELKHORN, COPPER MINING CO.

WYOMING

Property: on Elk Mountain, near Overland, Carbon Co., Wyo., is said to carry a 7' vein of sulphide ore, giving assays of 6 to 20% and claimed to average 7 to 8% copper, with considerable ore in sight. Mine has a shaft and a 460' tunnel, with about 1000' of drifts. Worked under lease by W. C. Sammons of Saratoga and reported shipping in 1914.

ELKO PRINCE LEASING CO.

NEVADA

Midas, Elko Co., Nev. J. N. V. Dorr, pres. Operates mill and cyanide plant on property of Elko Prince Mining Co., which see.

ELKO PRINCE MINING CO.

NEVADA

Midas, Elko Co., Nev. Controlled by Leslie Savage. **Property:** in the Gold Circle mining district, about 50 miles N. E. of Golconda, on the Southern Pacific R. R., and 35 miles from Red House on the Western Pacific R. R. Auto truck runs between Midas and Golconda; supplies are hauled from Red House.

Geology: the Gold Circle formation consists chiefly of rhyolite, andesite and bostonite; ore occurs in vertical fissures in the rhyolite; hanging-wall of veins in the Elko Prince mine is bostonite; foot-wall is rhyolite. The vein is a quartz filling containing gold with silver sulphide, breaks clean on the hanging-wall, but less well defined on the footwall.

Development: 700' crosscut adit from which drifts have been run N. and S. 1,200' on the vein, giving a back of about 350' above this level; this has been opened up by raises and drifts. Vein has been opened below the tunnel level to a depth of 750' below the surface. Shrinkage stoping is used and stoping width will be held to 30" if possible. Ore is said to average \$40 per ton, with enough blocked out to net \$500,000 over cost of mill.

A lessee on the June Belle claim is said to have opened up a new vein paralleling the Elko Prince, with indications that it will prove of greater average width.

The mill, operated by the Elko Prince Leasing Co., J. N. V. Dorr, pres., is equipped with a 4' Marcy steel-ball mill, a 5'x14' tube mill, Dorr classifier and thickeners, and an Oliver filter. Power is supplied by a 185-h. p. Allis-Chalmers oil engine. Water is pumped from a gulch at Midas through a 10,000' pipe line to the mill.

ELKTON CONSOLIDATED M. & M. CO.

COLORADO

P. O. Box 146, Colorado Springs, and Cripple Creek, Colo. **Officers:** E. P. Shove, pres.; A. E. Carlton, v.-p.; with J. A. Connell, M. F. Stark, C. G. Kingsbury, Geo. Bernard, and J. W. Graham, directors. T. W. Gauss, sec.-treas.; H. M. Ragle, asst. sec.-treas.; R. P. Windsor, supt. **Inc.** 1892 in Colo.; extended 1912 for 20 years. **Cap.,** \$3,000,000; shares \$1 par; 500,000 shares in treasury. Annual meeting in Feb. Listed in Colorado Springs and Denver. Company is one of the oldest in the Cripple Creek district.

Balance sheet as of Dec. 31, 1915, shows: assets, \$3,756,604, which

includes. property and plant \$3,131,044; treasury stock \$500,000; Cripple Creek Drainage & Tunnel Co. \$98,400; cash \$3,697; accounts receivable \$6,554; current liabilities \$15,949; surplus earnings \$233,177. In 1915 there was received from ore sales \$498,753, as compared with \$623,695 in 1914. Net profit in 1915, \$33,414, as compared with \$138,192 in 1914.

Dividends: to Jan. 1, 1916, \$3,579,460; last dividend paid May 24, 1915, \$50,000, previous to which time the rate had been 2c a share quarterly.

Property: Elkton group, 93½ acres, patented, on Raven hill, in Cripple Creek district. Company holds the Arequa lease on the property of the Raven & Beacon Hill Gold Mining Co., but operations in 1915 showed a slight loss. **Ore:** telluride in fissure veins in breccia and granite.

Development: by shafts, with many miles of underground workings. The main shaft is 1,500' deep, has 17 levels, and is connected with the Roosevelt tunnel by a raise from the tunnel level. This connection was made early in 1916. In 1915, 3,471' of development work was done, compared with 3,917' in 1914.

Ore reserves: of the Elkton vein above the 16th level have been largely depleted. There is 125' of stoping ground available between the 17th and 16th levels and there remains about 175' between the tunnel level and the 17th level. In 1915 prospecting work was started on the Mt. Girl claim of the Ida May group. The work, not yet completed, has disclosed one fissure vein in breccia containing ore said to assay \$12.60 per ton.

Property is thoroughly equipped. Company employs about 50 men. Average wages in 1915 for entire mine, including superintendent and office, \$3.68 per day. In 1915, 43 sets of lessees operated on the properties, producing 21,131 tons ore, average assay \$9.53 per ton. Thirteen sets of these lessees operated at a profit, the remaining thirty at a loss. In 1914 lessees produced 9,050 tons ore, average assay \$9.38 per ton.

Production: (from the Elkton mine)

	Tons Ore	Value p. Ton	Cost p. Ton (a)	Freight & T'tment
1915.....	16,510(b)	\$18.42	\$3.30	\$5.63
1914.....	29,509	18.37	2.62	5.34
1913.....	28,814	18.88	2.40	5.95
1912.....	29,163	19.01	2.22	5.85

(a) Total cost of ore shipped includes underground labor and powder sorting, sampling and loading, but not development. (b) Production was curtailed, awaiting extension of Roosevelt drainage tunnel.

ELLA W. MINE.

COLORADO

Operated by Consolidated Mines & Reduction Co., which see.

ELLAMAR MINING CO.

ALASKA

Office: 211 American Bank Bldg., Seattle, Wash. **Mine office:** Ellamar, Prince William sound, Alaska. **Officers:** F. M. Jordan, pres.-treas.; C. S. Packer, sec.; L. L. Middlekamp, supt.; preceding, with W. R. Rust and Chas. de Steigure, directors. Inc. 1900, in Washington. Cap., \$10,000,000; shares \$100 par. Is reported to have paid over \$300,000 in dividends. Gross earnings in 1915 amounted to \$740,000, \$722,000 from ore sales. Property changed ownership April, 1909.

Property: 14 claims, patented, known as the Ellamar mine, at Ellamar, on Virgin bay, 20 miles S. W. of Valdez. The mine has a 600' three-compartment vertical shaft, with levels at 100' intervals, and has about 3 miles of workings, said to block out about 250,000 tons of ore for stoping.

Ore: occurs in a lens 80x200' and lies wholly within the slate, pinch-

ing out 30' below the 500' level. Ore is mainly chalcopyrite associated with pyrite, pyrrhotite and sphalerite in a gangue of slate, graywacke and quartz, assaying from 3 to 25% copper, 3 oz. silver and up to \$50 gold. Mine was the first copper producer in Alaska, beginning shipments in 1901. A cofferdam has been built to permit mining orebody outcropping on the beach, below the ocean level, and from 1910 to 1913 mining was confined to that part of orebody between surface and 200' level. In 1913 development work was done on the 200, 300 and 400' levels. Geology fully described, p. 90, U. S. G. S. Bull. 605, 1915. Ore is mined by underhand filling.

Equipment: includes a 300-h. p. steam plant, with 3 boilers, a 3-drill Ingersoll-Rand air compressor, Nordberg compressor, a 12x24 Nordberg engine, a 60-h. p. hoist. In 1914 a 200-ton per hour aerial tramway and new loading dock were completed. The tramway conveys ore from mine bunkers a distance of 2,200' across shallow water to the loading dock, having 25' of water at low tide. Buildings include a machine shop, smithy, laboratory, mess house and 12 other buildings.

Costs are said to be about \$3 per ton, for ore loaded on vessels, with about \$3 transportation charges to the Tacoma smelter.

Production: 1911, over 16,000 tons, averaging 0.24 oz. gold, 0.80 oz. silver and 6% copper; 1912, 22,000 tons, averaging 0.30 oz. gold, 0.90 oz. silver and 2½% copper; 1913, 25,000 tons; 1914, 31,000 tons; 1915, 36,000 tons, a total to date of 200,000 tons. Shipments in 1915 averaged .168 oz. gold, .607 oz. silver, 2.18% copper.

ELM ORLU MINING CO.

MONTANA

Office: Miner Block, Butte, Mont. Hon. W. A. Clark and W. A. Clark, Jr., owners. J. W. Pyle, cons. engr.; H. C. Mangum, agt. Inc. 1907. **Cap.**, \$1,000,000; shares \$1 par. Statements filed with assessor of Silver Bow county for years ending May 31:

	Ore Value		Total		Costs		Net
	Tons	p. Ton	Mining	Const.	Trans.	Reduct.	Profit
1916....	200,752	\$18.52	\$1,011,537	\$18,029	\$408,823	\$1,783,352	\$495,757
1915.....	.....	.....	322,074	267,722	345,624	593,852	456,711

Company owns the Elm Orлу mine and claim of that name adjoining the Butte & Superior holdings, the Badger State mine of the Anaconda Copper Co. and the Pilot Butte mine, all in the N. E. section of the Butte district. The Poser claim is owned by a separate company.

The Elm Orлу covers part of the Rainbow lode and several other veins containing large bodies of copper ore and immense bodies of zinc ore. Copper occurs as copper glance, both in secondary fault veins and in veins of the Rainbow lode, and also as chalcopyrite mixed with zinc ore. The mine has a 1,400' shaft and several miles of workings, principally below the 900' level.

The output of the mine is handled in the mill of the Timber Butte Milling Co., (which see), also owned by Senator and W. A. Clark, Jr., zinc concentrates going to the National Zinc Co.'s plants at Bartlesville, Okla., Kansas City and Springfield, Ill. The copper ore is shipped direct to the Anaconda smelter, the mine yielding from 50 to 100 tons a day during 1915.

The apex controversy with the Butte & Superior company was decided by the U. S. District Court in favor of the Elm Orлу Co., giving this company the westernmost 301' along the vein and Butte & Superior all rights to the Rainbow lode east of the point where it enters the Black Rock claim (B. & S. Co.) ; subject, however, to the prior rights of the Pyle vein of the Elm Orлу company below its junction with the Rainbow.

Timber Butte Milling Co.

Affiliation of Elm Orlu Mining Co., Butte, Mont. **Officers:** W. A. Clark, Jr., pres. and gen. mgr.; W. A. Clark, v.-p.; W. D. Mangum, sec.; J. K. Heslet and A. J. Johnston, directors; W. N. Rossberg, supt. **Cap.**, 1,000 shares, \$100 par. A close corporation.

The mill was erected to concentrate zinc ores of the Elm Orlu mine. Capacity, 350 to 400 tons daily. Process, gravity separation and flotation. Crushing is by rolls and Hardinge mills; separation, by tables and Mineral Separation, Ltd., flotation machines. Electric power is supplied by the Montana Power Co. Mill began operations about May 1, 1914. Recovery said to be over 93% and concentrates to average 52% zinc.

The mill is completely described by Theodore Simons in Trans. A. I. M. E., June, 1915.

ELM RIVER COPPER CO.**MICHIGAN**

Final dividend of 19 cts. per share paid to stockholders and company liquidated. Property acquired by Contact Copper Co., which see.

ELY AMALGAMATED COPPER CO.**NEVADA**

Company controlled since 1911 by Jesse Knight, pres., Provo, Utah, who owns 51% interest. Inc. 1907, in Utah. **Cap.**, \$100,000; shares 10 cts. par.

Property: 6 claims, and a townsite, about 1 mile from the Steptoe smelter, of the Nevada Consolidated Copper Co., at McGill, White Pine county, carries silver-lead ores. Several carloads of ore have been shipped and property under development.

ELY BELL MINING CO.**NEVADA & UTAH**

Letters unclaimed at Ely, Nev., and Salt Lake City, Utah. Company probably dead. Stock worthless. Fully described Vol. XI, Copper Handbook.

ELY-CALUMET COPPER CO.**NEVADA**

Ely, White Pine Co., Nev. **Officers:** Al. D. Myers, pres.; J. K. Turner, sec.-treas. and gen. mgr.; preceding, with G. L. (Tex.) Rickard and Thos. Rockwell, directors. Fred Stroelke, supt. Inc. in Nevada. **Cap.**, \$5,000,000; shares \$5 par. Stock listed on Salt Lake Stock Exchange.

Property: 32 claims, unpatented, 600 acres, said to have cost \$75,000, about a mile north of Ely, at the extreme eastern end of the known copper belt. Claims cover a high hill of limestone, traversed by E.-W. fault veins of ferruginous quartz, much crushed and brecciated, with replacement bodies of ironstone carrying copper. **Development:** by a 450' two-compartment shaft, and 500' of tunnels, with about a quarter-mile of workings, showing a 4' vein carrying auriferous and argentiferous chalcocite. Management said to plan sinking the shaft to 1,000' and drifting at 100' intervals.

Several sets of lessees, working on the Wildcat and adjoining claims, have shipped a little ore, one shipment returning 42.6% copper and 3 oz. silver per ton. Sunday shaft in limestone cut lead ore at 120', passed into ironstone, 40', carrying 2½% copper. Management resumed operations in 1915.

ELY CONSOLIDATED COPPER CO.**NEVADA**

Office: 414 Judge Bldg., Salt Lake City, Utah. **Mines:** Ruth, via Ely, Nev., and Elko, Nev. **Officers:** S. M. Levy, pres.-gen. mgr.; Gideon Snyder, sec.-treas.; Grant Snyder and Daniel B. Shields, directors; R. M. Kellogg, supt. Inc. Oct. 2, 1906, in Utah. **Cap.**, \$10,000,000; shares \$10 par, of which 300,000 shares were donated to treasury by incorporators. Last assessment 3 cts. per share, levied Sept. 2, 1914, delinquent Dec. 31, 1914. Stock listed on Salt Lake Stock Exchange and New York curb.

Registrar and transfer agent, United States Corporation Co., 34 Nassau St., New York.

Company's report for year ending Sept. 30, 1914, showed general expenses \$60,767, mine development \$230,907, surface improvements \$33,221; with cash and accounts receivable, \$2,393; accounts payable, \$9,729.

Property: 3 groups, 1 in the Ely district, 20 claims, 370 acres, also a lease and bond on the Copper Queen mine, Elko, Nev., and the Baltimore, an adjoining property.

The Ely property, 15 claims, about 300 acres, on the south side of the mineral belt, near the Ruth and Jupiter groups of the Nevada Consolidated, was bought for about \$100,000. Developed by 3 vertical shafts. The 625' Brilliant shaft has silver-lead ore on the 400' level, and near the bottom is said to show a 100' bed of disseminated copper ore, below commercial grade. The American shaft was 500' deep, at last accounts.

Development: in recent years has been at the 800' Zack shaft in the western end of the group. Orebody on 500' level reported to be 100' wide. From 500 to 700' levels, ore flattened, being 264' farther south on the 6th than on the 5th level. Ore consists of bunches of copper glance with some oxide and carbonate in white, clayey gouge and decomposed rock. Crosscut on 700' cuts monzonite, but too deep for pay ore. Car-load shipment in 1913 netted \$21.65 per ton, averaging 3.3% copper, 15.2 oz. silver and 12.2% lead.

The Copper Queen group, 18 claims, in the Merrimac district, 22 miles N. W. of Elko, Nev., shows a gossan outcrop, 500x600', carrying 40 to 50% iron; also 2 veins, one of them traceable a mile, showing surface exposures of shipping ore. Work was begun on this property in March, 1913, and shipments in May and June averaged 100 tons per week, smelter returns showing 7.4% copper, 7.9 oz. silver per ton, 40 cts. gold, 28% iron and about 35% silica. The ore is hauled by automobile trucks. Smelter returns on shipments in 1913 were \$5,341. Company was drifting on 100' level from Ironside shaft in 1914-15.

The Baltimore group, 12 claims, 6 patented, includes the Cuag and Morgan mines, taken under bond June, 1913, on 15% royalty, with no cash payment until 1914, appears to be a valuable acquisition. The Cuag workings contain ore blocked out and the shaft has been enlarged, re-timbered and is now reported to show high-grade bornite ore. The Morgan mine shows 4' of ore and shipments have carried 3% copper, a varying percentage of lead and 7.8 oz. silver. Developed by Morgan tunnel driven to open up Morgan vein on 200' level. Smelter returns 1913 amounted to \$886.

After an expensive campaign of development at the Ely-Nevada property, it was realized that the property could not be put on a paying basis under existing conditions and the policy of the company was changed and new properties sought. In March, 1913, the Copper Queen mine, near Elko, Nev., was purchased, for \$50,000. In May the Peterson group in Pine Valley was bonded and in June the property of the Pacific Consolidated Mining & Smelting Co., near the Copper Queen, was taken over on \$30,000 bond and lease.

The Peterson group, bonded in 1913, is located at Lone mountain, midway between Elko and Tuscarora, 8 miles from Hale Crossing, a station on the railroad with which it is connected by good wagon road. Property shows veins with ore shoot carrying high-grade copper ore and old workings carry 5% copper ore from which shipments were being made. The Pacific Consolidated Mining and Smelting Co. property, also held under lease and bond, consists of a 300-acre group of claims on which shipping ore was also found. About 350' from portal of Morgan tunnel

a 4' copper vein was opened up with reported values of from \$12 to \$26 per ton. A copper-zinc vein is also being developed, 1915-16.

Company has a practical business man looking after its affairs and seems now to be operated on safe lines. For several years past, extravagant statements concerning the company were issued by brokers and misleading assays were published of the value of the ore developed in the Zack shaft. It is now known that the orebody is low-grade and cannot be profitably mined. The company has a large capitalization, but the new management and new properties appear likely to bring the property to a self-supporting, if not a profitable basis.

ELY COPPER CO.**NEVADA**

Office: 815 Ernest & Cranmer Bldg., Denver, Colo. No representative at Ely, Nev. Idle since 1907. Fully described Vol. XI, Copper Handbook. Unfavorably regarded.

ELY GIROUX COPPER CO.**NEVADA**

Kimberly, White Pine Co., Nev. Windsor Trust Co., New York, trustee. Inc. 1909, by B. W. Coleman, Graham F. Putnam, and Roswell S. Nichols. Cap., \$5,000,000; shares \$5 par. In Nov., 1912, majority holdings were pooled, and \$75,000 shares treasury stock offered public, proceeds to be handled by Windsor Trust Co. as trustee, exclusively for payment of contractors sinking shaft on company's property at Ely, Nev.

Property in Robinson mining district. Stock listed on the New York Curb, as a prospect, 1915. No returns secured, and company advertised delinquent for \$91 taxes in Jan., 1916.

ELY-MIZPAH COPPER CO.**NEVADA**

Property: the Modoc group, near Ely, Nev. Assessment work neglected and property probably forfeited. See Vol. XI, Copper Handbook.

ELY REVENUE COPPER CO.**NEVADA**

Idle. Office: 830 Equitable Bldg., Denver, Colo. **Officers:** F. C. Goudy, pres.; L. F. Twitchell, v. p.; J. P. M. Humphrey, sec.-treas.; above, with C. C. Eddy and A. E. Reynolds, directors. Inc. 1907 in Colo. Cap., \$1,000,000; shares \$1 par. International Trust Co., Denver, registrar. Annual meeting 1st Tuesday in March.

Property: 132 acres, known as the Revenue group, at Ely, White Pine Co., near the Chainman and Altman mines. Operations to be resumed.

ELY VALLEY MINING & MILLING CO.**NEVADA**

Pioche, Lincoln Co., Nev. **Officers:** George Weddell, pres.; W. E. Harrison, v. p.; Edward Thomarson, sec.-treas. and gen. mgr. C. L. Warren, supt.; James W. Abbott, mg. engr. Inc. Jan. 6, 1908, in Nevada. Cap., \$1,000,000; shares \$1 par, fully paid and nonassessable; 600,000 promotion stock and 400,000 treasury; 10,196 issued. Annual meeting, second Tuesday in May.

Property: 200 acres, 16 claims, part patented and balance held by location, in Ely mining district, shows ore in vertical contact veins between limestone and quartzite. Vein reported to be 7' wide, to strike N. W. and to be proven to a depth of 500'. A vein of 10% copper ore was cut in shaft at 480' depth. Average assays claimed to have been 20% lead, 20 oz. silver and \$2 gold per ton.

Development: by 4 shafts and 400' tunnel at last accounts. **Equipment:** includes gasoline hoist, air compressor, pump and air-circulating plant. S. P. L. A. & S. L. R. R., 2½ miles from property. Letters neither answered nor returned.

ELY VERDI COPPER CO.**NEVADA**

Geo. Wingfield, pres., Goldfield, Nev. Mine near Ruth, via Ely, Nev.

S. R. Roberts, John Berry, of Ely; A. P. Sawyer and Leslie L. Savage, of Goldfield; M. R. Brown and H. S. Anderson, of Pierre, S. D., directors. Inc. May, 1912, in South Dakota. Cap., \$5,000,000; shares \$5 par. Is a reorganization of company of same name that was listed on New York curb in 1909.

Property: a large group of claims south of the Copper Flat steam-shovel pit of the Nevada Consolidated. Only assessment work being done.
ELY WITCH COPPER CO. NEVADA

Idle. Mine near Ely, Nev. **Officers:** J. E. Bamberger, pres., 163 So. Main St., Salt Lake City, Utah; D. M. Hyman, v. p.-treas.; H. Cohen, sec.; Ernest Bamberger, gen. mgr.; preceding with H. G. McMillan and W. W. Armstrong, directors. Inc. Nov. 22, 1906, in Maine. Cap., \$5,000,000; shares \$5 par.

Property: 7 claims, 1 fractional, 54 acres, patented, bought for \$275,000, lying in the porphyry zone between the Ruth and Cumberland-Ely mines of the Nevada Consolidated, shows large blowouts of iron-stained porphyry. **Development:** by 300' shaft, with levels at 100' intervals, and by tunnels of 1,200', 600' and 1,050', with 3,500' of workings. Development was disappointing, for, while claims cover the main monzonite belt of the district, the underground work on 300' level showed values too low to work. Drilling by Nevada Consolidated Co. is the logical thing to do and that company can probably work this property since it is now handling 1.6% ore at a profit. Company was a speculative promotion at time Nevada Consolidated was floated, and proving lean on development, has been idle since.

EMERALD MINING CO.

UTAH

Mine office: Mammoth, Juab Co., Utah. J. E. Oglesby, pres.; J. L. Yundt, gen. mgr. Inc. 1896 in Utah. Cap., \$300,000; shares \$1 par, assessable, fully issued; last assessment one-third cent a share, delinquent June 15, 1914. **Property:** silver-lead, with some copper; 4 claims, and additional land bought, 1910. Mine has 1,100' shaft, with about 4,000' of workings, on a narrow but rich vein, carrying copper and lead ores.

In May, 1913, it was reported that 22' of ore cut on the 2000' level of the Opex mine extended into this property. In July, 1913, company started a drift on the 1,100' level to be driven 1,200' north, to open up the ore formerly worked on the 2,000' Opex, the latter company having withdrawn permission to use the workings.

Development: on the Emerald property in the 700' winze disclosed a 4' vein between well defined walls, showing heavy iron mineralization and sugar quartz. Plan drifting on 1,000' level in 1916.

Company has levied assessments for years and been regarded as the "wildest of wildcats," but is now in favor, and may repay stockholders for their blind faith and yearly contributions.

EMERALD MINING CO.

WYOMING

Idle. Wheatland, Laramie Co., Wyo. **Property:** the Cooney Hill mine, formerly owned by the Cooney Hill Gold & Copper M. & M. Co., and the Emerald mine, on Slate creek, showing a prominent gossan outcrop in schist. The Emerald has a 60' shaft in ore, and a 100' shaft bottomed in a gossan showing traces of copper sulphides. No recent report received.

EMERY-WHITCOMB TUNGSTEN CO.

ARIZONA

Acquired by International Tungsten Corp., which see.

EMMA COPPER CO.

UTAH

Alta, Salt Lake Co., Utah. **Officers:** Frank R. Snow, pres.; W. J. Bateman, sec.-treas.; V. S. Snow, asst. sec.-treas.; A. O. Jacobsen, gen. mgr.; 644 E. 6 So. St., Salt Lake City, with Chas. S. Herzig, directors. Lee Glock-

ner, supt. Inc. 1906. Cap., \$1,000,000; shares \$1 par; 175,000 in treasury, March 1, 1916. Stock originally nonassessable, was made assessable and assessments levied in 1909 and 1913. Stock listed on N. Y. Curb and Salt Lake Exchange.

Property: 8 patented and 3 unpatented claims in Little Cottonwood district. The Vallejo and Joab Lawrence groups adjoining the Emma ground were purchased in 1915 from Moylan G. Fox of Salt Lake City in exchange for 352,000 shares Emma Copper stock.

Development: the Emma mine is developed by 1,200' of tunnels, a shallow shaft, drifts and raises, which so far have failed to prove ore in commercial quantities. In Sept., 1915, 6" of ore were reported opened on contact between shale and limestone. A 50-ton carload shipment to Am. S. & R. Co. in 1915 yielded \$1.50 gold, 16.6 oz. silver; 18.2% lead, 29% iron.

Is a prospect, promoted and financed by George Graham Rice, New York City. Operated intermittently 1915-16, under direction of C. S. Hertzig, who is developing the property as a result of a careful geological study, and the deduction that it contains a faulted portion of the Old Emma orebody.

EMMA MINE.

NEW MEXICO

S. L. Landon, supt. Mine at Fierro, Grant Co., N. M., is owned by the Copper Queen Consolidated Mining Co. and is being operated on a small scale by lessees, 1916.

EMPIRE COPPER CO.

IDAHO

Address: Wm. A. Kerr, sec.-treas., 111 Broadway, New York. Mine address: Mackay, Custer Co., Idaho. **Officers:** Frank M. Leland, pres. and purch. agt.; Ralph R. Osborn, v.-p.-gen. mgr. with L. R. Eccles and Fred G. Taylor, Ogdén, Utah, directors. Inc. June 6, 1907, in Maine. Cap., 6,000,000; shares \$5 par, reduced, July 16, 1908, to \$1,200,000, shares \$1 par; issued \$1,000,000. Stock listed on the New York curb. Annual meeting, third Tuesday in May. Equitable Trust Co., New York City, registrar; Corporation Trust Co. of N. J., transfer agt.

Company bought the Mackay property of the White Knob Copper & Development Co., Ltd., taking over also a 5-year lease on the property from the MacBeth Lease, Inc., giving 250,000 shares of stock to the White Knob and 750,000 shares to the MacBeth, and began business without any cash in the treasury, but with 200,000 shares of stock.

Property: the White Knob Copper mine, 3 miles south of Mackay, on Salmon river branch of the Oregon Short Line, with 39 claims, 18 patented, 700 acres, also mill and smelter sites of 480 acres, and a railroad right-of-way, in the Alder Creek district, Custer county, Idaho. **Geology:** property carries a large number of lenticular contact deposits, in granite-porphry between limestone and granite and is remarkable for its peculiar ore deposits. These are cylindrical, pipe-like masses of a branching, tree-like form, found in garnetized altered porphyry lying between limestone and granite. The geology has been carefully studied and is described by Kemp in the Transactions Am. Inst. of Mg. Eng., 1907, and in Genesis of the Mackay Copper Deposits, by Jos. B. Umpleby, Econ. Geol. The ore is largely a cupriferous pyrite with much chrysocolla derived from its alteration. The average assay of the 26,200 tons of ore mined in 1912 was 5.8% copper, 3 oz. silver per ton and \$1.36 gold per ton.

The mine was opened 1884, and worked by a succession of White Knob corporations, each making a failure of it, until leased, July 1, 1905, to the MacBeth Lease, Inc., which worked the mine on a business basis, at a profit, something the old owners never succeeded in doing.

Development: mine has a glory hole, 125 to 200' wide, but mining is

mainly by tunnel, the 700' main shaft connecting with the Albert tunnel 3,200' long. The Cossack tunnel is expected to strike ore at a point 730' deeper than the deepest winze in the Albert tunnel. The breast of the Cossack tunnel is now in over 4,000' and the rock shows traces of copper in the form of chalcopyrite. The mine has about 12 miles of workings, estimated to show 2,000,000 tons of 2½% and 200,000 tons of 4% copper ore, blocked out for stoping. The mine is dry.

Equipment: includes steam, electric, gasoline, water and air power, with a total of 152-h. p. at the mine and 125-h. p. at the smelter. There are 6 small hoists, 2 and 5-drill air compressors; 14-drill air compressor being installed.

There are 20 buildings and a machine shop at the smelter.

The mine is reached by an 85-mile branch of the Oregon Short Line railway, running from Blackfoot to Mackay, and is connected with the smelter by the 7¼-mile Empire railroad, owned by the company, of 36" gauge, equipped with two 23-ton Shay mountain-climbing locomotives and 30 cars. The line has a maximum gradient of 6%, with a rise of 2,000', and has one 6% grade on a 34° curve.

The smelter is not now in operation, ore being shipped to the A. S. & R. Co. plant at Garfield, Utah, for treatment.

Production:

Year	Tons mined	Lbs. copper	Oz. gold	Oz. silver
1915.....	54,295	4,702,119	3,155.064	125,134.784
1914.....	18,251.822	2,012,244	962.196	53,767.803
1913.....	34,721.696	3,565,479	1,812.463	92,805.319

The Empire Copper Co. was promoted just in time to be caught in the 1907 panic, but every share of stock sold to the public was redeemed, at subscription price, for which promoters deserve credit. Property is considered very valuable. Present management good, Mr. Leland having made the property pay from the time he took hold of it. Company employing 85 men and 150 men are working on 60 separate leases. The lessees pay 17½% royalty on net smelter returns.

EMPIRE COPPER & GOLD MINING CO.

ARIZONA

Office: 510 Bradbury Bldg., Los Angeles, Cal. Mine address: Dragoon, Cochise Co., Ariz. Officers: Leon V. Shaw, pres. and treas.; P. E. Woolf, v.-p.; Chas. R. Van Tilburgh, sec.; preceding with M. J. Gress, H. Hermanson, C. J. Nordquist, R. W. Pigeon, C. R. Lawrence, directors. Inc. Jan. 31, 1905, in Arizona. **Cap.**, \$1,500,000; shares \$1 par, nonassessable; issued 953,814. Annual meeting, second Monday in October.

Property: 3 separate groups of claims, near Johnson and Dragoon, on the Southern Pacific railway. The Empire group, 16 claims, 2 miles S. E. of Johnson, shows limestones and quartzite cut by porphyry and traversed by N.W. fissures carrying ore. Principal development is by the 380' Empire 2-compartment incline shaft, with about 500' of drifts, so wet that it was abandoned, temporarily; also the 125' Bridge, 158' Copper Whale and a 2,000' tunnel-shaft started. Mine shows auriferous and argentiferous copper ore.

In May, 1913, machinery and supplies were moved from the Empire group 6 miles south to the Princess group, said to have attractive surface showings of iron gossan and copper carbonate and to be opened only by shallow shafts. Company also owns the Cowboy group of 8 claims, partly developed, showing veins in limestone near porphyry contacts.

Equipment: includes a 25-h. p. hoist and 1-drill Fairbanks & Morse air compressor. Buildings include an engine house, smithy, bunk house and boarding house.

Presumably idle in 1915.

EMPIRE MINING CO.**MEXICO**

Address: Dolores Mining & Development Co., P. O. Box 533, Sta. L., Oakland, Cal. Mine address: care Ben Bound, supt., Camanea, Sonora, Mex. Company is the Mexican holding company of the Dolores Mining & Development Co. **Cap.** 10,000 pesos. **Property:** 95 hectares, including the Major Domo copper mine, a few miles from Cananea. A 200' shaft is reported to show a N.E.-S.W. vein, 2½ to 3' wide. Company also owns the Dolores, Empire, Bonanza, Spanish, Golden Cross and Providencia, silver-gold properties, amounting to 65 hectares, in the Magdalena district, Sonora, Mex. Planned erecting a 3-unit Pittman mill at the Golden Cross property, 14 miles S.W. of Cananea. No recent reports received. Presumably idle.

EMPIRE-NEVADA COPPER MINING & SMELTING CO. NEVADA

Office: 42 Broadway, New York. Mine near Yerington, Nev. Wm. Gelder, pres.; G. B. Garrison, sec. Inc. in Arizona. **Cap.** \$5,000,000, shares \$5 par. General Development Co. is a small stockholder in this company.

Property: about 500 acres on Copper Flat in 2 groups; 1 about 1 mile W., the other 2½ miles N. W. of Yerington. **Ore:** occurs in bunches and disseminated throughout a body of monzonite-porphry, said to be opened for 3,000' in length and 1,000' wide, carrying copper in the form of silicates, carbonates and oxides, a considerable part of it averaging 2.65% copper.

Development: by 5 shafts, from 80 to 160' in depth, several tunnels and open cuts and also by diamond drilling. Mine is said to have produced about \$150,000 from surface workings. Shipped 6,000 tons of 6% ore to Mason Valley smelter, 1912, and 2,900 tons in 1914. Now making monthly shipments to the Mason Valley smelter at Thompson, Nev. Six sets of lessees working in 1916. Property has small smelting plant, assay office, hoist, boarding house, etc.

EMPIRE STATE MINING CO.**ARIZONA**

Office: 182 Buick Ave., Utica, N. Y. Mine office: Bisbee, Cochise Co., Ariz. **Officers:** R. E. King, pres.; F. L. Guillaume, v.-p.-treas.; E. M. Penny, sec.; W. A. Fenn, Geo. P. Langford, John A. Losee, John A. Urschel, directors. John A. Collins, gen. mgr. and purch. agt.; O. P. Zane, cons. engr. and supt. Inc. June 27, 1904 in Arizona. **Cap.** \$1,000,000; shares \$1 par; 813,000 shares issued. Annual meeting in June.

Property: 11 claims, 230 acres, near the Modern mine, about 9 miles N. W. of Bisbee, is developed by an 1,100' tunnel, said to show about 150' of low-grade copper ore, slightly auriferous and argentiferous, estimated to average about \$8 per ton. Ore is found in small stringers, typical of the district, and property is not considered well located. Idle since June, 1914.

EMPIRE ZINC CO. OF COLORADO.**UNITED STATES**

Is a subsidiary of the New Jersey Zinc Co., 55 Wall St., New York, which owns entire stock issue. Owns and operates mines in Arizona, Colorado, and New Mexico, including the San Xavier group of claims in Pima district, 20 miles S. of Tucson, Ariz.; the Cleveland group at Pinos Altos, N. Mex., properties at Hanover and Kelly, N. Mex., Eagle and Leadville, Colo.

The San Xavier claims show copper ores, but company was working silver-gold veins, employing about 40 men and shipping 40 tons daily, June, 1913. Operations are to be resumed in 1916.

The Cleveland Group of 6 claims, 120 acres, patented, and a mill site, 8 miles north of Silver City, on the west slope of the Pinos Altos mountains, shows limestone cut by intrusive dikes of diorite and andesite. Ore occurs in bedding planes in the limestone, varies from a foot or two up to 50' in thickness, with a generally N. E. strike and a dip of 15°.

Development: by several tunnels, longest 900', and pits, exposing copper carbonates and oxides, carrying up to 6% copper, 20% zinc, 3 oz. silver and \$1 gold per ton, ores being complex and highly zinciferous. The mine has about 2,000' of workings, and is said to show 200,000 tons ore developed. Producing at the rate of about 100 tons per day in 1916.

Equipment: includes a 9-mile mule tramway connecting the mine with the railroad and a 100-ton electrostatic concentrating plant, installed Nov., 1915, with 8 magnetic separators and a 280-h. p. Snow crude oil engine. A flotation plant will be installed in 1916.

The **Brockman and Thunderbolt mines**, and a 250-h. p. power plant, at Hanover, N. M., are also owned and operated by the E. Z. Co. The Thunderbolt is developed by a 3-compartment shaft showing zinc sulphides. Shipments during 1915 averaged 600 tons per day, the largest production of zinc carbonate coming from the claims on the western half of the company's holdings.

The **Eagle Mining & Milling Co.** property at Belden, Eagle Co., Colo., purchased in 1915, consists of the Ifon Mask and Rocky Point mines and a mill. The mines were formerly worked for gold-silver ore. Orebodies occur as irregular masses in pitching sedimentaries. The ores originally mined were oxides, but with depth sulphides became abundant and sphalerite proved so predominant that it precluded profitable mining of the gold-silver ore at that time. Ore averages 17% zinc and 1.5% lead. The magnetic-separation mill has a 120-h. p. Pelton wheel and two 6-hearth Dewey roasters. One ton of galena concentrate is produced with each 10 tons of sphalerite concentrate, the former averaging 75% lead, the latter 48% zinc. Production, 1915, was about 120 tons daily.

The **Small Hopes-Boreel mine**, Leadville, Colo., is reported to have been bought in April, 1916, for \$500,000. The Small Hopes Co., operating through the Robert Emmet shaft, is said to have opened one of the largest bodies of zinc sulphide ore ever found in the district. Shipments for several months have been at the rate of \$40,000 to \$50,000 per month.

ENGELS COPPER MINING CO.

CALIFORNIA

Office: 393 Mills Bldg., San Francisco, Calif. **Mine office:** Keddie, Plumas Co., Calif. **Officers:** Henry Engels, pres.; F. Klamp, v.-p.; Landon A. Bell, sec.; E. E. Paxton, treas.-gen. mgr., above with Richard Spreckels, I. J. Truman, Jr., J. F. Humburg and O. G. Traphagen, directors. Edmund Juessen, supt.; Henry Hanson, mill supt. **Inc.** 1901 in Calif. **Cap.**, \$1,500,000; shares \$1 par; nonassessable; 1,339,451 shares issued. Balance sheet, Dec. 31, 1915, shows: Assets, \$1,750,999; liabilities, \$118,484. Profit and loss, \$115,501; reserves, \$17,013. Gross earnings for 1915 were \$416,695 and operating profit was \$150,467. Net earnings for first 6 months, 1916, \$275,000. Paid initial dividend of 1½c per share, July 20, 1916.

Property: 2 groups, 2 miles apart, 114 claims, 2,300 acres, well timbered, on Iron Cap mountain; the Superior group near Taylorsville and the Engels group, 12 miles N. of Taylorsville and about 26 miles by good wagon road from Keddie, the nearest railway station on the Western Pacific line.

The Engel group, at 5,000' elevation, is in Sec. 3, 4 and 9 of T. 27 N., R. 11 E. The "copper belt" is 1,800' wide at this place and the gossan outcrop 300' across and 2,000' long, running N.E. and dipping W. Orebody is a huge lens, lying in porphyry alongside of a diorite dike and well adapted for development by tunnel. Underground workings, made in the past 5 years, amount to 4,108' of tunnels, longest 1,800', and prove ore for 250' in depth with upraise of 150'. The ore is a mixture of chalcopyrite and bornite with barite, magnetite and altered country rock and is said to

average 3.32% copper. Sulphide ore occurs at shallow depth. Company claims 350,000 tons chalcopyrite and bornite ore blocked out and total ore reserves of 5,000,000 tons of 2½% ore, this estimate probably being based on the assumption that the whole deposit is minable above the tunnel level. A shaft is being sunk to connect with tunnel 350' below present workings, to develop orebody disclosed by 4,000' of diamond drilling in 1915.

The Superior group of 8 claims, 164.8 acres, is 2 miles S.W. of the Engel group. The ore deposit is like that of the other group in both character and occurrence and is said to be 200' wide, to run N. and S., and dip 65° W. Development is meagre, being only a 400' tunnel and 60' shaft, but said to show 10,000 tons of ore on the dump and 25,000 in mine. Diamond drilling in 1915 opened up a promising orebody and tunnel is being driven to develop same.

The 100-ton smelter, built in 1911, was never operated owing to Government objections to fumes.

Improvements consist of 400-ton Minerals Separation oil flotation plant, 1½ mile rope tramway, electric and steam power plant, 5-drill air compressor, brickyard, sawmill and all necessary buildings.

Production: in 1915 was 2,893,133 lbs. copper, 30,226 oz. silver and 414 oz. gold.

The mill treated 63,526 tons in 1915, concentrates averaging 33.82%.

Employs 200 men when working at capacity.

Authorized by California Commissioner of Corporations to sell 133,395 shares at par \$1, to net 95, to build branch railroad to Keddie on W. P. R. R. Survey in progress, 1916. Extensive diamond drill exploratory work planned and 2,000-ton milling plant to be erected in 1916.

ENTERPRISE GOLD MINING CO.

CALIFORNIA

Owens the Enterprise mine, 160 acres, in East Fork mining district, 7½ miles north of North Fork, in the Trinity Forest Reserve, Trinity Co., Calif. The first claim, Lone Jack, was located in 1882 and mine has been operated more or less continuously since.

Ore: free milling gold occurs in vein in diorite. Vein has N.E.-S.W. strike and dip of 10° to 45° N.W. Ore occurs in 3 shoots, 900', 300' and 300' long, with average width of 14".

Development: by tunnels; longest 1,400', has 3,000' of workings, with 3 stopes from 300' to 900' long, 50' to 240' high, and average width of 5'. Greatest vertical depth of development is 500'. At last accounts considerable ore was said to be blocked out.

Equipment: includes compressor plant, small electric plant and 10-stamp mill. Employs 12 men. Production to date said to be over \$350,000. Cost of operating is over \$7 per ton.

ENTERPRIZE MG., REDUCTION & IMPROVMENT CO. ARIZONA

Kingman, Mohave Co., Ariz. Maj. W. A. Mensch, pres. and gen. mgr., 1729 29th St., San Diego, Calif. Property and equipment reported sold at sheriff's sale for a debt of \$2,169 in 1914. Described Vol. XI, Copper Handbook.

EQUATOR MINING & SMELTING CO.

ARIZONA

Idle. **Office:** 20 Exchange Place, New York, N. Y. Mine office: Jerome, Yavapai Co., Ariz. **Officers:** Hon. Wm. A. Clark, pres.; Jas. A. Macdonald, v.-p.; Harry H. St. Clair, sec.-treas.; preceding with Chas. W. Clark and Jas. H. Anderson, directors. Inc. March 19, 1900, in West Virginia. Cap., \$500,000; shares \$5 par; issued, \$250,000. Annual meeting, third Monday in February.

Property: the Iron King mine, on Equator hill, in the Agua Fria district, 6 miles by wagon road, south of Jerome, shows a mineralized zone

up to 600' in width, with N.S. strike, traceable for upwards of 1,000'. Mine has a 300' main shaft, and a 5,000' gravity tram line, connecting portal of upper tunnel with roast yard of the reduction plant.

EQUITY COPPER & GOLD MINING CO.

OREGON

Rev. W. J. Hughes, pres. and gen. mgr., 2441 Center St., Baker City, Ore. Mine P. O.: Prairie City, Grant Co., Ore. **Officers:** F. M. Saxton, v.-p.; Mrs. Kate Palmer, sec.; G. J. Bowman, treas.; preceding with Hon. T. E. Johns and Rev. R. W. Hughes, directors. **Inc.** 1901, in Oregon. **Cap.**, \$150,000; shares 10 cts., par, non-assessable. Paid a dividend of \$3,000.

Property: 16 claims, unpatented, 320 acres, with a 5-acre mill site, in the Quartzburg district, 7 miles north of Prairie City. Reported to show 11 orebodies, 3 under development by tunnels, traceable one-half mile, showing sulphide ore estimated by company to average 2 to 3% copper, 2% lead, 2% zinc, 4 oz. silver and \$18 gold per ton.

The frame mill has 5 stamps, a Blake crusher, New Standard tables and 3 slime-tables. Presumably idle.

EQUITY CREEDE MINING CO.

COLORADO

Office: 107 W. 3rd St., Pueblo, Pueblo Co., Colo. **Officers:** Frank Taylor, pres.; Geo. D. Weston, v.-p.; B. E. Watkins, sec.; E. E. Withers, treas., above with R. L. Rapalje, directors. Reorganized March 5, 1915, in Colorado. **Cap.**, \$600,000; shares \$1 par; outstanding, \$375,000. Annual meeting second Wednesday in March.

Property: 20 claims, 216 acres, unpatented, 7 miles N.W. of Creede, in the King Solomon mining district. Claims are on the Nelson Mountain vein which is said to show gold-silver ore in a contact vein in rhyolite and porphyry. Shipments made are said to have averaged \$24.65 net per ton.

Development: by tunnels, 225', 350', and 725' long; greatest depth of workings, 700'; total underground workings, 1,300'.

Total production to 1915, 43 cars netting \$18,555. No production in 1915.

ERNESTINE MINING CO.

NEW MEXICO

Absorbed June, 1915, by Mogollon Mines Co. Latter company wound up and holdings bought by Socorro Mining & Milling Co., which see.

ESMERALDA COPPER CO.

MEXICO

Has no representative at former mine office: Llano, Magdalena, Sonora, Mex. F. C. Emery, pres.; W. D. Fredericks, mgr., at last accounts. **Property:** 88 hectares, has about 300' of workings, showing copper ore, with silver said to increase at depth. Presumably idle.

ESMERALDA COPPER MINING & SMELTING CO.

MEXICO

Idle. Mine near Santa Catarina del Norte, Baja California, Mex., known as La Esmeralda, is opened by shaft, with considerable development.

ESMERALDA; NEGOCIACION MINERA.

MEXICO

Idle. **Property:** at Chalchihuites, Sombrerete, Zacatecas, Mex., includes the Anaconda, Esmeralda and La Luz mines, developed by shafts and tunnels, carrying argentiferous and auriferous lead and copper ores.

ESPERANZA, LTD.

MEXICO

Office: No. 1 London Wall Bldgs., London, E. C., Eng. Office of American company: 54 William St., New York. **Directors:** R. J. Frecheville, chairman; F. W. Baker, F. M. Crisp, W. F. Fisher, A. A. Kelsey, C. L. Johnson, sec.

Reg. Oct. 6, 1903, in Great Britain. **Cap.**, £455,000; shares £1 par, all issued and credited, except seven, as fully paid. Acquired by agreement with the Guggenheim Exploration Co., and the Venture Corporation, Ltd., 449,800 shares of \$5 each, all the capital except 200 shares, in the Esperanza Mng. Co. of New York, inc. in New Jersey and owning gold and silver

mines covering 384 acres, adjoining the El Oro mine at El Oro, Mexico. Purchase price, £454,993 in fully paid shares.

Financial report for 1914 shows a profit of £28,650, compared with £47,322 in 1913, making with balance forward, £31,536; dividends absorbed, £21,071; tax, £6,228, leaving £4,236 carried forward. American company had £216,971 cash and realizable assets, Dec. 31, 1914.

Dividends: now paid semi-annually: 1903-04, 10%, 1904-05, 14 months, 82½%; 1906, 160%; 1907, 105%; 1908, 70%; 1909, 25%; 1910, 30%; 1911, 30%; 1912, 15%; 1913, 10%; 1914, 5%; 1915, 5%, interim, paid July 31.

Ore: gold and silver in veins from 3' and 5' to over 50' wide. **Development:** chiefly on the Orion, Bumerango, Esperanza and Emilia claims, but south of these is the Sirio claim with an 840' shaft, and the Suceso claim with a 646' shaft, which has been unwatered down to 500' and is being prospected.

Total development work to Dec. 31, 1914, amounted to 155,467'. Work in 1914 comprised 13,277' of which 4,918' was on the San Rafael vein, 59' on the Descubridora vein, 3,553' on West vein No. 1, 1,130' on West vein "A" and 3,616' on the San Carlos vein. In the upper levels of the San Rafael vein a considerable tonnage of low-grade ore was developed, but in the lower levels the vein continued to show discouraging results. Black shales are found in the 14th level footwall. On the San Carlos vein the upper and lower limits of the orebody appear to be in sight.

Ore reserves: estimated Jan. 1, 1915, as 148,254 dry metric tons of developed and probable ore, which should yield an approximate working profit of \$446,000 gold. Estimate, which shows a slight increase over figures of previous year, does not include old stope filling, nor 200,000 tons of sand tailing, estimated to yield \$200,000 gold.

Equipment: includes 120-stamp mill, tube mills and a cyanide plant.

Production:

Year	Tons milled	Value per ton	Costs per ton	Profit per ton	Rec. %
1914.....	166,212 (b)				
1913.....	207,281 (a)				
1912.....	229,076	\$7.31	\$6.01	\$1.30	80
1911.....	272,235	6.17	4.43	1.76	88

(a) includes 121,438 tons of tailing; (b) includes 45,237 tons of tailing. Mill was closed down from April 21 to Aug. 31, 1914, due to revolutionary conditions, and in Feb., 1915, the plant was again closed down. A little development work was done during the year.

Other properties are being investigated with a view to prolonging the life of the company. An interest has been secured in the Anglo-Colonial Co., Ltd.

ESPERANZA MINING CO.

MEXICO

Office: 54 William St., New York. Controlled by Esperanza, Ltd., which see.

ESPERANZA MINING CO.

MEXICO

Sec. and office: E. W. Nicholson, 801 Land Title Bldg., Philadelphia, Pa. **Operating office:** P. O. Box CCC, San Diego Cal. Mine near Ensenada, Baja California, Mex. **Geo. P. Brown,** gen. mgr.

Property: 83 hectares, and 40 acres miscellaneous lands, on Cedros island, on the Pacific coast, shows diorite, cut by veins having 3 lenticular ore shoots carrying carbonate and sulphide ores, estimated by company to average 40' width, 300' depth and 1,100' length, and to contain an average of 2.5% copper, 3% zinc, 2 oz. silver and \$3.50 gold per ton. **Development:** about 8,500' of workings, showing 150,000 tons of low-grade ore, with about

100,000 tons blocked out for stoping. Has produced about \$450,000 from shipments to the Denver, Pueblo, San Francisco and Tacoma smelters.

In 1915, unsettled conditions in Mexico necessitated closing down the property.

ESPERANZAS MINING CO.

MEXICO

Idle. Mine at Estación Symón, San Juan de Guadalupe, Durango, Mex. Joseph Steel, gen. mgr., at last accounts. **Cap.**, \$200,000. Property includes the Montaña de Cobre, Esperanza and other claims.

ESQUER y CA; ALEXANDER.

MEXICO

Idle. Mine at Baroyeca, Alamos, Sonora, Mex. J. J. Esquer, mgr., at last accounts. **Property:** the Mexicana, Esperanza and other mines, developed by shafts and tunnels, carries auriferous and argentiferous copper ores.

ESTELLE MINING CO.

CALIFORNIA

Office: 310 So. Grand Ave., Los Angeles, Calif. **Officers:** R. C. Troger, pres., sec. and supt., Keeler, Inyo Co., Cal. E. H. Sweetser, v.-p. Adolph Ramish, treas. **Inc.** 1902 in California. **Cap.**, \$100,000; shares \$1 par; 90,300 shares issued.

Property: 29 claims, 500 acres, including the Morning Star group, shows complex lead-copper ore with gold-silver values. **Ore:** occurs in fissure veins and replacements in lime-porphyr. **Development:** by a 520' shaft and a 6,300' tunnel. Company plans continuing the tunnel to 7,300' and installation of electric power and larger compressor. Claims to have spent \$24,560 for development work in 1914-1915.

EUREKA COPPER MINES, LTD.

BRITISH COLUMBIA

Nelson, Kootenay district, B. C. **Officers:** J. J. Malone, pres.; A. B. Ritchie, v.-p.; L. B. Reynolds, sec.-treas. **Inc.** March 2, 1906, in British Columbia. **Cap.**, \$250,000; shares 25 cts. par, nonassessable; issued, \$231,250. **Property** was under bond and lease to B. C. Copper Co., Ltd.

Property: 7 claims, 2 fractional, all except 1 crown granted, approximately 250 acres. Situated 2½ miles from the Canadian Pacific railway, and about 9 miles westerly from Nelson. Claims contain several veins, partly along contacts between limestone and granite, and partly along fracture planes in the granite. One of these veins is developed by shaft, winzes, raises and a 900' crosscut tunnel. Mine is equipped with hoisting and steam-compressor plant. Crosscut adit, driven 1914, failed to disclose any ore and operations were discontinued.

EUREKA GOLD & COPPER MINING CO.

ARIZONA

Jerome, Yavapai Co., Ariz. Dr. A. J. Murietta, pres.; A. A. Macpherson, sec.-treas. **Property:** 8 claims, 7 miles south of Jerome, near the Iron King mine, is opened by 2 tunnels, showing a 30' vein with an 8' paystreak carrying bornite and chalcopyrite, with occasional visible gold, but has not developed ore in commercial quantities. Mainly idle, for some years, excepting annual assessment work.

EUREKA HILL MINING CO.

UTAH

Office: Deseret National Bank Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. **Officers:** Moylan C. Fox, pres.; Waldemar Van Cott, v.-p.; Jas. E. Berkey, sec., with Ed. W. Packark, directors. Jackson C. McChrystal, managing engr.; Chas. Weisbaker, supt. **Inc.** Nov. 12, 1875, in Utah. **Cap.**, \$1,000,000; shares \$100 par. Is a close corporation, and has paid considerable dividends, but accounts are not published. Annual meeting, third Tuesday in February.

Property: 5 claims, 27 acres, patented, also a 25-acre mill site and 150 acres miscellaneous lands, in the Tintic district, adjoins the Bullion-Beck and Centennial Eureka. The Eureka Hill mine has a 1,500' main working shaft and about 30 miles of workings. **Orebodies** are lenticular deposits,

carrying cuprite, malachite and enargite, with average values of about 1.4% copper, 6% lead, 25 oz. silver and \$3 gold per ton. Mine worked for 45 years but shut down, 1911, and only old workings mined by lessees since then. Produced many millions of silver-lead ore from above 1,000' level. Deep development in future will be from adjacent mines.

Lessees working through Bullion-Beck shaft, down to 700' level, 1915, marketed many carloads of ore assaying 93 oz. silver and 40% lead. Knight-Dern interests, 1916, leased tailing dumps of Eureka Hill, reported to contain 200,000 tons of ore, averaging \$4.50 per ton.

EUREKA MINES CO. CONSOLIDATED

NEW MEXICO

Property sold to Jarilla Consolidated Copper Co., Dec., 1912. Fully described Vol. X, Copper Handbook.

EUREKA MINING, SMELTING & POWER CO.

OREGON

Idle. P. O. Box 63, Clarkston, Wash. W. E. Howard, sec. **Property:** 40 claims, patented, at Imnaha, Wallowa Co., Ore. Secretary reports, 1915, property idle for many years, awaiting railway facilities.

EUREKA OPHIR MINE.

UTAH

At Dry Canyon camp, via Stockton, in Rush Valley district, Tooele Co., Utah, on the S. P. L. A. & S. L. R. R. Property shows veins with replacement orebodies in Paleozoic limestones at and near dike contact and was shipping 50 tons a month from the 200' and 375' levels, averaging 8% copper, 15 oz. silver, 10% lead, in 1913. Property idle in 1914, but reported operated under bond and lease by Mineral Development Co., in 1915 and shipping \$26.92 ore from the 200' level. Plans sinking main shaft to 400' level.

EUSTIS MINING CO.

QUEBEC

Eustis, Sherbrooke Co., P. Q., Canada. W. E. C. Eustis, 131 State St., Boston, Mass., pres., sec.-treas.; F. M. Passow, supt. Inc. 1878, in Quebec, and operated as a close corporation.

Property; near Sherbrooke, carries 4 parallel interbedded lenses of cupriferous pyrite, in talcose schist crossed by diorite dikes, the cupriferous belt being traceable for 2 miles. The orebody is worked through an inclined shaft to a depth of about 3,450' on the incline, with an average dip of 45°. Lenses are 3 to 60' in width, averaging about 2.5% copper, up to 60 cts. per ton in combined gold and silver values, and 40% sulphur, but with considerable variations, ore occasionally carrying up to 50% sulphur. Footwall vein, or lens 4 to 20' thick, 50 to 100' long. Main vein 20 to 60' thick, 100 to 120' long. Shaft vein, 3 to 15' thick, 50 to 100' long. No. 1 vein 2 to 25' thick, 20 to 120' long. Footwall and shaft lenses richest in copper, averaging 4 to 8%, while others carry 2½% copper with 42 to 48% sulphur. Property is primarily a producer of pyrite, for the sulphuric acid trade.

Development: the mine, opened 1870, and producing for 30 years, has a 7x7' crosscut tunnel, 1,000' long and a 3,000' shaft, sunk at 20 to 45°, with double skip tracks. The mine is dry, most of the water coming from surface and the upper stopes, but the limited quantity of mine water is very acid, and contains copper in solution, which is precipitated as cement copper on scrap iron as it leaves the tunnel, through which it is conducted by a launder. Mine is served by the Boston & Maine railway. About 150 men are employed in the mine and mill.

There is a 400-k. w. hydro-electric power plant on the Coaticook river, 2 miles from the mine. The main plant has 2 alternators mounted on the same shaft and run in parallel, driven by turbine water wheels. There is one 150 and one 200-k. w. generators, direct-connected to the water wheels running at 500 r. p. m. The power is generated at 2,200 volts. The electric

efficiency is 90 to 93% and efficiency of water wheels is 60 to 80%, according to load.

Equipment: includes a 150-h. p. Westinghouse electric hoist, good for 3,500' depth, and two 8-drill 2-stage Rand air compressors, 1 run by steam and 1 by electricity.

The 200-ton mill, three-fourths mile from the mine, is connected therewith by an electric tram, equipped with three 3-ton cars. The mill has a 150-h. p. electric equipment. Ore is dumped onto grizzlies, coarse ore falling to the sorting floors and conveyor belts, where hand-picked and cobbled. Ore sufficiently rich for shipping is reduced to 2½" size, and concentrated ore is reduced to ¼" size, by crushers and 3 sets of rolls, going thence to a 6-compartment classifier, which sends each size to one of 8 Wilfley tables, middlings from the tables being sent back through the classifiers.

Selected ore and concentrates are shipped to various acid works, and there burned for sulphur, the cupriferous cinder remaining then being shipped to the Norfolk smelter, where treated for copper. Production is about 30,000 tons of cupriferous pyrite yearly.

EVANGELINA COPPER MINING CO.

MEXICO

Idle. Mine near Santa Catarina del Norte, comprises 150 acres, carrying a fissure vein of 3 to 6' width. Has steam power.

EVERGREEN BLUFF MINING CO.

MICHIGAN

In liquidation. Property owned by Mass Consolidated Copper Co.

EVERGREEN GOLD & COPPER MINES CO.

COLORADO

Reorganized as the Evergreen Mines Co., which see.

EVERGREEN MINES CO.

COLORADO

Office: 409 Empire Bldg., Denver, Colo. Mine office: Apex, Gilpin Co., Colo. **Officers:** J. L. Tapp, pres.; Geo. E. Bell, v.-p.; Wm. C. Hollister, sec.-treas.; preceding with W. J. Tapp, E. F. Krewinghaus, M. C. Shaffer, J. W. Barre, C. W. Keal, directors. Etienne A. Ritter, cons. engr.; Shad Reid, supt. **Inc.** Sept. 17, 1914, in Colorado. **Cap.**, \$2,000,000; shares \$1 par, non-assessable; outstanding a little over 1,000,000 shares. Notes authorized, \$75,000, with \$35,000 outstanding. Annual meeting third Tuesday in August. Company is a reorganization of the Evergreen Gold & Copper Mines Co.

Property: the Evergreen mine with 9 claims, 3 patented, 60 acres, in the Pine mining district.

Geology: the property shows Archæan gneiss and crystalline schists, cut by pegmatite, with an eruptive rock called "evergreenite." This dike is 3 to 12' in width, bounded on either side by ore-bearing contact zones of about 50 to 80' width. The ore deposit is unusual, carrying secondary (?) bornite as chief constituent.

Development: by tunnel and 350' shaft. Two ore shoots were found on the 100' level, 1 on the 200' and a new one south of this on the 350' level. Main orebody is 15 to 18' thick. There are 4 known ore shoots, carrying chalcopyrite, bornite and covellite, estimated by management to average 3.5% copper, 2 to 8 oz. silver and 50 cts. to \$4 gold per ton. The upper workings show some malachite and tetrahedrite. Underground work amounts to 3,400'.

Equipment: includes steam power, with a 45-h. p. hoist and 4-drill Leyner air compressor. A 60-ton mill has one 9x15" Blake crusher, 2 sets of rolls, 1 Richards classifier and 2 Card tables, making a concentrate containing 26% copper, 0.15 oz. gold and 4 oz. silver per ton, the tailings carrying 0.75% copper, being a saving of \$80 of the assay value of the ore.

Property idle in 1914-1915. Company plans to resume development work on the 350' level and build a flotation plant.

EXCELSIOR CONSOLIDATED MINING CO. CALIFORNIA

Inc. May, 1914, as a reorganization of Excelsior Cons. Gold Mines Co. and controlled by Worcester, Mass., parties. **Cap.**, \$3,000,000; shares \$1 par. R. B. Elder, mgr., W. H. Rea, supt.

Property: Excelsior group, in Meadow Lake district, Forest Hill, Nevada Co., about 7 miles from Cisco, the nearest railroad station, said to show oxide ore with gold values averaging \$10 per ton. Ore is treated by amalgamation and cyanidation. **Development:** 135' shaft and drifts. Use of Baltimore tunnel has been secured for further development at depth. **Equipment:** 9-stamp mill, a Marks centrifugal mill, 700-h. p. Horseshoe Bar electric power plant, bunkhouse and mine buildings. The mill treats about 250 tons of ore daily. Employs about 70 men.

Ore reserves: management claims to have \$35,000 worth of ore in bins.

EXCELSIOR MINING CO. IDAHO

Burke, Shoshone Co., Idaho. Chas. Chriswell, supt. **Property:** 6 claims, carrying a 15' vein, said to show copper carbonates and galena at surface. **Development:** by 2 tunnels.

EXCELSIOR MINING & DEVELOPMENT CO. NEW MEXICO

Property: near Orogrande, Otero Co., N. M., includes the Nashville and Three Friends claims, said to carry a 4' vein of 4% silver-copper ore, also lead carbonate up to 50% in tenor. Controlled by Ben L. Farrar and associates of El Paso. Operations resumed, 1915.

EXCELSIOR MINING, MILLING & ELECTRIC CO. COLORADO

Office: 401 Continental Bldg., Denver, Colo. Mine address: Frisco, Summit Co., Colo. **Property:** the Excelsior mine with 2,600' tunnel, developing a vein carrying lead-copper ore, with gold-silver values. **Equipment:** includes Leyner compressor driven by water and electric power. Has a 50-ton concentrator mill.

Mine being operated under lease and bond, Dec., 1915, by E. Flood, Frisco, Colo..

EXCELSIOR MOUNTAIN COPPER CO. NEVADA

Hawthorne, Mineral Co., Nev. **Officers:** Frank D. Qualey, pres.-gen. mgr.; J. H. Suits, sec.-treas.; George Brodigan, W. R. Jackman, W. B. Tait, directors; Wm. Winkelman, supt. Inc. June, 1905, in Arizona. **Cap.**, \$1,000,000; shares \$1 par. Annual meeting, June 7.

Property: 13 claims, 260 acres, in process of patenting, 16 miles S. E. of Hawthorne, in Whiskey Flat district, Mineral county, Nev., said to have promising surface showings of copper for a distance of several thousand feet along a contact between granite and limestone. Has 4 shallow shafts and 2 tunnels, with one 1,500' tunnel showing ore averaging 4% copper and \$2 gold per ton. Total of underground workings about 3,000', said to prove ore to a depth of 600'.

Equipment: includes 50-h. p. gasoline engine and 6-drill compressor. Development in 1913 included a connection between No. 1 and No. 2 tunnels, claimed to be in ore of commercial character. Property closed down during past two years, but management planned resumption by April 1, 1916.

EXPLORATION CO., LTD. MEXICO

H. F. Wreford, sec., 24 Lombard St., E. C., London; P. L. Foster, 61 Broadway, New York. Directors: R. T. Bayliss, chairman and managing director; J. H. M. Shaw, managing director; J. R. Maguire, J. E. D. Ryder, G. D. Smith, O. E. Warburg.

Registered March 21, 1904, to acquire the assets and undertakings of a company of same name, registered June, 1896, except certain assets and liabilities which had been acquired by the Exploration Assets Co., Ltd. The

company carries on a general financial business and holds interests in the South African Real Estate Trust, Ltd., Tomboy, El Oro, Santa Rosa, Buena Tierra, Greene-Cananea Copper, Inspiration Cons. Copper, Chile Copper, Natomas Cons. and other concerns, and has floated the Mexico Mines of El Oro, Ltd., and formed the Exploration Company of England and Mexico, Ltd., to deal with Mexican interests.

Cap., authorized and outstanding, £750,000; shares £1 par. For every 5 old shares, holders received 3 fully paid shares and £2 of the Assets Company's debenture stock.

Dividends declared by former company: 1896, 2s; 1897, 2s 6d; 1898, 2s 6d; 1899, 3s; 1902, 1s. Dividends paid by present company: 1905, 1s; 1906, 1s; 1907, nil; 1908, 1s; 1909, 1s 6d; 1910, 1s; 1911, 1s; 1912, 1s 6d; nil in 1913, 1914 and 1915.

For year ending Dec. 31, 1914, there was a net profit of £28,586, making, with balance forward, £56,411, which was carried forward; cash, £112,617; loans to subsidiary companies, £39,676; investments, £652,575; debtors, £6,426; creditors, £4,416.

EXPLORATION CO. OF ENGLAND & MEXICO, LTD. MEXICO

H. F. Wreford, sec., 24 Lombard St., London, E. C., Eng. **Officers:** R. M. Raymond, cons. man'g dir., Columbia Univ., New York; R. T. Bayliss, chairman; P. L. Foster, J. R. Maguire, John E. Dudley Ryder, G. D. Smith, O. E. Warburg and J. H. M. Shaw, directors. **Inc.** March 8, 1909, in Great Britain. **Cap.**, £250,000; shares £1 par; all issued, 3s 6d paid, and held by the Exploration Co., Ltd. A dividend of 8s per share, payable in fully paid Buena Tierra mining shares, was declared, Aug., 1912. Company is a subsidiary of the Exploration Co., Ltd. It has acquired and sold to operating companies bearing these names, the Buena Tierra and Santa Rosa properties. Owns no copper mines at present.

EXPOSICION MINING CO., LA.

ARIZONA

See La Exposition Mining Co.

FAIRBAIRN EXPLORATION CO.

UTAH

Address: A. J. Fairbairn, Breckenridge, Colo. Has a 2-year lease on the Godiva mine at Eureka, Utah, and on adjoining property of the Plutus Mining Co., which see.

FAIRVIEW MINING CO.

ARIZONA

Mine near Dragoon, Cochise Co., Ariz., idle many years. See Vol. XI, Copper Handbook.

FAIRVIEW MINING CO.

CALIFORNIA

Reorganized as Calumet & California Mining Co., which see.

FANNY FERN MINING CO.

COLORADO

Lake City, Hinsdale Co., Colo. Property carries copper and silver-lead ores, developed by a 200' tunnel. Operated under lease by Theo. Watson and F. A. Ralph. Shipments in 1914 said to have returned 176 oz. silver, ¼ oz. gold, 6.9% lead and 2½% copper per dry ton, or \$108 per ton.

FANNY RAWLINGS MINING CO.

COLORADO

Office: 6 N. Nevada Ave., Colorado Springs, Colo. **Officers:** John A. Himebaugh, pres.; Thomas S. Brigham, v. p.; Walter C. Frost, sec.-treas. **Cap.**, 1,000,000 shares; par value \$1; only small amount of cash in treasury, Jan. 1, 1916. Has \$7,000 loaned at 5½ and 6% and secured by lien on first-class improved real estate, stock, 5,551 shares. Last stockholders' meeting held June 29, 1912. Listed on Colorado Springs Exchange. Total amount of dividends paid to date, \$50,000; last dividend, \$5,000, paid Dec. 29, 1908.

Property: the Fanny Rawlings lode mining claim, about 10 acres, on Breece Hill, near Leadville. **Development** on south half of claim said to have cost \$255,000, and plant cost about \$13,000. Property is leased to

Charlestown, W. Va., parties, who expect to develop it on a large scale.

FARRELL COPPER CO.

MONTANA

Idle. Mine at Butte, Mont. **Officers:** W. C. Lewis, pres.; Carlton H. Hand, v. p.; J. D. Slemons, sec.-treas.; above, with A. T. Morgan, Walter C. Lewis, Donald Campbell, W. H. Hall and Daniel Tewey, directors. Inc. July 24, 1906, in Montana. **Cap.**, \$1,000,000; shares \$2.50 par.

Property: 17 acres, in the S. E. part of the Butte district, has a 200' shaft, sunk jointly with the Alliance Copper Co. Cross-cut on the 200' level shows a little ore carrying copper, lead, zinc and silver values.

FARWELL MOUNTAIN COPPER CO.

COLORADO

Mine in Routt Co., Colo. **Officers:** J. A. Ouimet, pres., 301 Essex St., Lawrence, Mass.; J. R. Simpson, v. p.; W. H. Moisson, sec.; J. U. Emar, treas.; preceding, with J. E. Lemay, A. B. Sutherland and T. J. Buckley, directors; Geo. B. McFadden, gen. supt.; C. D. McFadden, mine supt., engr. and purch. agt. Inc. March, 1907, in Colorado. **Cap.**, \$5,000,000; shares \$5 par.

Property: 42 claims, 434 acres, 30 claims patented and 560 acres placer ground, in the Hahn's Peak district, Routt county, Colo., shows vertical fissure veins accompanying quartz porphyry dikes in granite. Ores carry values in gold and silver with some copper; the vein under development said to be 8' wide, proven to a depth of 351' and has a total value of \$14 per ton.

There are several shallow shafts, one 94' deep, and a tunnel 625' long. Total length of underground working 2,320'.

Property is 27 miles from the Denver, Northwestern & Pacific railroad. Letters neither answered nor returned, 1916.

FAUNTLEROY GOLD MINING CO.

COLORADO

Office: 516 Exchange National Bank Bldg., Colorado Springs, Colo. **Officers:** Verner Z. Reed, pres.; L. L. Aitken, v. p.; A. D. Aitken, sec.-treas. **Cap.**, 1,250,000 shares; \$1 par. In treasury Jan. 1, 1916, \$104.88; no stock. All taxes paid. Liabilities, \$3,336. Last stockholders' meeting, April 18, 1911. Listed on Colorado Springs Exchange.

Property: 5 claims, 20.3 acres, patented, on Gold Hill and Mineral Hill, Cripple Creek. **Development:** on the Little Fauntleroy, consists of 800' of work done from the Ophelia tunnel at 278' from surface. Shaft from surface also connects with tunnel. On the Garfield claim is an 80' shaft with 100' of drifting. During 1915 about 100' of drifting and cross-cutting was done.

Little Fauntleroy claim is leased for two years on graduated royalties ranging from 15 to 25%; 50 shifts per month required. Gross production to date, \$7,890; production during last six months of 1915, \$498.

FAVORITE GOLD & COPPER MINING CO.

WASHINGTON

Mine at Nighthawk, Okanogan Co., Wash. **Officers:** W. R. Calkins, pres.; Henry Loudenslager, v. p. and treas.; A. E. Faine, sec.; Edw. Williams, supt., at last accounts. Inc. Dec., 1902, in Washington. **Cap.**, \$2,000,000; shares \$1 par, nonassessable.

Property: 28 claims, 14 fractional, 300 acres, adjoining the Nighthawk mine, in the foothills of Mount Ellemeham, in the Wannicut Lake district, 34 miles from the Canadian Pacific railway. Said to show 3 veins, one, of 7' width, carrying copper, and 2 carrying silver-lead, with values mainly in lead. The principal silver-lead vein, of 1 to 5' width, has a 963' upper tunnel, and a 650' lower tunnel. No recent returns. Probably idle.

FAY-CANANEA COPPER CO.

MEXICO

Offices: 2105 East Superior St., Duluth, Minn.; Cananea, Sonora, Mex. **Officers:** Marcus L. Fay, pres.-gen. mgr.; G. A. Daugherty, v. p.-treas.

Geo. M. Fay, sec.; preceding, with Wm. J. Schulze, John McDaniels and Leo Kannaple, directors. *Inc.* Sept. 4, 1904, in Arizona. *Cap.*, \$3,000,000; shares \$5 par. Company holds title to its lands through the Cananea-Eastern Mining Co., S. A., inc. in Mexico. Mr. Fay is said to own a majority of the issued stock.

Property: originally aggregating 2,127 acres, about 2 miles apart, has been greatly reduced, company retaining only the Cananea Eastern group. Former holdings fully described Vol. VIII, Copper Handbook.

The Cananea Eastern property was acquired on a bond in 1912, by A. C. Charlot and associates, of New York, on behalf of the Charlot Mining & Smelting Co., which in turn transferred the bond to the Eastern Cananea Development Co., who did extensive development work and made necessary repairs.

The Sulphide group has a strong vein, claimed to average about 150' in width, but it is improbable that the full width will be found workable. This property has an antigua mine, with two 100' shafts, from which more or less high-grade silver ore was stoped in the past. A 26' shaft on the Azurite claim shows ore giving average assays of 6% copper, 10% lead and 30 oz. silver per ton. Property considered promising. Idle.

FEDERAL ELY COPPER CO.

NEVADA

Office: 26 Mining Exchange Bldg., Salt Lake City, Utah. **Mine office:** Ely, Nev. **Officers:** J. A. Cunningham, pres.; A. C. Ellis, Jr., v. p.; J. R. Evans, sec.-mgr.; L. L. Farnsworth, treas.; with Wm. J. Craig, John T. Hodson, D. C. Jackling, H. Newell, W. H. Dickson, E. L. Sheets and Wm. M. Bradley, directors. *Inc.* 1914 in Utah. *Cap.*, \$5,000,000; shares \$5 par; assessable; 12 assessments levied to March, 1915. Stockholders plan reducing company's capitalization to \$150,000 in 1916.

Property: 21 claims, 3 fractional, 400 acres, also the Huesser ranch of 600 acres, 15 miles north of Ely, in the Steptoe valley, bought 1906, and a mill-site. Mining lands are the Panama claim, bought, 1909, for \$10,000, lying about one-half mile north of the Star Pointer shaft of the Nevada Consolidated; 8 claims north of the Nevada Consolidated; 3 claims between the Cumberland-Ely and Turner-Ely, and the Queen of the West group, in Robinson cañon. Company is said to have paid \$225,000 for its lands.

Geology: property north of the Nevada Consolidated shows limestone beds dipping to the east, said to be underlaid by cupriferous monzonite, and to carry 3 parallel shear zones, each about 400' in width, 600' apart, showing a little copper and lead ore. The limestone capping on the Savage claim is said to carry lead ore. Churn-drill borings are said to have given a satisfactory showing of ore, and there also was some test-pitting and surface trenching.

Development: by tunnels aggregating about 1,600' and 4 shallow shafts, 3 said to show copper sulphides at depth of 100', the main shaft said to be near the contact of 3 ore zones, which seems peculiar, if the ore zones are parallel, as claimed.

The Queen of the West shaft shows, at depth of 110', a sulphide ore-body of considerable size, averaging 3% copper, 1 to 2 oz. silver and 40 to 50 cts. gold per ton. The Kessler shaft, about 100' deep, near the tunnel, shows lead carbonates of fair tenor. Mine has a small steam plant.

Company has done little save levy assessments for several years, doing barely enough work on the claims to meet annual assessment requirements. Their claims were surveyed for patent in 1912 and reported partly patented in 1914.

FEDERAL LEAD CO.

MISSOURI

Flat River, Mo. H. A. Guess, gen. mgr.; H. G. Washburn, supt. Sub-

subsidiary of American Smelters Securities Co. Inc. in Delaware. **Cap.**, \$2,000,000; shares \$10 par. The lead-smelting and refining plant, at Federal, Ill., near Alton, comprises 302.5 acres. The plant is a custom smelter.

Mining property, 13,690 acres in the Flat River district, southeastern Missouri, shows lead ore in limestone. Mine has 12 shafts and prospecting is done by diamond drills, as no outcrop of disseminated ore occurs. The mill of 4,600 tons daily capacity is equipped with 12 Hancock jigs, 72 tables, 18 vanners arranged in 3 units or 2 sections each; also regrind rolls, elevators and Esperanza-Federal drag classifiers. Most of the power is generated at a central power plant. The power plant consists of a battery of 10 boilers, equipped with chain grate stokers, 3 750-k. w. Curtis vertical turbines, 1 800-k. w. Allis-Chalmers turbine, 3 Nordberg compressors, 1 Ingersoll-Rand compressor, together with necessary condensing equipment, etc.

Production: 1,163,000 tons in 1913; 1,212,000 tons in 1914; 1,355,000 in 1915.

FEDERAL MINING & MILLING CO.

UTAH

Stateline, Iron Co., Utah. Company owns the Ophir mine and a mill in Rice canyon. Is a private corporation.

FEDERAL MINING & SMELTING CO.

IDAHO

Offices: 32 Broadway, New York; Wallace, Idaho, and Wilmington, Del. (Corporate office). **Officers:** F. H. Brownell, pres.; Wm. J. Hall, sec-treas.; preceding officers, with Chas. Sweeny, Frank Sweeny, of Spokane; F. C. Druding, H. W. York, F. R. Ruff, W. E. Bennett, Edwin Brush and E. L. Newhouse, of New York, directors; F. E. Burbidge, gen. mgr.; P. E. Smith, asst. gen. mgr.

Inc. 1903 in Del. (charter perpetual), amended Sept. 15, 1903. **Cap.**, authorized \$20,000,000 Pfd., 7% Cum., and \$10,000,000 Com.; shares \$100 par. Outstanding, \$12,000,000 Pfd. and \$6,000,000 Com. Preferred stock has no voting power except in connection with the increase of preferred stock, but is preferred as to assets. One-sixth entire capital stock said to be held by American Smelters Securities Co., which controls Federal. Guaranty Trust Co., New York, transfer office; U. S. Mortgage & Trust Co., New York, registrar. Annual meeting, 2nd Monday in April. Listed on New York and Spokane Exchanges.

Dividends:

Year—	Pfd.	Com.	Year	Pfd.	Com.	Year	Pfd.	Com.
1903.....	7%	.....	1908	7%	.....	1915	4%	.....
1904.....	7%	4½%	1909	7%	1½%	....	...	....
1905.....	7%	6 (a)	1910-11	7%	.....	....	...	....
1906.....	7%	6 (b)	1912-13	6%	.....	....	...	....
1907.....	7%	6 (c)	1914	5%	.....	....	...	....

(a) 4% extra. (b) 11% extra. (c) 8½% extra. Preferred dividend rate reduced Aug. 18, 1914, to a 4% basis. Accumulated dividends on pfd. stock amounted to 7¾% up to March 15, 1916.

Summary of Annual Reports—Income Account

	1915	1914	1913
Value of Product.....	\$2,782,658	\$2,200,777	\$3,248,406
Cost Prod. & Other Exps.....	2,326,719	2,011,684	2,828,473
Operating Profit	455,939	189,093	419,932
Miscel. Earnings	352,662	702,462	644,133
Total Earnings	808,601	891,556	1,064,066
Deductions	498,234	339,160	374,051
Net Credit to Profit & Loss.....	310,367	552,396	690,015
Less Div. on Pfd.....	479,444	599,305	719,166

Net Amt. carried to surplus acc't for

the year	169,076	46,908	29,150
Bal. at first of year.....	1,388,613	1,435,522	1,464,673
Bal. at end of year.....	1,219,536	1,388,613	1,435,522

Note—In 1915 \$246,620 was expended for development and equipment on the new Frisco and Iron Mt. properties, and these expenditures were charged against earnings for 1915 rather than to capital account. Jan., 1916, showed net earnings of \$83,000, and Feb., \$77,000.

Comparative General Balance Sheet

Assets—	1915	1914	Liabilities—	1915	1914
Property	\$18,000,000	\$18,168,469	Cap. Stk., Pfd.	\$12,000,000	\$12,000,000
Investm'ts (a)	286,120	286,120	Cap. Stk., Com.	6,000,000	6,000,000
Supplies, etc..	120,839	114,376	Accts. Payable	257,658	211,887
Accts. receiv..	521,531	261,039	Surplus	1,219,536	1,388,613
Cash	548,703	770,495			
			Total	\$19,477,194	\$19,600,500

Total

(a) Includes 28,000 shares Bunker Hill & Sullivan stock carried at par value.

Note—In 1915 mines and equipment carried at par value of outstanding stock, regardless of actual value of property.

The Federal has a contract with the A. S. & R. Co., dated Oct. 16, 1905, terminating Aug. 31, 1930, by which the Federal company must sell all of the silver-lead ores, slimes and concentrates, of its own or leased mining properties, and all owned or leased property of any company in which the Federal owns 75% of the capital stock to the A. S. & R. Co., and the A. S. & R. Co. agrees to take all such output.

The A. S. & R. allows the Federal 90% of the contents of the latter's lead ore at 90% New York quotations, when lead sells at less than \$4.10 per 100 lbs.; when the price is over \$4.10 they divide the difference between \$4.10 and the market price. Contract for silver calls for 95%, based on Handy & Harman quotation. Contract for gold calls for 95% at \$20 per oz., provided ore contains 0.05 oz. per ton. Contract provides deductions of \$8 per ton for treatment charge plus freight to smelter (app. \$7.17 per ton) and 50c per ton for each 1% or fraction of 1% of zinc in excess of 10%. Federal cannot lease or dispose of its stock in a company owning or leasing mining property without previous written consent of the A. S. & R. Co.

Suit was filed Feb., 1913, by Sydney Norman, on behalf of the minority stockholders, to set aside the above "alleged unfair smelting contract" and to recover \$2,000,000 damages to Feb., 1913; said amount being the estimated difference between New York price of lead and the lesser terms of the contract. On July 1, 1914, this suit was dismissed in the Supreme Court of New York City, but that it will be appealed seems certain. With lead selling at its present high price the burden carried by Federal is indeed a heavy one.

Apex litigation with the Bunker Hill & Sullivan, started in 1908, was settled in 1910 by agreement between the two companies.

History: company entered upon the operation of its properties Sept. 1, 1903. Of the preferred stock, \$10,500,000, and of the common stock, \$5,250,000, were issued upon the acquisition of all the mining property formerly owned by the Empire State-Idaho Mng. & Dev. Co., by the Standard Mining Co., the Mammoth Mines in Idaho, and certain smelting property at Everett, Wash. The smelting property has since been sold without loss to the company. The above mentioned mining property consists of silver-lead mines in the Coeur d'Alene mining district.

In 1910, company acquired an option on a portion of the stock of the Govt. Gulch Dev. Co., lying east of the Black Hawk mines in the Wardner district. On account of default of the stockholders, 414,000 shares out of a million reverted to the Federal Mining & Smelting Co. The property of this company consists of 1 patented and 6 unpatented claims. Company also controls through stock ownership the Black Hawk Mng. & Dev. Co., Ltd.

In fiscal year 1912-13 the company exercised an option on $\frac{1}{4}$ of the Cleveland group of the Idaho Investment Co., and started negotiating for remaining $\frac{3}{4}$, also for the Green Hill ground. This resulted in the organization of the consolidated Green Hill-Cleveland Mng. Co., to which company Federal deeded its $\frac{1}{4}$ interest, and the owners thereof deeded their $\frac{3}{4}$ interest in the Cleveland group, and also all of the Green Hill ground. Subsequently Federal leased to the Green Hill-Cleveland Mng. Co. all of the mining and milling plant of the Mace mines for an indefinite term, until the ores in the ground belonging to the new company are exhausted, receiving therefor a rental of \$180,000, payable out of the first profits of the new company, before any dividends were declared. Ownership of the Green Hill Co. lies 50% with the Federal company and 50% with the Green Hill interests. Owners of each half interest share equally in directorate and management of the new corporation, operations of which were started Nov. 1, 1912. Dividends received by the Federal from the Green Hill-Cleveland Co. amounted to \$352,000 in 1913, \$576,000 in 1914 and \$192,000 in 1915.

In Oct., 1915, a bond was taken by the Green Hill-Cleveland on the Olympia group, adjoining the Green Hill-Cleveland on the west. Extensive development at depth will be done from Green Hill levels.

The Helena-Frisco property was purchased in Jan., 1913, for \$100,000. Federal company agrees to spend \$150,000 in dewatering the mine and equipping it for further active work; then to take back out of the earnings \$250,000, and after this will be entitled to one-half the balance, the remainder going to the former owners. Helena-Frisco values consist largely of zinc.

In July, 1915, Federal purchased, at receiver's sale, the mine, concentrator, power line and supplies of the Iron Mt. Tunnel Co., at Superior, Mineral Co., Mont., for \$100,000. The mine is an old one, having been stoped for 1,700' above water level about 20 years ago. Operations to date by Federal have shown a steady monthly deficit, but this is being reduced and property is expected soon to be on a paying basis.

In the 1915 annual report the following active properties are named: the Wardner, which includes the Last Chance mine at Wardner; the Mace, or Standard-Mammoth, one mile west of Burke; the Morning, at Mullan; the Helena-Frisco, at Gem; the Green Hill-Cleveland, near Mace; the Iron Mountain, at Superior, Mont.

The Wardner group consists of 40 patented and numerous unpatented claims, also several hundred acres of agricultural land. Mineral claims cover over 7,000' in length of the Wardner lode, developed by the Last Chance mine, north and west of the Bunker Hill & Sullivan; orebodies belong to the same vein as those worked by that company, and lie chiefly along the Jersey fissure zone. The Sweeny adit level is the principal level. It is about 700' above the Kellogg tunnel of the Bunker Hill & Sullivan. Ore is hauled to the Arizona portal, from there over a spur of the O.-W. R. R. & Nav. Co.'s line to the mill at the mouth of Government Gulch. Below the Sweeny tunnel is an inclined shaft several hundred feet deep with several

levels. The mine has been a steady producer for 25 years, but is approaching the end, together with the Mace.

The Morning mine, $\frac{1}{2}$ mile N. W. of Mullan, is one of the large lead-silver properties in the district, and one of the best equipped. It is the most important mine of the Federal group, though its ores are the lowest grade of any property in the district and very difficult to treat.

For geology of the Coeur d'Alene district, see U. S. G. S. Prof. Paper, No. 62.

The Iron Mountain mine, near Superior, Mont., is an old worked-out property, recently acquired by the Federal, and thus far operated at a loss.

The North Star-Triumph mines, near Hailey, Idaho, acquired 1916, have a 300-ton concentrator with flotation system and electric separator under construction. General Naval Stores oils are used in the flotation plant.

Ore reserves and development work for past two years:

		Reserves		Concts.		1st Class	Dev.
		Milling Ore	Ore	Ore	Ore	Feet	
		Tons	Tons	Tons	Tons	(b)	
Wardner	Jan. 1, 1915	62,200	4,060	1,020			3,655
	Jan. 1, 1916	25,000	2,060	450			3,364
Morning	Jan. 1, 1915	673,150	61,180	43,660			2,212
	Jan. 1, 1916	752,300	74,840	62,685			3,781
Mace	Jan. 1, 1915	87,000	8,250				85
	Jan. 1, 1916	87,700	8,350	4,390			1,154
Frisco	Jan. 1, 1915	111,000	20,000 (a)				
	Jan. 1, 1916	181,600	41,730 (a)				1,314
Iron Mt.....	Jan. 1, 1916	46,500	3,330 (a)	210			278
Green Hill-Cl.....	Jan. 1, 1915	55,100	5,660	3,960			1,304
	Jan. 1, 1916	14,500	1,060	445			2,541
Total	Jan. 1, 1915	988,450	99,150	48,640			7,256
	Jan. 1, 1916	1,107,600	131,370	68,180			12,432
Increase		119,150	32,220	19,540			5,176

(a) Includes lead and zinc. (b) For year ending.

The Federal company is amply provided with modern concentrating, pumping, hoisting, compressor and electric plants.

Employed an average of 1,064 men, 1915, at average wage of \$3.747 per shift, compared with 997 men at average wage of \$3.675 in 1914.

Production:

Year—	First-Class Ore				Lead Concts. &			Zinc Concts.	
	Total Tons Mined	Tons	% Pb.	Milled Tons	Tons	% Pb.	Oz. Ag.	Tons	% Zn.
1915 (a) ..	461,252	29,338	30.4	408,315	66,610	40.20	14.77	8,839	42.46
1914.....	421,631	21,091	34.0	389,450	57,058	44.67	16.01	4,200	44.61

(a) Morning mine only operated for last 8½ months.

	First-Class Ore		Concentrates		Frisco (a)		Iron Mt. (b)				
	%	Oz.	%	Oz.	%	Oz.	%	Oz.			
1915.....	Pb. Ag.	45.7	28.9	57.7	19.6	46.1	15.5	25.9	7.6	37.1	60.1
1914.....	51.2	29.6	59.1	22.4	44.7	14.7	....	....	....	....	....

(a) % zinc in zinc concentrates was 40.0%; (b) % zinc in zinc concentrates was 37.6%.

Production of Various Mines in 1915

Mines—	Tons Prod.	Gross Val.	Cost Extr.	Trans. & Red	Net Profits
Standard	52,958	\$ 332,794	\$205,296	\$ 88,206	\$ 39,291
Morning	250,260	1,947,606	598,898	741,996	571,560
L. Chance.....	136,180	620,682	369,083	204,228	47,370
Frisco	58,113	.....	.....	.....	None
G. H.-Cleve....	.....	1,643,798	658,941	415,228	497,864 (a)

(a) Compares with \$1,046,757 in 1914.

The Last Chance and Green Hill-Cleveland mines are practically worked out, the latter reverting to the Bunker Hill Co. whenever it fails to show an operating profit for 5 consecutive months. Inasmuch as \$12,000,000 7% preferred stock is in arrears \$1,000,000 and the common has received no dividend since 1909, and is now worthless, the sole property of value, the Morning mine, has a heavy load to carry. Nothing but a miracle could restore the company's prosperity so long as it is subject to a surtax of \$5 a ton more than other companies in the same district, as a result of the present smelting contract.

FELIX BASIN COPPER MINES.

MONTANA

Assessment work not done in 1915 and location forfeited. Described Vol. XI, Copper Handbook. Mines near Coram, Mont.

FERRIS-HAGGARTY COPPER MINING CO.

WYOMING

Inactive. Owns, or did own, the copper mine of this name at Rudefeha, Carbon Co., Wyo. Company also owned \$375,000 of the Penn Wyoming bonds, but as its stock is practically all owned by the Penn Wyoming, its corporate officers and affairs are of no public interest, save as the only valuable mining asset of the chain of bankrupt corporations, controlled by the Penn Wyoming and its alleged and equally rotten successor, the United Smelters, Railway & Copper Co. The mine itself has been idle for many years. See Penn Wyoming Co.

FESSENDEN GOLD MINES CO.

ARIZONA

Oatman, Ariz. **Officers:** M. A. Fessenden, pres.; F. W. Crosley, v. p.; J. E. Shank, sec.; Dan Angius, treas.; with J. O. A. Carper, directors. **Inc.** in Arizona. **Cap.,** \$100,000; shares 10 cts. par; treasury 600,000 shares. Listed in Los Angeles.

Property: the Sunlight and Moonlight claims, 40 acres, adjoining the Long and McIver group on the East, at Oatman. Developed by 500' shaft and equipped with 3-drill compressor. Company is cross-cutting, 1916.

FIDALGO-ALASKA COPPER CO.

ALASKA

Ellamar, Alaska. **Thos. Donahue, pres.;** L. A. Levensaler, mgr.; E. D. Reiter, supt. **Property:** 24 claims, about 15 miles from Ellamar and one-half mile east of Irish cove, on the southern side of Fidalgo bay, an inlet of Prince William sound. **Development:** includes a 450' main tunnel following a well-defined fracture zone, in slate, carrying 2 lenticular ore shoots, said to be 5x50' in cross-section, cut at 200' and 300' from portal, with many small stringers. **Ore:** mainly chalcopyrite, said to give average assays of about 10% copper, occurs as cementing material of fractures, irregular stringers, disseminated grains and as lenticular replacements of country rock, the fracture zones being very erratic in size and extent.

Equipment: includes 1,000' aerial tram, ore bins and wharf, besides several mine buildings. Company employing 16 men. Operations were continued throughout 1915 and management plans further development and prospecting. Geology described on page 118, U. S. G. S. Bull. 605.

FIDELITY COPPER CO.

ONTARIO

Owns property 12 miles north of Sturgeon Falls, Ont., showing copper ore. **W. G. Colwell, Buffalo, N. Y., pres.** Idle.

FIFE MINES, LTD.

Rossland, B. C. Chas. Dempster, gen. mgr. **Property:** the Hattie Brown claim at Rossland and the Dykehead, Ben Hur, Three Bells and Fife claims at Fife, near Christina lake, 12 miles E. of Grand Forks, Boundary district, B. C. Claims show a vein up to 30' in width, carrying about 6' of smelting ore, with balance of concentrating grade, developed by a glory hole, an 80' shaft and a main tunnel having a 235' winze. **Ore:** contains chalcopryrite, carrying gold and silver values, claimed to average 3 to 6% copper and \$4 to \$8 gold per ton. **Equipment:** includes necessary mine buildings and a 5-drill Rand air compressor. Property considered promising. Presumably idle.

56 (FIFTY-SIX) COPPER MINE.

J. P. Turner, operator, Winnemucca, Nev. Is the first quartz mine located in Nevada, being staked out in 1856, by L. D. Vary. The mine is in the southern end of the Eugene mountains, not far from the Humboldt river and S. W. of Mill City. Idle.

FINANCE MINING CO.

Idle. St. Thomas, Lincoln Co., Nev. Levi Syphus, pres.; Robert O. Gibson, sec. **Inc.** Oct. 23, 1906, in Nevada. **Cap.**, \$500,000; shares \$1 par, nonassessable. **Property:** 4 claims, unpatented, in the Gold Butte district, 60 miles from a railroad, developed by 120' shaft, with hand whim, said to show complex ores with copper, lead, silver and gold values.

FINDLAY COPPER CHIEF MINING CO.

Idle. Findlay, Ohio. John N. Dotz, pres.; P. M. Cox, sec.; R. E. Taylor, treas., at last accounts. **Inc.** 1907. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 2 claims, in the Yellow Pine district, about 25 miles S. W. of Las Vegas, developed by 30' shaft and 60' tunnel, said to show ore.

FINDLEY MINES CO.

Cripple Creek, Colo. **Officers:** L. G. Carlton, pres.; A. E. Carlton, v. p.; V. H. Mann, sec.-treas. **Inc.** Jan. 1, 1912, in Wyo. **Cap.**, 2,000,000 shares; par value 2½c. In treasury Jan. 1, 1916, cash \$291, 750,000 shares stock. Total dividends, \$337,500; last dividend paid September, 1906, by original company; amount, \$12,500. Colorado Title & Trust Co., Colorado Springs, transfer office. Annual meeting 2nd Wednesday in June. Last meeting, June, 1913. Stock listed on Colorado Springs Exchange. Liabilities, \$2,500 demand note.

Property: 5 claims, patented, 12.5 acres, on south slope of Bull Hill, Cripple Creek, Colo. **Ore:** carries gold and occurs in fissure veins. Underground workings are extensive, aggregating about 6 miles. Property fully equipped with machinery.

Litigation: Stratton C. C. M. & D. Co. vs. Findley, re ownership of certain ores. Gross production to date, \$1,651,183.14. None of this company's mines are being worked.

FIRST CHANCE MINING & MILLING CO.

Idle. Mine office: Ibadah, Tooele Co., Utah. **Officers:** Wilkins Goodrich, pres.; Soren Nielsen, v. p.; John Jensen, sec.-treas., at last accounts. **Inc.** Nov. 17, 1909, in Utah. **Cap.**, \$100,000; shares 20 cts. par. **Property:** 7 claims, unpatented, in Paleozoic limestones cut by porphyry, in the Dugway district, 76 miles S. W. of Center on the Salt Lake railroad. Slightly developed.

FIRST NATIONAL COPPER CO.

Office: 111 Broadway, New York. Mine and works office: Coram, Shasta Co., Cal. **Officers:** Thos. W. Lawson, pres.; Wm. A. Kerr, v. p. and treas.; A. R. Buchanan, sec.; with Frank M. Leland, gen. mgr.; preceding, with H. W. Hoops, John A. Young and E. M. Buchanan, directors. **Inc.** Jan.

BRITISH COLUMBIA**NEVADA****NEVADA****NEVADA****COLORADO****UTAH****CALIFORNIA**

20, 1908, in Nevada. **Cap.**, \$3,000,000; shares \$5 par, assessable; paid in \$3.75; 600,000 shares outstanding. Is said to have 5,500 shareholders, including American Smelters Securities Co., owning 80,000 shares. Stock is listed on the New York and Boston curbs. Empire Trust Co., New York, and State Street Trust Co., Boston, registrars; Registrar & Transfer Co., New York, and International Trust Co., Boston, transfer agents. Annual meeting, last Thursday in October, at Carson City, Nev. This corporation is a holding company, owning the entire capital stock of the Balaklala Consolidated Copper Co., which in turn owns the entire capital stock of the Coram Water Co. and other subsidiaries and a third interest in the Balaklala Central Mining & Smelting Co.

The mining property and smelter are described under the above titles. The smelter was shut down in 1909 by fume litigation in the California courts, and cannot resume operations until some device is successful in eliminating the damage done by smelter fumes. Mine closed Aug. 21, 1914, on account of low price of copper, and resumed operations Aug. 25, 1915. Shipping 300 tons of 2.8% ore daily to the Mammoth smelter of the U. S. Smelting Co. at Kennett, Calif., in 1916. Company has entered into a 10-year contract with the U. S. Sm. Co. Management claims to earn about \$2.25 per ton on 19c copper.

The Balaklala Consolidated Copper Co. had a bond issue of \$1,500,000, which was paid by the First National, in 4 annual installments of \$375,000 each. The First National authorized, 1909, a \$1,000,000 bond issue, flotation of which was a failure, but pledged some of these bonds for a loan of \$375,000, which loan presumably was paid by the proceeds of the last assessment. The stock was manipulated to \$10 per share by Boston interests in 1915. Property fully described under Balaklala Consolidated Copper Co.

Property should and could be operated, and its idle condition with copper selling at 29c a pound is almost a crime.

FIRST THOUGHT MINING CO.

WASHINGTON

Idle. Orient, Wash. Patrick Burns and Blake Wilson, of Calgary, owners. Alexander Sharp, mgr., Vancouver, B. C. Property produced \$750,000 prior to 1909, idle since. Company won a suit against Stevens County assessor, June, 1916, and court ordered valuation reduced to \$10,000.

FISSURES EXPLORATION CO.

UTAH

McCornick Blk., Salt Lake City, Utah. Operates a lease on property of Pacific Gold M. & M. Co., which see.

FITZSIMMONS GROUP.

BRITISH COLUMBIA

P. O.: Newport, B. C. **Property:** All-Up and Yellow Jacket claims, on Fitzsimmons creek, Howe Sound district, 38 miles from Newport, of which 26 miles is by trail. Mine is in the Greenlake country, tributary to the Pacific & Great Eastern railroad, and shows a mineralized zone, 150' wide, with an orebody 10' wide, traceable for 250'. Outcrop forms a bluff 60' high with chalcopyrite in epidote and garnet gangue. Outcrops show values of 60 cts. to \$4 gold, one-half to 1½ oz. silver and 5 to 12% copper per ton. Property examined by F. W. McCready, who reports large quantities of payable ore on outcrop.

FIVE BEARS MINING CO.

CALIFORNIA

Office: 15 N. 40th Ave., Chicago, Ill. **Mine office:** Genesee, Plumas Co., Cal. **Officers:** F. A. Meidinger, pres.; A. Vermaas, sec.; J. D. Meidinger, treas.; preceding, with E. C. Goeckel, directors. **Inc.** April 10, 1903, in South Dakota. **Cap.**, \$2,500,000; shares \$1 par, nonassessable; issued, \$2,428,174.

Property: 10 claims, patented, 200 acres, well timbered, 21 miles from the Western Pacific railway, shows fissure veins in talcose schist, and con-

tact replacement deposits between schist and porphyry. The gossan was worked, 1876-93, for gold. Main vein, of 14' estimated average width, carries chalcopryrite, associated with pyrite, estimated by management to average 6% copper, 1.5 oz. silver and \$1.40 gold per ton. **Development:** 2 tunnels, of 380' and 1,250', latter a drift tunnel, following the vein fault-fissure, showing low-grade chalcopryrite for an average of about 12' width. Mine has 3,484' of workings, estimated to show 80,000 tons of ore, with 9,500 tons blocked out for stoping.

Equipment: includes a 50-h. p. water plant, a 2-drill Giant air compressor, 50-ton mill with ten 850-lb. stamps, and electric light plant. There are 11 buildings. Idle.

FIVE PINES MINING CO.

CALIFORNIA

Minersville, Trinity Co., Calif. H. J. Van Ness, pres.; L. Van Ness, mgr. **Property:** located in 1896, is on the N. E. side of Van Ness Creek, about 1½ miles above its mouth and 2 miles N. W. of Minersville. Mine is said to have produced to 1915 almost \$300,000, and to be the best producer of the district.

Ore: free milling gold quartz with calcite, occurs in a series of pockets in a contact vein between meta-andesite and overlying slate and sandstone.

Development: 225' incline shaft with a level at 125'. **Equipment:** includes a small hoist and 2-stamp mill. Coarse gold and 80% of total value is recovered in hand mortar. Water power is used. Employs 4 men. See U. S. G. S. Bull. 540, p. 73 and Mines & Min. Res. of Trinity Co., State Mineralogist's Report 1915.

FLAGSTAFF COPPER MINING CO.

UTAH

Dead. Company consolidated with the Columbus Consolidated, and Superior Alta, under name of Wasatch Mines Co., which see. Described Vols. X and XI, Copper Handbook.

FLANNERY ZINC CO.

MISSOURI

Pittsburg, Pa., and Sarcocie, Mo. Acquired the Boyd zinc properties at Sarcocie, 1915, and spent \$40,000 rehabilitating the mine and mill. **Equipment:** includes a 1000-ton concentrator and a Diesel engine. The ore is blende, but some calamine is also mined.

FLATHEAD DEVELOPMENT CO.

MONTANA

Address: Gen. Chas. S. Warren, 73 Hirbour Blk., Butte, Mont. Mine at Coram, Mont. L. O. Evans and John M. Murphy of Butte, Fred Oliver and V. D. Williamson of Spokane; Dr. W. H. Campbell and A. Ingraham of Kalispell, organizers. **Property:** Big Copper, Nos. 1, 2, 3 and 4 and Noble Copper claims covering veins 10 to 20' wide on Felix creek, a tributary of South Flathead river, 30 miles south of Coram, a station on the G. N. R. R. No development done.

FLORENCE COPPER MINING CO.

ARIZONA

Address: Jas. C. Tharp, supt., Florence, Pinal Co., Ariz. Property is a copper-gold prospect, intermittently operated and developed by several shallow shafts.

FLORENCE GOLDFIELD MINING CO.

NEVADA

Offices: Goldfield, Nev. and Denver, Colo. **Officers:** A. D. Parker, pres. and treas., P. O. Box 4561, Denver, Colo.; G. C. Cunningham, v. p.; S. G. Arscott, sec.; preceding with S. W. Morris, and J. K. Turner, directors. H. C. Clapp, gen. mgr. Inc. April 28, 1905, in South Dakota. **Cap.,** \$1,250,000; outstanding \$1,050,000; shares \$1 par. Stock transferred at company's office. **Dividends:** 1908, 40%; 1909, 20%; 1910 and 1911, 10% each; none since. Annual meeting March 1st at Goldfield, Nev.

Financial statement for 1915 shows assets of \$1,145,442, which in-

cludes: property account \$1,044,604, and cash \$66,451. Balance to credit of profit and loss, Dec. 31, 1915, was \$95,384, compared with \$124,793 in 1914. Net revenue for 1915 was \$58,495, compared with \$215,024 in 1914. Expenditures in 1915 were \$88,240, leaving an operating deficit of \$29,744 for the year. In 1914 there was a total net profit of \$73,786.

Property: 67.7 acres at Goldfield. The main shaft was sunk 1,200' several years ago; at this depth the vein was mineralized, but ore was not of commercial grade and the shaft was allowed to fill with water to the 600' level. Work since then has been above this level, and in 1915 amounted to 3,543', compared with 2,601' in 1914. The orebody which was furnishing the shipping ore played out in Sept., 1915, and no shipments have been made since. Management claims there are 100,000 tons of low-grade sulphide ore, averaging \$4 to \$6 per ton in gold, silver and copper, opened up in the mine.

In Oct., 1915, a 2-year lease on the surface dumps was granted to F. A. Mead, who organized the Nevada Metals Extraction Co. to erect a 150-ton mill and treat the low-grade ore by flotation. Mill started operations in April, 1916, and is reported to be making an extraction of 92% gold and 99% copper. Operating costs are reported under \$2.25. Dumps have been estimated to contain 50,000 tons of \$5 ore.

Development work is being done on the 250' level at the northern end of the property and in the neighborhood of the old stopes of the famous Reilly lease. The mine may be developed at depth. Upon the results of this work depends the future of the property.

Production: for 1915, 3,194 tons ore, average value \$17.42 per ton; compared with 8,029 tons, average value \$26.39 in 1914.

FLORENCE MINING & MILLING CO.

IDAHO

Address: John B. Steffes, sec.-treas., Kellogg, Idaho. Chas. Dallaire, pres.; J. D. Chisholm, Jas. Ezkiel and John Haalund, directors. **Inc.** 1908 in Idaho. **Cap.**, \$1,000,000; shares \$1 par, assessable; 440,000 issued. Annual meeting 2nd Tuesday in July.

Property: 10 claims, 170 acres, due E. of the Alhambra and S. E. of the Sherman and Roanoke mines in the Yreka mining district. Ore occurs in vein in Revett quartzite, carrying lead, silver and copper. Orebody is 10' wide, has dip of 35° and S. E.-N. W. course. Developed by crosscut tunnels, 150' and 300' long, with a total of 650' underground workings.

Plans for 1916 include installation of electric power, compressor and machine drills. Property is still in development stage.

FLORENCE-RAE COPPER CO.

WASHINGTON

Index, Snohomish Co., Wash. N. Rudebeck, mgr; Fred Booth, supt. **Property:** on Copper mountain, about 4 miles E. of Index, has a tunnel showing a 10' paystreak of chalcopyrite in the Margurite vein and an assay of 400 lbs. taken across 6' of the vein averages 12 oz. silver, 18.5% copper, 29.6% iron, 7.2% silica and 35.8% sulphur. **Development:** hindered 1913-14 by litigation among opposing factions of stockholders, was resumed in 1915. Plans installing an aerial tram over the divide to Mineral City, to connect with the railroad at Index.

FLORENCE SILVER MINING CO.

BRITISH COLUMBIA

Office: Hutton Bldg., Spokane, Wash., and Ainsworth, B. C. **Officers:** F. R. Wolfe, pres. and gen. mgr.; W. M. Frost, v. p.; D. E. Sanders, sec.-treas.; with A. F. Kelly, J. A. Lavender, directors. Chas. Simpkins, supt. **Inc.** July 1, 1911, in Washington. **Cap.**, \$1,000,000; outstanding \$900,000; shares \$1 par; non-assessable. Stock transferred at company office. Annual meeting July 3.

Property: 9 claims, crown granted, 370 acres, 3 miles N. of Ainsworth in the Ainsworth mining district. Claims, on the west side of Lake Kootenay, extend west from shore about 2 miles. **Ore:** lead, zinc and silver in E. W. fissure veins in quartzite and slate. One oreshoot said to have over 400' of commercial ore. Milling ore said to contain 10% to 20% lead, 8% to 15% zinc and 6 oz. silver per ton.

Development: tunnels, with 5,000' underground workings at average depth of 350'. Company states there are 300,000 tons ore blocked out and \$50,000 was spent for development in 1915. A 200-ton mill being built, is expected to be completed by Sept., 1916. Water power is being developed. Total cost of these improvements, \$150,000.

During first two months of 1916 eight cars of ore were shipped. Company was concentrating 60 tons per day and extracting 30 tons of crude ore, March, 1916.

FLOWER OF THE WEST GOLD MINING CO. COLORADO

Cripple Creek, Teller Co., Colo. **Officers:** K. C. Schuyler, pres.; N. S. Gandy, sec.-treas. **Cap.**, \$1,500,000; shares \$1 par. In treasury Jan. 1, 1916, 69,500 shares; cash, \$10,000. All except current taxes paid. No liabilities. Exchange Registry and Guarantee Co., Colorado Springs, transfer office. Listed in Colorado Springs.

Property: 2 claims on Squaw Mountain, and 2 on Gold Hill, 15 acres, patented. Gross production to date, nominal.

FORD MINING CO.

ARIZONA

Address: Geo. O. Ford, pres., Junction, Yavapai Co., Ariz. **Property:** 16 claims, unpatented, a copper-gold-lead prospect in the Black Hills district, developed by shaft and prospected by diamond-drill work. Owner claims to have expended \$50,000 in 12 years uncovering ledge.

FORT HALL MINING & MILLING CO., LTD.

IDAHO

Pocatello, Bannock Co., Idaho. **Officers:** Geo. W. Derr, pres.; W. A. Hyde, v. p.; W. H. Witty, sec.; L. Fargo, treas.; preceding and A. Fitzgerald, directors. **Property:** 7 miles from Pocatello, said by R. N. Bell, state mine inspector, to show big, low-grade deposits of copper-iron-sulphide ores, not as yet profitably mined. Equipped with steam power. Reported under bond and lease to T. A. Ferguson, 1915, who planned erecting cyanide plant.

FORT PITT COPPER CO.

NEW MEXICO

Practically out of business. Was unfavorably regarded. Fully described, Vol. XI, Copper Handbook.

FORTUNA, S. A.; COMPANIA MINERA LA.

MEXICO

Aguascalientes, Mex. **Mine office:** Tepezalá, Ocampo, Aguascalientes, Mex. **Officers:** Geo. B. Wardman, pres.-gen. mgr.; O. F. Westlund, v. p.; De Witt Crevelling, sec.-treas. Alberto Pez, supt. **Inc.** 1902. **Cap.**, 200,000 pesos; shares 100 pesos par. **Property:** 20 hectares, including La Fortuna and adjoining mines. **Development:** by 2 tunnels and a 100-meter blind shaft, mines having a vertical depth of 200 meters and greatest horizontal length of 600 meters of workings, showing mainly oxidized argentiferous copper ores of good average tenor in both metals. Has animal power and employs 200 men normally. Probably idle owing to revolution.

FORTUNA COPPER CO.

CALIFORNIA

Letters neither answered nor returned. Mine at Fortuna, Humboldt Co., Cal. **Officers:** P. J. Mulley, pres.-gen. mgr.; Frank Legg, v. p.; C. A. Eastman, sec.; Fortuna Merchandising Co., treas.; A. E. Purdy, supt., at last accounts. **Inc.** June 8, 1901, in California. **Cap.**, \$70,000; shares \$5 par. **Property:** 19 claims, unpatented, 380 acres, in Trinity county, Cal.,

opened by tunnels. Ore said to have assayed 28% copper and \$3 gold per ton, in veins of 12 to 16" width.

FORTUNA GOLD & COPPER CO.

ARIZONA

Property sold at sheriff's sale and acquired by Nathan Sturdy. See Sturdy Gold Mining Company.

FORTUNA MINES CORPORATION

ARIZONA

Mines at Fortuna, Yuma Co., Ariz. **Office:** 31 State St., Boston, Mass., and care F. G. Hobbs, sec.-treas., Sharon Bldg., San Francisco, Calif. **Officers:** F. E. Boland, pres.; Frank G. Hobbs, Thos. Pascoe, J. E. Manders, directors. T. C. Woodworth, cons. engr.; W. H. Enderton, supt.; F. B. Keever, mgr. Inc. 1913 in Calif. **Cap.**, \$500,000; shares \$1 par. Listed on Boston Curb. Federal Trust Co., Boston, depository.

Property: the Fortuna mine, 7 patented, 11 unpatented claims, 358.7 acres, 15 miles S. of Blaisdell station on the S. P. R. R. and 22 miles S. E. of Yuma, Ariz. Claims are at base of W. slope of the Gila range. The Fortuna mine is said to have been worked by Chas. D. Lane of San Francisco, 1896-1904, with a gross production of \$2,887,075 gold and to have paid \$1,180,000 in dividends. The oreshoot was lost in 1901, a fault from 800' to 1,200' level cutting off the ore, and \$500,000 was spent in vain to recover ore beyond the fault. Present company started work May, 1913, and is reported to have spent \$100,000 and to have recovered the vein on the 800' level.

The Fortuna is a quartz vein in schist, near gneiss and granite masses. It runs E. W., dips 50° S. and has an average thickness of 4', said to widen out to 30' in lenses. The outcrop shows iron and copper oxides, but the ore is free milling.

Development: by an old 1,500' working shaft whose levels have been utilized by present company. Crosscutting is reported to have found the oreshoot, 5' wide, on the 800' level. A new shaft, 400' E. of old workings, is said to show a 2' vein of \$40 ore. Company claims 1,000,000 tons of probable ore, which is regarded as too optimistic.

Mill has 20 1400-lb. stamps and receives water from a 4-mile pipe line.

Mine has a good record and company has several eminent stockholders, but promotion record has been disappointing.

FORTUNA MINING CO.

ARIZONA

Address: care Judge D. A. Richardson, Douglas, Ariz. **Mine address:** care Johnson & Marvel, Superior, Pinal Co., Ariz. Inc. Jan. 27, 1908, in Arizona. **Cap.**, \$1,000,000; shares \$10 par. **Property:** a group of claims near Superior, under lease and bond to Johnson & Marvel at last accounts, shows copper ore with high gold and silver values. **Development:** by the 250' Richardson tunnel following a vein carrying a 2 to 6" pay streak of ore, said to assay 10% copper, up to several thousand ounces silver and \$25 gold per ton, but cut off by a cross fault in face. Tunnel was being continued to cut the Fortuna vein at 750' from portal in 1913. Probably idle. No recent returns.

FORTUNA MINING CO.

UTAH

Idle. Office: 161 South Main St., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake Co., Utah. Simon Bamberger, pres.; J. B. Bean, sec.; Jas. Start, supt. Inc. March 10, 1904, in Utah. **Cap.**, \$300,000; shares \$1 par, nonassessable; fully issued.

Property: 23 claims, mainly fractional, 175 acres, adjoining the Ohio, in Keystone gulch. Mine shows monzonite porphyry, quartzite and limestone, with a series of 4 nearly parallel veins following the strike and dip of the quartzite bedding, occasionally cutting across, and with some fracturing and crushing. The veins, of 2 to 5' width, carry films and vein-

lets of native copper, with occasional chalcocite. The mine carries silver-lead ores in the upper workings, with copper sulphides at depth, giving good assays. **Development:** by shafts of 150', 300', 200' and 1,100'; 2 crosscut tunnels of 400' each, and drift tunnels of 1,700', 4,200', 1,900', 900' and 400', with about 16,000' of workings. Mine was opened 1875 and closed 1908.

Equipment: includes electric power, with 2 hoists, good for 1,500' depth, and an air compressor.

FORTUNE MINING CO.

ARIZONA

Address: 19 Lawler Blk., Prescott, Ariz. **Officers:** A. W. Davis, pres.-gen. mgr.; H. J. Marshall, v. p.; J. P. Dillon, sec.-treas.; preceding, with J. E. Russell, A. E. Broas, J. L. Dennerlein, M. Collins, directors. W. W. Lewis, cons. engr. **Property:** the Wizard mine and other claims in the Big Bug mining district, Yavapai county. Is a gold mine in which high-grade copper ore was found Oct., 1913. **Development:** 1,200' tunnel on the vein showing 4 to 6' of ore in a shoot 800' long; 225' shaft and cross-cuts. **Equipment:** includes 10-stamp mill and two 50-h. p. gas engines. 10,000 tons of milling ore reported on dumps.

FOSS RIVER CONSOLIDATED COPPER CO.

WASHINGTON

Everett, Wash. Owners exhausted their means and shut down mine, 1910. Fully described Vol. XI, Copper Handbook.

FOSTER COBALT MINING CO., LTD.

ONTARIO

Property worked by Glen Lake Cobalt Mines, Ltd., and described under that title.

FOUR METALS MINING CO.

ARIZONA

Reorganized as Red Mountain Mining Co. Owns the Four Metals mine near Patagonia, Ariz. Described Vol VIII.

FOUR METALS SMELTER & MINING CO.

CALIFORNIA

Dead. Property held by Cerro Gordo Mines Co., which see.

FOURTH OF JULY MINING & MILLING CO.

COLORADO

Dead. Property, the Fourth of July group, Eldora, Boulder Co., Colo., now owned by Cons. Copper M., M. & Sm. Co., which see.

FOX COPPER MINING & MILLING CO.

IDAHO

Letters neither answered nor returned from Mullan, Idaho, or Saltese, Missoula Co., Mont. Fully described Vol. XI, Copper Handbook.

FRANK HOUGH MINING CO.

COLORADO

Office: 830 Equitable Bldg., Denver, Colo. Mine: Lake City, Hinsdale Co., Colo. Inc. 1907, in Colorado. Mine, on Engineer mountain, has a 2,500' tunnel, developing a large body of copper sulphides, including bornite, with assays up to 27% copper, 47 oz. silver and \$5 gold per ton. Mine shipped several hundred tons of high-grade silver-copper ore, under former ownership. **Equipment:** includes 800-ton shipping bins. **Production:** estimated at 250,000 lbs. fine copper in 1909, and 600,000 lbs. in 1910. Property considered promising, but was closed down in 1912 because of destruction by fire of its surface equipment.

Development work resumed in 1914 under Edward Arps and promising ore said to have been found 100' below old workings.

FRANKLIN JUNIOR MINE.

MICHIGAN

Owned by Franklin Mining Co., at Demmon, Houghton Co., Mich.

FRANKLIN MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. **Mine office:** Demmon, Houghton Co., Mich. **Mill office:** Point Mills, Houghton Co., Mich. **Officers:** R. M. Edwards, pres.-gen. mgr.; Henry D. Forbes, v. p.; Henry Tolman, treas.; preceding, with C. W. Van Law, C. A. Hight, Sidney J. Jennings

and Harry M. Howard, directors. Albert L. Wyman, sec. Enoch Henderson, supt.

Inc. April 3, 1857, in Michigan; cap., \$500,000, and reincorporated, 1887, for 30 years; cap. increased, 1899, to \$2,500,000, and again increased, Nov., 1908, to \$5,000,000; shares \$25 par; issued, 166,473; paid in \$16.20, to Dec., 1915. Unissued stock has been set aside for the purpose of acquiring the total capitalization or 100,000 shares of the Rhode Island Copper Co. Has paid dividends of \$1,240,000, and has levied assessments of \$1,753,000, including a \$2 assessment called Aug., 1914. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, third Wednesday in April. Balance sheet of Dec. 31, 1915, showed a cash surplus of \$30,022, as compared with \$117,165 in 1914.

Property: 3,280 acres of mineral property, and a 217-acre mill site, with 1 mile of frontage on Portage lake. The old Franklin mine (described Vol. VIII), 160 acres, was sold, July, 1908, to the Quincy Mining Co., for \$170,000, and Sec. 6, T. 55 N., R. 33 W., 640 acres, lying directly north of the Franklin Junior and west of the Rhode Island, was bought from St. Mary's Mineral Land Co., 1909, for 33,333 shares of stock.

Property carries 2 miles of the strike of the Pewabic amygdaloid and other cupriferous beds of the Keweenaw series. In addition to the main tract, there are 3 other tracts of mineral lands, of 160, 480 and 640 acres. The company also controls, and is absorbing, the Rhode Island Copper Co., which has 800 acres immediately north of the Franklin Junior mine.

Development: early work was on the Franklin Junior property, where two parallel lodes, the Allouez conglomerate and the Pewabic amygdaloid, 500' apart, have been worked. The amygdaloid worked prior to 1902, gave but 9.65 lbs. copper per ton, and was abandoned in favor of the conglomerate until the latter, decreasing in width and value on the 2,000' to 2,400' levels, was abandoned and work resumed on the Pewabic in the Franklin, Jr., shaft (No. 1), sunk about 20' in the footwall. The values being extremely low, mining was stopped, and only exploratory work done. In 1913, a crosscut was started eastward from the shaft at the 3,200' level to explore the entire eastern part of the company's holdings. At 550' from the amygdaloid this crosscut entered payable ore in the Allouez conglomerate, in the Autumn of 1913. Drifts were at once started to prove the extent and copper content of the orebody. Work continued until August, 1914, and was resumed in July, 1915, the orebody now being developed for 1,100' on the 32nd level. It is opened for stoping on each level from the 27th down to the 36th, an average of 700' on each level, or a total of 7,043' of drifting, with a continuous raise, used as an ore chute from the 2,700' to the 3,700 level, where ore is gathered by electric motor trains and carried to the shaft. Besides this main raise there is another for men and supplies, the new raises in 1915 aggregating 1,253'. The shaft is down to the 37th level, and shows considerable improvement below a depth of 2,000'. Shaft is equipped with a steel circular rock house (Edwards design), formerly used at No. 2 conglomerate shaft. On the 28th level a crosscut driven in 1915 connects the lode with the shaft, and a similar crosscut has been driven on the 37th level. The old conglomerate shaft, bottomed at 2,400' on the incline, has not been connected.

Having cut the Allouez conglomerate, the exploration crosscut on the 32nd level was continued to a total distance, Dec. 31, 1915, of 4,000' from the Pewabic lode. The crosscut encounters and passes for 25' through the Calumet conglomerate at 2,150', the 10' Osceola amygdaloid at 2,820' and the Kearsarge conglomerate, 40' wide, at 3,380' from the shaft, but

all three lodes were devoid of any copper. Twenty-two other amygdaloids were also cut, 9 of them copper bearing, but only 2 rich enough to warrant exploratory drifts and raises; the remaining 13 were barren.

Production in 1915 came from development work only, no stoping being done on the conglomerate lode and but little from reopened stopes on Pewabic. Total openings, development and exploratory, amounted to 11,554' in 1915. Company employs 340 men at mine and 80 men at mill.

Equipment: includes a Nordberg hoist at No. 1 shaft hoisting a 10-ton skip, and has special air-compression cylinders, storing up energy, otherwise wasted, in compressed air, the compressed air being mixed with steam, in the cylinders, as a prime motive force.

The mill is reached by the Mineral Range railroad. Equipment includes 5 Allis-Chalmers 2-way heads, with 20x24" cylinders, each capable of crushing 350 tons of conglomerate or 500 tons of amygdaloid rock daily. Each stamp is fed from a 1,000-ton rock bin, and equipped with hydraulic separators, which remove considerable heavy copper. The washing plant includes 8 Woodbury classifiers, 20 roughing jigs, 15 finishing jigs, 32 Wilfley and 10 Overstrom tables. The jigs are of the Hodge eccentric type, with centershield copper discharges, obviating skimming.

Power for the mill is furnished by a 16x32" Allis-Chalmers engine, and steam is supplied by two 500-h. p. Stirling boilers. The boiler house has a self-supporting brick-lined smokestack of 7' diameter, 165' high, on a 52' brick foundation. Water is furnished by a 15,000,000-gal. Allis-Chalmers vertical compound pump, having 12x42" high-pressure and 42x42" low-pressure cylinders, with 47" stroke and plungers of 37½" diameter. Water is drawn through a 36" pipe line, running 200' under the rock to a crib protected by quarter-inch screens. The mill has a 5x12" duplex fire pump with fire hose, and electric light. There is a 267' wharf at the mill site, equipped with coal hoist and sheds, with 18' of clear water alongside. The mill site has about 20 dwellings for employees.

In 1903 the recovery of copper was 15.25 lbs. per ton of rock stamped and in 1907 was only 11.48 lbs., falling, 1909, to 9.47 lbs. per ton of rock stamped. The largest production ever secured by the mine was 5,259,140 lbs. fine copper in 1902. Recent production has been: 4,206,085 lbs. in 1905; 4,228,650 lbs. in 1906; 4,401,248 lbs. in 1907; 3,703,421 lbs. in 1908; 1,615,556 lbs. in 1909; 966,353 lbs. in 1910; 820,203 lbs. in 1911; 1,710,651 lbs. in 1912; 1,021,440 lbs. in 1913; 93,283 lbs. in 1914; 1915 production was 151,269 tons hoisted, 29,251 being discarded and balance, 122,018, stamped, yielding 1,314,969 lbs. refined copper for six months work.

The 1914 production was from test runs only on rock from the Allouez conglomerate. Regular shipments were started in the summer of 1915 and by December had reached a daily average of about 900 tons. A daily production of 1,600 tons, capacity of the mill, is looked for in the near future. Output is coming from the Allouez conglomerate and the Pewabic amygdaloid, the latter furnishing about 16% of the tonnage and carrying 8 to 9 lbs. copper per ton rock, while the Allouez lode carries about 20 lbs.

In Sept., 1915, Franklin made money for the first time in 20 years; net profits were about \$12,000. Property is now on a profitable basis and management excellent.

FRANKLIN MINING CO.

Webb City, Mo. Owns a tract of "sheetground," carrying zinc ore at depth of 200'. Is equipped with 880' air-compressor and a 600-ton mill, completed 1915.

FRANKLIN MINING CO.

Helena, Mont. Inc. 1915 in Mont. Cap., \$1,000,000; shares \$1 par.

MISSOURI

MONTANA

Owned by estate of Thos. Cruse. **Property:** in the Scratch Gravel district near Helena, Lewis and Clark Co., Mont., adjoins the property of the Scratch Gravel Gold Mining Co., on the W. The mine is said to have made a profit of \$29,597 from Dec. 20, 1914, to March 15, 1915. Total profits from April, 1914, to May, 1916, aggregate \$185,498; the net profit for May, 1916, was \$11,000, with disbursements of \$8,099.

Claims show 2 veins, crossing, one carrying high-grade gold ore, with free gold, the other silver ore. The gold vein is developed eastward and passes into the lands of the Scratch Gravel Co. Values are chiefly in gold. Employs 50 men.

FRASER MOUNTAIN COPPER CO.**NEW MEXICO**

Dead. Property now owned by Taos Mining Co. See Vols. VI and XI, Copper Handbook.

FREE COINAGE GOLD MINING CO.**COLORADO**

John B. Neville, mgr., Altman, Colo. **Property:** the Pinto mine; and the Neville 60-ton mill at Altman, Teller Co., Colo., operated by lessees. Mill treats Pinto ores, said to average \$7 per ton. Fully equipped with modern machinery and aerial tram, connecting shaft with mill.

FREE COINAGE MINING & MILLING CO.**UTAH**

Office: 69 Commercial Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. L. A. Evans, pres.; D. H. Wenger, sec.-treas. Inc. 1896, in Utah. **Cap.**, \$125,000; shares 25 cts. par, assessable, with 2 assessments levied. **Property:** 4 claims, 3 patented, in Little Cottonwood canyon, 2 miles from a railroad, developed by shaft and tunnels, showing lead and copper ores. Letters neither answered nor returned. Probably idle.

FREELAND CONSOLIDATED MINING CO.**OREGON**

Office: Salem, Ore. Mine at Elkhorn, Marion Co., Ore. Hugh Freeland, owner. Assessment work only has been done since 1911. Inc. 1901, in Oregon. **Cap.**, \$2,000,000; shares \$1 par, nonassessable; issued, \$1,625,000. Annual meeting, third Monday in April.

Property: 13 claims, unpatented, 200 acres, with about 100 acres timbered, on Gold creek, a tributary of the Little North fork of the Santiam river, 18 miles from Gates, the nearest rail point. Lands show porphyry, syenite and diorite, with occasional Tertiary sedimentary rocks, having 5 fissure veins, of which 3, under development, are estimated by the company at 17' average width, and to be traceable 2,000'. Veins have 1 to 6" stringers, carrying chalcopryrite and occasional native copper, and the pyrite adjoining carries gold. Ores are reported by the company to range 1 to 14% copper, and \$2 gold per ton. **Development:** 175' crosscut tunnel, and about 1,300' of workings. There are 4 buildings.

FREMONT CONSOLIDATED MINING CO.**CALIFORNIA**

Officers: 24 Market St., San Francisco, and Amador City, Amador Co., Calif. Arthur Goodall, gen. mgr.; A. L. Palmer, supt.

Property: 4 claims, 4,200' on the lode, 1½ miles north of Amador City, shows gold ore occurring on contact of black slates on the west, and meta-diabase on the east. Vein strikes N. 25° W., dips 50° E., and has an average width of 6'. West of the main vein ore has been developed in schist. Orebodies occur as lenses, the ore being in the form of quartz stringers, cutting the schist. The rock is highly mineralized with pyrite.

Development: by the Fremont shaft, 2,350' deep, sunk on a 51° incline, and a 1,500' incline shaft north of the Fremont shaft. There are several miles of underground workings. The Fremont shaft is being sunk to 2,750'.

Equipment: includes a steam hoist at each shaft and a 40-stamp mill. Oil is used as fuel. Company employed 140 men at last accounts.

FREMONT DEVELOPMENT CO.

WYOMING

Out of business. See Vol. XI, Copper Handbook.

FREMONT MINING & MILLING CO.

ARIZONA

Probably dead. Was not favorably regarded. See Vol. XI, Copper Handbook.

FRESNO COPPER CO., LTD.

CALIFORNIA

Lands sold and company out of business. See Vol. XI, Copper Handbook. Company had a ranch, not a mine, and is another case of too trusting Englishmen.

FRIDAY-LOWDEN COPPER CO.

CALIFORNIA

Idle. At Redding, Shasta Co., Cal. **Officers:** T. H. Benton, pres.; S. E. Bretherton, v. p.; John R. Lowden, sec.-treas. and gen. mgr., at last accounts. **Inc.** 1909. **Cap.**, \$2,000,000.

Property: 15 claims, partly patented, 300 acres, near the Balaklala, Mammoth and Trinity mines. Considerable diamond drilling done is said to have proven extensive orebodies, and there are 5 tunnels of 800' aggregate length. Letters neither answered nor returned.

FRISCO CONSOLIDATED MINING CO.

UTAH

Probably dead. Letters unclaimed at Salt Lake City and Frisco, Beaver Co., Utah. Fully described Vol. XI, Copper Handbook.

FRISCO MINES & TUNNEL CO.

COLORADO

Animas Forks, San Juan Co., Colo. Joe Warner, mgr.; Dan McNaughton, supt. **Property:** the Bagley mine, near Animas, developed by 11,000' tunnel cutting veins carrying gold, silver, copper, lead and zinc ores. A strike of very rich silver-copper ore was made in the Red Cloud vein at a point 900' below the outcrop. Mine has electric power, air compressor, a 150-ton concentrating mill and employs about 75 men. Requests for information ignored.

FRONTENAC CONSOLIDATED MINES, LTD.

COLORADO

Bankrupt. Mine at Central City, Gilpin Co., Colo., is a gold mine, whose ores carry lead and copper, the latter as tetrahedrite, in small quantities. Credited with production of \$500,000 worth of ore in 1913. Property closed down end of 1913 and was sold at sheriff's sale, 1915, to creditors. Lessees reported shipping from old workings, 1916.

FRONTENAC COPPER CO.

MICHIGAN

Dead. Property conveyed to Calumet & Hecla Mining Co.

FRONTIER MINING CO.

WISCONSIN

Office: 413 Fletcher Trust Bldg., Indianapolis, and Galena, Ill. **Officers:** J. H. Billingsby, pres.; D. C. Ellison, v. p.; W. C. Haneisen, sec.-treas.; preceding, with C. W. Craig, C. R. Hinkle, Carl L. Rost, S. O. Deschler, directors. **Cap.**, \$125,000; shares \$100 par. Dividends began April, 1916; were 2% the first of each month, and 10% on the 15th.

Property: 500 acres under lease, in Sections 8 and 9, T. 1 N., R. 1 E., at Benton, Wis. **Ore:** zinc sulphide in pitches and flats in limestone. Stopes are 120' wide and 35' high. **Development:** 3 shafts, average depth of 150'. Room and pillar mining system is used.

Equipment: includes one 50-h. p. and one 75-h. p. electric hoists, air compressor and Keystone drilling machines. There are also 3 concentrators with daily capacity of 600 tons in 10 hours.

Treated 189,252 tons of ore, 1915. The Calvert property produces 220 tons of zinc concentrate and 6,000 lbs. lead ore weekly; the Bull Moose, 200 tons weekly, and the Treganza the same amount of 48% material.

A new power and concentrator plant began operations in May. Wages are \$2.75 to \$3 for car men and shovelers.

FURLOUGH DEVELOPMENT CO.**ARIZONA**

Geo. B. Halderer, mgr., Wickenburg, Ariz. **Property:** several claims in Big Horn district, 30 miles S. W. of Wickenburg, shows ledge in "Pinal" schist, traceable for 6,000' and showing iron gossan with copper and gold ore. **Development:** 550' shaft, with levels at 100', 300' and 500', now being deepened. Employed 22 men in 1916.

FURNACE CREEK COPPER CO.**CALIFORNIA**

Dead. See Vol. XI, Copper Handbook.

GALENA BAY MINING CO.**ALASKA**

Office: 425 Orchestra Bldg., Chicago, Ill. **Mine office:** Valdez, Prince William Sound, Alaska. B. F. Millard, pres. and mgr. A. Stanford White, v. p.; Alfred Barge, sec.; J. S. Jurey, asst. sec. **Inc.** 1906, in Washington. **Cap.**, \$500,000; shares \$1 par. Stock held by voting trust of 7 trustees for a term of 10 years, the Continental & Commercial Trust & Savings Bank issuing trust certificates, in lieu of stock, which are negotiable and transferable.

Property: company now owns control of the Standard Copper Mines Co. and the Hemple Copper Mining Co.

The company's holdings proper, acquired in 1907, are all on Galena bay, about 30 miles from Valdez, and include the Sunnyside, Copper Crown, Starvation, Sheep Run and the Vesuvius claims.

Development: by 2,200' adit on the Starvation, 400' adit on the Sunnyside, with only surface work and diamond drilling on the Copper Crown and Sheep Run claims. Ore occurs in lenses of chalcopyrite, pyrrhotite, quartz and calcite, 4-5' long and up to 14" in width. On the Copper Crown a 4' vein of solid sulphide ore was opened up in a N. E. shear zone, assaying \$3-4 gold per ton. Geology fully described, p. 100, U. S. G. S. Bulletin 605. Only assessment work done since 1912.

GALENA FARM MINING CO.**BRITISH COLUMBIA**

Silverton, B. C. Care Jas. J. Stewart, 50 Broad St., New York.

Property: the Galena Farm mine, with a vein said to show 14' of ore, treated in a 100-ton concentrator which produced, May, 1916, 759 tons of concentrate that averaged 46.5% zinc and 20 oz. per ton silver, netting \$25 per ton; also 237 tons lead concentrate averaging 67.3% lead and 66.1 oz. silver, netting \$125 per ton. Net earnings for May, 1916, were \$40,000.

GARBUTT LEASING CO.**COLORADO**

John Cortellini, mgr., Leadville, Lake Co., Colo. **Property:** adjoining the famous Little Jonny mine on Jonny Hill, has 1,000' shaft, producing copper with good gold-silver values. Report that a large body of ore, assaying \$15 gold per ton, was found in 1915. Equipment includes a steam hoist and 15-drill air compressor. Company planning to erect a 200-ton mill in 1916.

GARFIELD MINING CO.**MONTANA**

Property: 5 claims, 13 miles from Belgrade and 18 miles from Manhattan. A 450' tunnel is said to cut a gold-copper vein, 9 to 15' wide. Lower tunnel to be driven to cut vein below zone of oxide ore.

GARFIELD MINING & MILLING CO.**IDAHO**

Mine at Harvard, Latah Co., Idaho. Albert Burns, supt., at last accounts. **Property:** the Gold Bug mine, developed by shaft and carrying copper ore. Equipment includes a small steam plant.

GARFIELD SMELTING CO.

Office: 165 Broadway, New York. **Operating office:** 714 McCornick

Blk., Salt Lake City, Utah. **Works office:** Garfield, Salt Lake Co., Utah. Is the Utah Copper Co. smelter, owned by American Smelters Securities Co., and itself owns the Garfield Water Co. and the Garfield Improvement Co. The smelter has cost, complete, about \$6,000,000. Fully described Vol. X.

GARNET MINE.**NEW MEXICO**

Mine near Oro Grande, Otero Co., N. M. Operated by C. C. Camp-house for English company and shipped copper-silver ore, 1914.

GARRETSON-SAHUARIPA CO.**MEXICO**

Mine at Calera, Sahuaripa, Sonora, Mex. W. H. Farnsworth, pres.; Laurens Enos, v. p.; W. H. H. Davenport, sec.; D. B. Sherman, treas.; John A. Moore, supt., at last accounts. Inc. 1903, in Arizona. **Cap.**, \$600,000; shares \$100 par, nonassessable; issued, \$450,000.

Property: 96 hectares, and 14,000 acres of surface rights, about 30 miles S. E. of Sahuaripa, includes La Calera mine, having 6 orebodies. 2 under development, of 3 to 6' width, estimated by company to average 2% copper, 45 oz. silver and \$14 gold per ton, which is interesting, if true. Mine has about 1,200' of workings.

The smelter, 1 mile from the mine, receiving ore by pack trains, has a 50-ton 29x48" Garretson pyritic water-jacket blast furnace, burning charcoal and wood, which apparently has not worked well. Idle since 1908, awaiting construction of the Sonora Central railway from Tonichi, which has been surveyed to pass through this property.

GARRISON-MONSTER MINING CO.**UTAH**

Idle. Mine at Ibapah, Tooele Co., Utah. **Officers:** J. P. Gardner, pres.; J. S. Garrison, v. p.; H. B. Windsor, sec.; S. W. Morrison, treas. Inc. June, 1906, in Nevada. **Cap.**, \$1,000,000; shares \$1 par, as a merger of the Garrison Gold & Copper Mining Co. and Monster Mining Co. **Property:** 26 claims, patented, on Dutch mountain, in the Clifton district, 40 miles from Wendover, on Western Pacific railroad. Branch line to property was to be completed, 1914. Mine has 3,500' of workings and is said to show considerable bodies of silver-lead ore.

GARSON MINE**ONTARIO**

Owned and operated by Mond Nickel Co., which see.

GEM CONSOLIDATED MINES CO.**COLORADO**

Letters neither answered nor returned from 341 Sixth Ave., Pittsburgh, Pa. **Mine office:** Idaho Springs, Clear Creek Co., Colo. Inc. Jan. 1, 1907, in Colorado. **Cap.**, \$5,000,000; shares \$1 par.

Property: 10 claims, patented, and a mill site, showing a vein traceable 3 miles, carrying sulphide ores said to assay 10 oz. silver and \$18 gold per ton, with a little copper. Mine has about 5 miles of workings. A 550-h. p. hydro-electric plant supplies 350-h. p. to the mine and 200-h. p. to the mill. There are 4 hoists, good for 3,000' depth, and an 18-drill Ingersoll-Rand air compressor. Buildings include a machine shop, carpenter shop, smithy, etc., and a 100-ton stamp mill. Several sets of lessees reported developing and producing at a profit in 1915.

GEMINI MINING CO.**UTAH**

Office: 723-4 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. E. W. Packard, pres.; Jackson H. McChrystal, v. p. and gen. mgr.; J. E. Berkley, sec.; E. O. Howard, treas., with W. Van Cott, directors. John H. McChrystal, supt. **Cap.**, 5,000 shares, \$100 par. Dividends to end of 1915, \$3,230,000, with \$5 a share paid Mch. 10, and June 10, 1916.

Property: the Gemini is a silver-lead mine with accessory copper ore, in shoots. There are 3 fissure veins, in an ore channel about 450'

wide, cut transversely by a number of cross-fissures, making a rather complex system of orebodies, the main fissure, of 15 to 20' width, having a S. E. dip, with ore shoots raking to the north. Ore in the upper workings averages about 12% lead and 40 oz. silver, while the bottom level, at 1,600' shows a 20' vein carrying argentiferous 3% copper ore. The mine has a 1,700' shaft, and a 300' winze, equipped with electric hoist. The adjoining Ridge & Valley mine is operated through the Gemini shaft. Company operating on 1600 and 1700' levels in 1916; plans drifting to open new ore system. Upper levels leased, over 100 men being employed.

Production in 1916 about 60 tons daily, partly by lessees, and estimated to average about \$30 per ton. Mine has been a regular producer since 1886.

GENERAL DEVELOPMENT CO.

Office: 61 Broadway, New York. **Officers:** Adolph Lewisohn, pres.; J. Parke Channing, v. p.-cons. engr.; Theo. L. Herrmann, sec.; Sam A. Lewisohn, treas.; preceding officers, Samuel Untermeyer, Herman Sielcken, D. M. Hyman, H. W. Davis, W. T. Rosen, A. S. Rossin, J. H. Susmann, E. H. Westlake, Arthur Lehman, B. Hochschild, F. W. Estabrook and S. S. Rosenstamm, directors.

Inc. 1906, in Delaware. **Cap.**, \$2,000,000, increased to \$2,500,000, in 1909 to \$2,600,000, and again increased, 1913, to \$3,000,000; shares \$25 par, nonassessable; 120,000 shares issued. Equitable Trust Co. of New York, registrar. Dividends paid 1908, 1½%; 90% in 1909, 15% in 1910; 1½% in 1913; 6% in 1915; 5% or \$1.25 in March, 1916, a total of 119%. Balance sheet of Oct. 31, 1915, shows a surplus of \$1,896,651.

Company is a securities holding corporation, which owns nearly one share of Miami stock for each issued share of its own, and also owns a large block of dividend paying Kerr Lake stock, and of New Cornelia Copper. It also controls, through stock ownership the Colorado Gold Dredging Co., San Cayetano Mines, Ltd., and Naumkeag Copper Co. The increase of capitalization; 1913, was to finance the merger of the Silver Mines Exploration Co., the corporation which developed and promoted the Kerr Lake and Wettlaufer-Lorraine companies of Cobalt, Ont. Company has extensive stock interests in New Planet Copper Co., Bagdad Copper Co., with other mining interests in the United States, Canada and Mexico.

The General Development Co. is a parent corporation, examining, developing and financing mining properties which, when they have reached the self-supporting producing age, are turned over to operating companies. It is a powerful factor in the copper industry, and with the wide experience and astute guidance of Mr. Adolph Lewisohn, combined with the technical skill and great ability of J. Parke Channing, its consulting engineer, promises to become increasingly important.

GENERAL EXPLORATION CO.

UTAH

Alfred Frank, gen. mgr., Newhouse Bldg., Salt Lake City, Utah. Clarence Bamberger, E. L. Newhouse, Jr., John MacGinniss, C. W. Saacke, directors. **Inc.** June 15, 1915, in Utah, to operate a lease on the mine and mill of the Ohio Copper Co., which see.

GENERAL MINING, MILLING & LEASING CO.

BRITISH COLUMBIA

Officers: W. H. Honefenger, pres., Hyde Bldg., Spokane, Wash. W. A. Kelly, sec.; Chas. V. Bobb, mgr., with W. T. McCurry, directors. Has a lease on the Lucky Strike and Wisconsin mines, on a tributary of Midge Creek, 7 miles W. of Kootenay landing, said to show a 30' ledge

in Nelson granite, traceable for 3,000'. Cuts and pits along ledge reported to show assays of \$25 to \$40 gold and 3 to 7 oz. silver per ton.

Development: 2 tunnels claimed to open up \$1,000,000 in ore which seems very high. Company said to plan driving a new tunnel at greater depth, to add machinery and an aerial tram. Ore will be shipped to Trail, B. C., or to Tacoma, Wash.

GENESSEE MINING CO.

ONTARIO

Cobalt, Ont. L. F. Steenman, mgr. Inc. in 1915. Cap., \$1,000,000. Has a 6 years' lease on the U. S. claim, north of the East claim of the Chambers-Ferland.

Property has been idle 6 years, but recent developments in the Chambers-Ferland have given hope to the Genesec management, which intends to sink 60' shaft to 300'. This shaft was sunk on a 4" vein of low-grade silver ore. Property is a prospect.

GENESSEE VALLEY COPPER CO.

CALIFORNIA

Genesee, Plumas Co., Cal. A. L. Beardsley, pres.; Henry Metz, v. p.; Mel. J. Smith, sec.-treas.; A. B. Clark and J. E. Baum, directors. Inc. Nov. 1, 1909, in Nevada. Cap., \$2,000,000; shares \$1 par, nonassessable; issued, \$1,000,000. Annual meeting, August 1. Properties have been transferred to Mel. J. Smith, trustee, to satisfy creditors' demands.

Property: 15 claims, unpatented, 300 acres, in 3 groups, and a 120-acre mill site, showing porphyry dike in meta-andesite, with bornite disseminated through the porphyry. Dike runs N. 20° W., dips 54° S. W. Orebody reported as 80 to 300' wide, 3,000' long and proven for 150' depth, assaying 3% copper, 2 oz. silver and \$0.50 gold per ton. Company reported, 1913, about 100,000 tons. No recent development except drilling to determine tonnage and value. Ore shows 90% recovery by Minerals Separation flotation process, concentrates carrying 35% copper, 10 oz. silver and 1 oz. gold per ton. Property considered promising. Idle and will probably remain so for some time.

GENESSEE VANDERBILT MINE

COLORADO

John F. Thompson, owner, Ironton, San Juan Co., Colo. **Property:** in the Red Mountain district, was formerly owned by the Red Mountain Mining Co., which was sold out for debt. Mine has a 3,000' tunnel cutting a vein carrying covellite, which was developed for stoping preparatory to shipments made Sept., 1913. Owner plans building mill and installing machinery, 1916.

GEORGETOWN TUNNEL & TRANSPORTATION CO. COLORADO

Offices: care T. D. Fuller, 608 Dearborn St., Chicago, Ill., and Georgetown, Colo. **Officers:** C. G. Breitenbach, pres. and treas.; Geo. W. Talmage, v. p.; Miss C. A. Bassey, sec., Jacob H. Robeson, cons. engr., Denver; J. J. Keating, local mgr.; with H. S. Parks, and Alex Williams, directors.

Inc. Dec., 1909, in Colo., as a reorganization of the Georgetown M. P. & T. T. Co. Cap., \$15,000,000; shares \$5 par; \$300,000 outstanding. Annual meeting in August at Denver.

The company is a transportation project, which will supply power and cheap transportation to mine owners in the district, similar to the Argo, or Newhouse, tunnel at Idaho Springs. The tunnel when completed will cut at depth the veins that traverse Columbian, Republican, and Democrat mountains at Georgetown; it is being driven by contract. Information not available as to present length of tunnel. In Oct., 1915, it was in about 800', had been idle for some time, but work was again in progress, Jan., 1916.

GERMAN-AMERICAN PIONEER CONSOLIDATED CO. ARIZONA

Kingman, Ariz. Claims and 10-stamp mill sold in 1915 to Jos. Winchester of Cripple Creek, Colo.

GERMAN COPPER CO.**ARIZONA**

Office: Chas. H. Trotter, sec., 10 No. New Jersey St., Indianapolis, Ind. Mine at Globe, Ariz. John H. Murdoch, pres.; Chas. H. Zollner, v. p.; John A. Hook, treas.; preceding officers, Wm. Elwarner, Jos. Lauler, David Fair, Wm. Burnett, John I. Carson and J. B. McMurray, directors. John H. Faught, supt.; P. H. Pernot, cons. engr. Inc. March 25, 1911, in Arizona. **Cap.**, \$3,000,000; shares \$5 par, fully paid; 142,373 issued; outstanding debt, \$75,000. Annual meeting, second Tuesday in October. Company is successor, 1911, of the Arizona-Colorado Belt & Gold Mining & Milling Co.

Property: 14 claims, 270 acres, held by location in the Globe district of Arizona. Ore occurs in a large fissure vein cutting through diabase, quartzite, and limestone, and as contact ores between diabase and sedimentary rocks. Vein strikes N. E.-S. W., dips 55°, is reported as 9' wide, proven to depth of 900', and said to carry 2% copper, 2 oz. silver and slight gold values per ton, principally as chalcopryite, on 800' and 900' levels. Ore developed above 800' estimated at \$125,000.

Development: by 863' shaft, several short shafts, and a total of 3,000' of underground work. The 800' level is said to block out 2,000 tons of ore with 18,000 tons of 2½% ore reasonably certain. **Equipment:** includes 100-h. p. steam hoist, Cameron pump and 7-drill air compressor. Arizona-Eastern railroad is 1 mile from property, which is well located and has merit. Assessment work only was done in 1915.

GERTIE MINING CO.**IDAHO**

Burke, Idaho. **Officers:** L. W. Hutton, pres.; M. J. Maher, v. p.; John Harvey, treas., with Mrs. J. H. Tarvers and A. A. Booth, directors. G. N. Crawford, sec. **Cap.**, \$150,000, increased in 1914 to \$250,000; shares 10 cts. par; unissued about 250,000 shares. Listed on Spokane Stock Exchange.

Property: 3 patented claims, 35 acres, adjoining Hecla on the S. E. and Maher Ahearn group on the W., near Burke. Also owns about 10 acres at mouth of crosscut tunnel. Company has been driving a long 6'x8' tunnel, now in over 4,100' with depth of 1,400', in the expectation of cutting a vein mined on the Hecla property. This vein is said to have shown 3 or 4" of clean galena, 300' from the Gertie lines and 250' farther back Hecla is said to have mined 3 to 5' of clean ore. A large vein was cut, Dec., 1915, but results to date have been very disappointing and in flow of water so heavy that the management decided to start work on a different fissure, March, 1916.

GETHIN LEROY UNITED MINES CO.**UTAH**

Office: 517 Atlas Blk., Salt Lake City, Utah. **Officers:** A. S. Fowler, pres. and treas.; E. P. Hapgood, 72 R St., Salt Lake City, v. p.; Jas. Mof-fat, sec., with Given Fowler and Lorin Pratt, directors. **Cap.**, \$1,000,000; shares \$1 par; 750,000 issued. Paid a dividend of 1c per share, Nov., 1913.

Property: in Silver Island district, Tooele Co., 15 miles north of Wendover, said to show silver-lead-copper ore. Company has made several shipments during the past few years. Property is being worked by lessees who are said to have shipped 500 sacks of ore in Jan., 1916.

GIANT-ECLIPSE CONSOLIDATED CO.**COLORADO**

Address: P. O. Box 488, Salida, Chaffee Co., Colo. Wm. Murray, pres.; Clyde H. Jay, v. p. and cons. engr.; F. L. Ream, sec. and gen. mgr.

Inc. Sept. 21, 1909, in Colorado. **Cap.**, \$800,000; shares \$10 par, fully paid, nonassessable; 67,800 issued. Annual meeting, third Friday in January.

Property: 11 claims, 101 acres, in Monarch district, Colo., showing contact deposits of lead-iron, copper, and zinc ores between granite, limestone and quartzite. Deposit runs N.-S. and dips at 45°. Orebody developed for 50 to 150' width, 1,400' length and 1,400' depth, claimed to carry 12 to 35% zinc, 3 to 25% lead, 1 to 3 oz. silver and 80 cts. to several dollars per ton in gold. Zinc occurs in ore and as clean zinc carbonate. Mine has tunnels aggregating several thousand feet. Company claims to have developed 10,000 tons low-grade zinc ore.

Equipment: includes electric hoist and compressor. Property credited with \$1,000,000 production since 1878. Shipments, resumed in 1915, were 200 tons in November-December, netting \$5 per ton. Incline shaft being sunk to water level, 1916.

GIANT LEDGE GOLD & COPPER CO.

CALIFORNIA

Office: 500 Frost Bldg., Los Angeles, Cal. **Mine office:** Barnwell, San Bernardino Co., Cal. L. M. Gregory, pres. and gen. mgr.; H. G. Stoddard, sec.; R. W. Kenny, treas.; Edward Brough, mine supt. **Inc.** July, 1901, in Arizona. **Cap.**, \$1,000,000, increased, 1910, to \$1,500,000; shares \$1 par. Company has kept out of debt.

Property: 30 claims, a 40-acre mill site and miscellaneous holdings, about 800 acres, in the New York district, 5 miles from Barnwell. Claims show 4 veins, of which 2 are under development, one a fissure in granite, the other a contact deposit between limestone and granite, with average width of 60', giving average assays of 5% copper, 5% lead, 10 oz. silver and \$4.50 gold per ton, from carbonate and oxide ores near surface and sulphides at depth. Mine has 1 shallow shaft and 2 tunnels, longest 992', with about 4,000' workings, developing a considerable amount of ore. Company experimenting with leaching and electric precipitation, having about 50,000 tons of oxidized ores available for this process, which is planned to yield electrolytic copper, with lead peroxide as a by-product.

GIANT LEDGE MINING CO.

IDAHO

Office: at Spokane, Wash. **Inc.** 1913, as reorganization of the Granite Allie Co. Chas. G. Taylor, mgr. **Property:** on Granite Gulch, 4 miles E. of Murray, Shoshone Co., Idaho, shows galena, containing gold-silver and copper values, in an E.W. vein said to be 7' wide.

Development: 176' double-compartment shaft; a drift 150' long in June, 1915, was said to be entirely in good grade of milling ore. **Equipment:** 7-drill compressor, hoist, pump, 1½ mile flume and water power.

GIBSON COPPER CO.

ARIZONA

Office: Globe, Gila Co., Ariz. Mine at Bellevue, Gila Co., Ariz. P. P. Greer, pres.; F. F. Towle, sec.-treas.; P. P. Greer, F. F. Towle and S. D. Gibson, directors. **Inc.** 1906, in Arizona. **Cap.**, \$2,500,000, shares \$25 par; non-assessable; issued \$2,000,000. Has authorized a \$500,000 issue of 6% bonds; issued, \$6,000. Total dividends to date, \$20,000. Annual meeting, first Wednesday in March. Property was under lease and option to the Summit Copper Co., Arizona, for 17 months, at \$442,375, but reverted to owners, Jan., 1912.

Property leased to Sultan and Wayne until Aug., 1913, and in Oct., 1913, was reported taken over by W. H. Mason, J. W. Sanders, J. H. Dieter and Richard Stevens, the last two named being attorneys, all of St. Louis, Mo.

Property: 15 adjoining claims, 7 patented and 8 in process, 300 acres, about 18 miles W. of Globe, with a good wagon road connection, includes the Summit, Pasquale, Reynolds and one additional group, of 4 claims each.

Worked in a very small way, by different owners, 1900-06, when taken over by the Gibson Copper Co., and thereafter worked continuously, until June, 1910.

Geology: country rock is Pinal schist and granite carrying 3 approximately parallel fissure veins, having a N.E. strike. The Summit and Pasquale are the principal veins, the former vein, of 4 to 7' width, traceable for the entire length of the property, a distance of $1\frac{1}{4}$ miles. The Summit and Pasquale veins are about 250' apart, the Intermediate vein about 75' E. of the Pasquale. Ore occurs in the Summit and Pasquale veins in well-defined shoots, pitching 40 to 65° S. the lenticular form of these shoots being in some cases due to strike faulting and movements. Ore is mainly massive chalcopyrite, with a little bornite. Gangue is quartz with some calcite and small quantities of specular hematite and gypsum. Two veins show high-grade ore and some low-grade ore has been developed in 5 veins. The McKinley vein, undeveloped, shows a strong outcrop.

The Gibson mine was opened by Messrs. Gibson and Henderson, with capitalization of \$90 cash and a team of horses, and not only paid its way but earned good profits from grassroots. **Development:** 3 shafts and 5 tunnels, 2 shafts and 4 tunnels being worked. The Pasquale tunnel, driven on the Pasquale vein, is about 200' below the collar of the incline shaft. The Reynolds tunnel is to intersect the vertical shaft at 1,800' from the portal, at depth of 500'; the Toombs tunnel, 100' vertically above and the Upper Toombs tunnel, 210' above the Reynolds, are drifts on the Summit vein. Working shaft is an incline, 600' deep, sunk on the Summit vein, with 6 levels which show that the Summit vein runs N. 21° E., dips 56° N.W., and carries a seam of high-grade ore, the main pay streak carrying 8 to 15" of chalcopyrite ore assaying 20 to 30% copper, throughout the various levels. The shaft has 5,915' of workings on the Summit vein, besides drifts on the Pasquale and Intermediate vein, reached by crosscuts on the 3rd and 4th levels.

Development by the Summit Copper Co. was by a vertical 3-compartment shaft, sunk to a depth of 244' by the Gibson Copper Co., and deepened by this company to 573', this depth corresponding with the 7th level of the old incline shaft. About 4,000' of new drifting and crosscutting, costing nearly \$142,000, was done. The vertical shaft cuts the Pasquale vein at 165', the Intermediate vein at 300' and the Summit vein at 500' depth.

The Pasquale vein differs from the Summit in that it cuts across the bedding of the schist, instead of following the bedding planes as does the Summit, having a strike of N. 20° E., with dip of 35 to 50°. Apparently the Pasquale vein is better defined, more continuous and stronger than the Summit, the fissure being of 5 to 10' width, carrying a pay streak, from a few inches to 3' in width, of ore assaying up to 33% copper. Ore occurs in the Pasquale vein in shoots pitching to the south, similar to the ore occurrence of the Summit.

The Intermediate vein, with drifts of 225' length on the 3rd and 4th levels, has a strike of 12° E., with dip of 52° N. W., and is only about 8" wide, with firm walls and, as developed, is not of great importance, but has possibilities. The ground is heavy and treacherous, requiring timbering for practically every foot of drifting and concrete posts were used. Messrs. Pritchett & Hamilton estimated the developed ore reserves, at the end of 1910, excluding all high-grade ore, and omitting probable ore between the 3rd and 4th levels on the Pasquale vein, as 33,011 tons of ore, averaging 4.36% copper, on the Summit vein; 17,062 tons of 3% copper ore in the Summit filling; 39,860 tons of 2% ore on the Summit dump and 8,578 tons of 6.51% copper ore developed in the Pasquale vein. The development by

the Summit Copper Co. proved disappointing; irregular occurrence and insufficient tonnage failing to offset the high-grade ore extracted. C. W. Pritchett, Denver, Colo., consulting engineer, advised the surrender of option after sampling and examining all workings.

Equipment: at the incline shaft includes two 250-h. p. boilers, a 14x16" hoist and a 6-drill Sullivan air compressor. The plant at the vertical shaft includes two 200-h. p. Stirling water-tube boilers, a 16x20" Hendrie & Bolt-hoff double-drum hoist, good for 1,000' depth and a 10-drill Sullivan cross-compound air compressor, with a 132' steel smokestack of 42" diameter. The vertical shaft has pumps with capacity of 500,000 gals. daily.

The gross value of ore produced by the Gibson Copper Co., 1906-09, has been estimated at \$1,250,000. It was shipped to the Old Dominion smelter, a distance of about 18 miles, by 10-horse teams, and required careful selection, owing to the extremely high cost of transportation, returning better than 20% copper. **Production:** 1,106,100 lbs. fine copper in 1906; 3,340,777 lbs. in 1907; 1,270,211 lbs. copper and 2,000 oz. silver in 1908; 667,405 lbs. copper in 1909, and 600,000 lbs. in 1912. Shipments in 1913 claimed to have averaged 20% copper. Company plans building a 50-ton mill.

GILA CANON COPPER CO.

ARIZONA

H. Stuart Hotchkiss, pres., 214 East St., New Haven, Conn. Mine address: Ray, Pinal Co., Ariz. Milton J. Warner, sec.-treas.; preceding officers, Geo. B. Chittenden and Erroll M. Augur, directors. **Inc.** 1907, in Arizona. **Cap.**, \$1,000,000, shares \$5 par. Is operated as a close corporation. **Property:** 16 claims, 320 acres, known as the Schneider group, in the Banner or Troy district, Gila county, 4 miles from the Southern Pacific railway. **Development:** by Geo. Chittenden, progressing since Sept., 1912, and according to the company, sufficient ore is being shipped to the smelter at Hayden, to pay for development work.

GILA COPPER SULPHIDE CO.

ARIZONA

Office: Room 514, 49 Wall St., New York. S. H. Sherman, supt. Christmas, via Winkelman, Ariz. **Officers:** B. P. Cheney, pres.; F. M. Murphy, v.-p.-gen. mgr.; G. D. Morris, sec.-treas.; L. B. Mulhearn, assist. sec.-treas.; preceding officers, H. J. Meany, F. P. Cruice, F. L. Stoessel, R. E. Sloan, W. G. Bushnell, directors. Company is controlled by B. P. Cheney and F. M. Murphy. **Inc.** 1909, in Arizona, by the Development Co. of America, which bought the property from the Saddle Mountain Mining Co. **Cap.**, \$2,500,000; shares \$10 par, non-assessable. Has authorized and issued \$1,000,000 first mortgage 5-year 6% bonds, convertible into stock at par, at option of bondholder.

New company spent over \$350,000 in developing a large and valuable property at Christmas, which is now being equipped and operated by the American Smelting & Refining Co., under title Southern Arizona Mining & Smelting Co. Property is not under lease and bond, but merely operated under a smelting contract. Mines still belong to the Gila Co. which can resume direct management whenever able to meet certain conditions.

Property: 2 groups, comprising 60 claims, 1,200 acres, 50 patented, and 640 acres coal land. Holdings include Christmas mine and claims in Banner district, Gila county, and coal, gold and copper claims in the Saddle Mountain district, Pinal county, all within a radius of 6 miles.

The Saddle Mountain group of gold and silver claims, patented, 265 acres, with 3,450' of workings, shows base dry ore, with a little lead and zinc and traces of copper, an average of 300 assays showing \$13 per ton in gold and silver values.

There are also 640 acres of patented coal lands, in the lower basin of creek, showing a 3' vein of dirty bituminous coal, developed by a

175' incline shaft and 800' of workings, equipped with a small steam hoist and pump. There is a bee-hive coke oven for testing the coal.

The Christmas mine is at the junction of Christmas canyon with the Gila river, on the north side of the stream, 8 miles from Winkelman. The mine was opened, 1883, but closed, 1884, because found to be located on the San Carlos Indian Reservation, and remained idle until the lands were restored to the public domain, by executive order of the president, Dec. 2, 1902. **Geology:** property shows heavily bedded white and gray Carboniferous limestone, in various stages of alteration, near a granite porphyry contact. Ore occurs mainly as replacements in limestone, with garnetiferous gangue, carrying sulphides, mainly chalcopyrite, but with bornite and some copper glance. The contact zone has shown copper ore wherever opened and the porphyry also carries copper ore. Four main orebodies are under development, ranging from 4 to 60' in width. Orebody contains nuclear blocks of undigested limestone, surrounded by ore, hence it is difficult to measure tonnage developed. Ore mined gave average assays of about 3% copper and 30 to 40 cts. per ton in combined gold and silver values.

Development: at Christmas is by 4 shafts, all showing oxidized and sulphide ores. The mine has open cast workings of 30,000 sq. ft. area, showing carbonate ores. Much new and important work and equipment is being added. In 1915 the improvements on the property were about completed, including the construction of an aerial tram, connecting the mines with the Arizona Eastern Railroad, and production began early in 1916. The company entered into a contract with the American Smelting & Refining Co., whereby they have control of the mines for a given period, and the ores will be smelted at the Hayden plant.

GILA MONSTER COPPER CO.

ARIZONA

Probably dead. Owned the Confidence mine, near Kelvin, Ariz.

GILA MOUNTAIN COPPER CO.

ARIZONA

Idle since 1909 and probably dead. Property has had a checkered career; it was first the basis of a swindling promotion that landed the promoters in jail; then worked as a real mine by John Weber, who made money until the panic of 1907. Present company out of funds and property liable for watchman's wages, etc., at last accounts. See Vol. XI, Copper Handbook, for description of holdings.

GILES MINING & MILLING CO.

UTAH

Property reported sold to Samuel Perry, B. T. Critchlow, L. L. Bagley, and Geo. Webb in July, 1915, for \$600,000, or at the rate of 40c per share, with payment to be completed within 2 years. H. L. Giles, gen. mgr. **Property:** 31 patented claims, 560 acres, in Big Cottonwood canyon, near Bingham, located 20 years ago by H. L. Giles.

Ore: said to occur in veins from 4-6' wide, containing gold-copper-silver and lead, said to run 80c gold, 15 oz. silver and 16% copper. Main vein outcrops for 10,500'. **Development:** 1,200' main tunnel, several shafts and drifts. At last accounts new owners expected to start extensive development work.

GILMORE MINING CO.

IDAHO

Offices: 222 Kearns Bldg., Salt Lake City, Utah and Gilmore, Lemhi Co., Idaho. **Officers:** Edgar C. Ross, pres. and gen. mgr.; Frank Hahne, v.-p.; Harry R. Hyde, treas.; Clarence Warnock, asst. sec., with E. B. Critchlow, directors. **Inc.** Feb. 10, 1912 in Utah. **Cap.,** \$1,000,000; shares \$1 par, assessable; outstanding \$800,000. Bonds authorized, \$100,000; none issued. Company is a close corporation. Annual meeting, Jan. 2. All receipts from ore sales spent in development work.

Property: 12 patented claims, 250 acres, in the Texas mining district,

at Gilmore, was purchased from the Allie Mng. Co., Ltd. **Ore:** gold-silver in fissure veins in limestone, said to have an average value of \$14.50 per ton. Veins strike N. 10° E. and dip 60°. **Development:** by a 60° incline shaft and tunnels, greatest depth of workings on the vein is 850'. Total underground workings, 4,650'. This company in conjunction with the Pittsburgh-Idaho and Allie Mining companies has run a 4,500' development and transportation tunnel into Gilmore Mountain, which is said to cut a number of lead-silver fissures and one important gold vein.

In Jan., 1915, the following statement was compiled from smelter returns: dry tons, 8,460; average assay per ton, \$11.63 gold; \$0.14 silver; iron bonus, \$1.65; total, \$13.43. Gross cash receipts were \$114,539; freight, \$44,616, leaving net cash receipts of \$69,923.

Company intends developing the lead veins on the property in 1916. See U. S. G. S. Bull., 528, p. 107.

GILPADO MINING CO.

COLORADO

Office: 512 Equitable Bldg., Denver, Colo. Forbes Rickard, pres.; W. C. Wright, sec.-treas. Harry T. Willis, supt., Central City, Gilpin Co., Colo. **Property:** the Chase mine, said to show a vein of gold-silver bearing copper ore developed by 500' shaft. Equipment includes steam power. Idle.

GILPIN-EUREKA MINING CO.

COLORADO

S. S. Clark, sec.-treas., Denver, Colo. John C. Jenkins, supt., Idaho Springs, Colo. **Property:** Eureka mine, near Central City, Gilpin Co., Colo., shows gold-silver-lead-zinc ore in veins, developed by Newhouse tunnel and shaft. **Equipment:** 10-stamp mill, concentrating plant, compressor and electric power.

Returns from 2 car lots of concentrates shipped in Jan., 1916, gave 1.28 oz. gold, 5.45 oz. silver and 12% lead per ton.

GILPIN ORION GOLD MINING CO.

COLORADO

Office: Suite 22, Moffatt & Kassler Block, Denver, Colo. Wm. A. Miller, v.-p. and gen. mgr.; A. C. Ogle, Jr., sec.; Jas. A. Jones, director. **Inc. Sept., 1910, in Ariz. Cap., \$2,500,000, shares \$1 par. Property:** 4 claims, patented on Gregory and Bobtail Hills, Gilpin Co., Colo., worked by lessees since 1914 and reported producing about \$300 worth of ore per month. **Development:** 340' shaft and E. and W. drifts. Shipments returned from 1-3 oz. gold, 3-8 oz. silver, and 1-6% copper, netting better than \$20 per ton. Management plans raising funds for systematic development on company account. A small and not particularly attractive property.

GILT EDGE MINES CO.

ARIZONA

Oatman, Ariz. **Officers:** E. A. Burns, pres.; E. A. Shaw, v.-p.; S. W. Klass, sec.-treas., Kingman, Ariz. **Inc. in Ariz. Cap., \$150,000; shares 10c par; 800,000 in treasury. Listed on San Francisco and Los Angeles Exchanges.**

Property: 95 acres, 2 miles S.W. of Oatman, adjoining the old Vivian mine, said to show 4 parallel veins varying from 4' to 60' in width. **Development:** 4 tunnels, one claimed to have opened a vein for 50' with gold values from \$5 to \$12 per ton. Company is sinking a shaft, 250' deep, April 25, 1916, at which depth altered andesite was found, said to show quartz and spar and to contain fair values. Crosscutting is being done on the 100' and 200' levels. Company employs 20 men. **Equipment:** includes 25-h. p. Fairbanks Morse hoist and a 52-h. p. air compressor. Plans sinking 600'.

GILT EDGE MINES & SMELTING CO.

COLORADO

Office: 402 First National Bank Bldg., Denver, Colo. **Officers:** Henry I. Seemann, pres.-gen. mgr., P. O. Box 1374, Denver, Colo.; Wm. H. Warrinner, v. p.; A. W. Craig, sec.-treas., with E. M. Kirton, directors. **Inc. July 24, 1913, in Colorado. Cap., \$1,500,000, to be increased later to \$2,500,000;**

shares \$1 par; outstanding Dec. 20, 1915, 1,002,750 shares. Annual meeting fourth Thursday in July.

Property: 46 claims, about 300 acres, partly patented, in Lincoln mining district, Clear Creek Co., Colo. **Ore:** gold-silver-copper in fissure veins in schist and porphyry, said to assay from \$9 to \$200 per ton. The Gilt Edge mine is said to have produced some rich gold ore.

Development: the Aurora tunnel is being driven to develop the property at a depth of 1,000'; in Dec., 1915, this tunnel was in 400'. Total underground workings, 2,000'. **Equipment:** includes a 20-stamp mill and electric power.

Output in 1915, which was small, said to assay \$18 per ton. Company plans adding an air compressor to equipment this year.

GILT EDGE MINING CO.

MISSOURI

Company held lease on ore lands, 2 miles E. of Tipton Ford, near Joplin, Mo. Lease was transferred, June, 1916, to Wade Mining Co., which see.

GINZA COPPER CO.

UTAH

Mine near Kelton, Box Elder Co., Utah. Operations stopped in 1915 after considerable prospecting had failed to locate ore of commercial grade. Described Vol XI, Copper Handbook.

GIRARD COPPER CO.

MONTANA

George J. Kirby, pres., Willimantic, Conn.; Geo. R. Grantham, sec., Kimball Bldg., Boston, Mass., E. C. Denton, supt., Warm Springs, Mont. Inc. 1912 in So. Dakota. **Cap.**, \$10,000,000; shares \$10 par; 601,120 issued; 501,000 shares pooled. Admitted to quotation on Boston curb, for 91,020 shares, Jan., 1913. Annual meeting in Jan. First Nat'l. Bank, Boston, registrar; Ex. Trust Co., Boston, transfer agents.

Property: 20 claims, partly patented, 400 acres, 5 miles from Warm Springs and 10 miles N.W. of Butte. Ore occurs as a sulphide in 5' fissure-quartz vein, between monzonite and aplite, assaying 4-8% copper, 6 oz. silver and 2 oz. gold. **Development:** by 60' Jack Pot shaft and 150' tunnel. Assessment work only done in 1915.

GIRARD DEVELOPMENT CO.

Garrit B. Kip, Girard C. Herrick and E. Hicks Herrick, 7 Wall St., New York, chief stockholders. Company is a New York corporation interested in several mining properties in the United States.

GIROUX CONSOLIDATED MINES CO.

NEVADA & MEXICO

(Subsidiary of Consolidated Coppermines.) **Office:** 1400 Alworth Bldg., Duluth, Minn. **Mine office:** Kimberly, White Pine Co., Nev., and Carbo, Ures, Sonora, Mexico. **Officers:** Thos. F. Cole, pres.; Henry B. Paull, v.-p.; John Uno Sebenius, v.-p.; Jos. B. Cotton, gen. counsel; Thos. B. Adams, treas.; preceding officers, J. H. McLean, Geo. G. Barnum, J. W. Neukon, C. d'Autremont, Jr., G. A. Tomlinson, directors; Frederic R. Kennedy, sec.; E. F. Gray, gen. mgr. in Nevada; S. L. Heslett, supt. Mexican mines.

Inc. April 14, 1903, in Delaware. **Cap.**, \$7,500,000, shares \$5 par, was originally \$5,000,000, increased 1908, to \$6,500,000 and again increased, 1909, to present amount; issued, \$7,207,100, with \$496,400 in the treasury for the conversion and retirement of convertible bonds. Bonds outstanding, \$496,400 firsts at 6%. American Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, first Tuesday in June.

Income for first quarter of 1916 was \$101,961 from 18,537 tons of ore, netting a profit of \$49,026, on which the bullion tax was \$613.

The Giroux is now controlled absolutely by the Consolidated Coppermines Co., through exchange of Giroux stock for that of the new company.

on a basis of 10 shares for 1, amounting to 90% of the stock issue of the new company. A proposed \$3,000,000 bond issue by the new company will furnish ample working funds.

Property: the Nevada mineral lands, originally 52 claims, patented, 1,050 acres, were largely increased, 1909-10, by the acquisition of the Giroux-Ely Extension Copper Co. holdings, 130 acres, south of the Giroux Consolidated and east of the Ely-Central; the Rickard-Ely Copper Co. holdings, 5 claims, adjoining the Veteran-Ely on the west; the Military group of 4 claims, adjoining the Giroux, and various other adjoining properties, for which \$226,551.40 was expended in 1909. The main holdings constitute a tract about $2\frac{1}{2}$ miles in length, and one-half to one mile in width, lying immediately west of the Nevada Consolidated. The company also owns 1,800 acres of miscellaneous lands, including the town site of Kimberley, 7 miles west of Ely, and valuable water rights in the Steptoe valley.

The Giroux controls the lands of the Butte & Ely Copper Co. through ownership of 239,175 shares, bought at \$1 per share.

The Giroux property covers a total area of 2,000 acres, with extreme length E. and W. of 15,000' and a maximum width of 4,000'. It covers an intrusive body of monzonite porphyry and is part of the long mass running through the district, on which the steam-shovel pit of the Nevada Consolidated Co. is working. This porphyry is exposed over a large part of the company holdings, the rest being limestone whose beds dip away from the porphyry. The contacts are silicified with very extensive areas of quartz, stained by iron and copper.

Ore: deposits include porphyry, or disseminated ore, similar to that of the Nevada Consolidated Co., and secondly the contact orebodies beneath the outcrop just mentioned. The porphyry orebodies have been developed by churn drill holes in the customary 200' blocks and by underground workings. It is found that the orebodies, together with blocks of barren rhyolite, are faulted and are not continuous throughout the property. These orebodies cannot be worked by steam shovel but are being mined by caving methods. They are mined through 3 shafts, the main ore supply coming from the 205' Morris shaft, now yielding 1,000 to 1,200 tons a day, of 2.24% ore. The Bunker Hill shaft is connected with the above, the main level being 165' beneath the surface. The Brooks incline shaft is used as a stair-way for the men and for lowering timber and supplies.

The porphyritic ore is comparatively friable, and readily amenable to concentration, though necessarily somewhat given to sliming. The southern monzonite orebody is about 400' wide, with a proven length of about 2,000' and is 100 to 175' thick. Another monzonite orebody extends along Old Glory hill from the western end of the property, in a course between the Alpha and Giroux shafts. The porphyry orebodies have been tested by 6 Keystone churn drills, and these drills have done considerable work also on the Butte & Ely ground. A large number of holes have been bored, mainly to the depth of about 500', with 1 hole of 1,035' put down, 1909. The lands are so extensive that a comparatively small part of the property has been thoroughly drilled.

Development: was continued until Aug. 1, 1914. In 1913 40 holes were drilled, totaling 14,334', at a total cost of \$2.477 per foot; 2,875' of underground work was performed through the Minnesota shaft, Old Coppermines, at a cost of \$8.197 per foot. This development work applies to the property of the Consolidated Coppermines Co., and not to that of the Giroux Cons. alone.

The Alpha mine is an independent orebody, having a zone, or lode, several hundred feet wide of mineralized, silicified limestone along the

porphyry contact. This deposit is thoroughly leached from the surface downward almost to the water level 1,000' below. The orebody so far developed is 400' wide on the 1,000' and 1,200' levels, and is several hundred feet long. It has not been found on the 700' level, though that drift shows the formation to be 360' wide by 520' long. The mine has 2 shafts, the Alpha 1,200' deep, and the Giroux 1,450' deep.

The 1,200' three-compartment Alpha shaft formerly was the principal working under the old management, but caved, Jan., 1908, rendering the sinking of a new main shaft necessary. The Alpha is about 800' from the Cumberland-Ely mine, and is connected with the Giroux shaft on the 770' and 1,200' levels. The Alpha is now only used as an air-shaft, and an extra exit from the mine.

The 1,450' vertical Giroux shaft, 700' west of the Alpha, is 12x19' 4" in the clear, with 5 compartments. Timbers are unusually heavy, being 12x14", with wall plates 20' long, and 12x12" and 14x14" end plates. The shaft was sunk through solid limestone, at the rate of 120' per month, a record for Nevada shaft work, almost exclusively by raising, at an average cost of \$71.25 per ft. The Giroux shaft made very little water while in the limestone, but became wetter when bottomed, and is equipped with unusual pumping facilities, having 2 pumps of 600 gals., and 1 of 1,200 gals. capacity per minute. The main pumping station is on the 1,200' level. The 1,200-gal. Prescott cross-compound condensing pump is one of the largest underground engines ever built, and has a 7-ton fly wheel, with a 16" discharge pipe.

Equipment: at the Giroux shaft, includes a 26x48" Allis-Chalmers duplex-cylinder hoist, capable of handling 5-ton skips in counter balance to depth of 2,000', at a hoisting speed of 1,500' per minute; also a 20x48" Allis-Chalmers hoist for the cage. Part of this equipment was moved to Morris No. 2 shaft in 1912.

A 3-mile private railway, connecting the principal shafts with the Nevada Northern line, has grades averaging about 1.5%. Equipment includes a Porter engine, of 600 tons tractive power, and 75 Ingoldsby ore cars.

The company owns the water right to Steptoe creek, 9 miles from the mine and 967' lower.

Ore reserves: the Bunker Hill-Morris mine contained 7,000,000 tons of 2% ore, according to the rigid estimate made by Henry Krumb, 1913, for the Consolidated Coppermines Co. Reliable estimates, with allowance for probabilities made by Giroux engineers and published in the company's report for 1915, give 16,952,989 tons of fully developed ore, average grade 1.19%, and 7,437,108 tons of partially developed ore, average grade 1.01%, for the Giroux property as a whole, considerable churn drilling and underground development work having been done in the interim, and for Old Coppermines the tonnage of partially developed ore is given as 1,011,304 tons, average grade 1.02%.

The Sultana mine, the Mexican property, 9 claims, includes the San José mine, about 1 mile W. of Copete, in the Sierra de Oro, 25 miles E. of Carbo and about 35 miles from Hermosillo. Property shows a contact vein of 50 to 100' width, between limestone and porphyry, opened by 3 shafts, No. 2, the main working shaft, sunk on an incline, 1,200' deep. The San José mine shows, in the bottom level, a vein of about 40' width, carrying oxidized ores to shallow depth, succeeded by sulphides. The Mexican property as a whole shows low-grade copper ore with fair gold value. The shipments of Sultana ore to El Paso smelter have returned combined gold and silver values ranging from 92 cts. to \$734.36 per ton.

The Sultana mill is said to be an utter failure. The smelter, purchased after the failure of the mill, remains at the railway station, because a competent metallurgist reported that the ore could not be profitably smelted. The mine produced about \$250,000 from enriched oxidized ores which gave out and exploration and development costing about \$500,000 to the end of 1907 developed only low-grade ore which the critics say is neither millable, smeltable nor profitable. The mine has been inactive since 1907 but maintenance expenses during these years of idleness have been quite heavy.

The Giroux has been a disappointment to its stockholders from the beginning, the many promises made by the old management were never kept and the optimistic press reports of later years have not been sustained by results. Company is now practically merged with the Consolidated Coppermines Co. by the exchange of over 90% of its stock, and it is believed to be a good thing for the stockholders, as by an amalgamation of properties the mines may be worked on a large scale and thereby made profitable. Experience has shown that low-grade ores of this character can only be profitably worked on a scale of at least 1,000 tons a day and this the new company will be able to do. Excessive freight rates on the railroad and smelter charges at Steptoe prohibit local treatment by another company and developed tonnage of Giroux alone would not warrant independent reduction plants. For production, see Cons. Coppermines Co.

GLACIER PEAK MINING & SMELTING CO. WASHINGTON

Office: Roslyn, Kittitas Co., Wash. Mine in Snohomish Co., Wash. Wm. Adam, pres.; Jas. Wright, v.-p.-sec. Christopher Menseghel, treas. Property: near Glacier peak shows fissure veins carrying copper ore. Developed by tunnel. Employs about 15 men when operating.

GLADSTONE MINE. CALIFORNIA

Owned and operated by Hazel Mining Co., which see.

GLASGOW & WESTERN EXPLORATION CO., LTD. NEVADA

Office: 33 Renfield St., Glasgow, Scotland. Sec. and office: H. O. Jackson, 317 McCornick Bldg., Salt Lake City, Utah. Mine office: Golconda, Humboldt Co., Nev. See Vol. XI, Copper Handbook, for details of organization, capitalization, directors, property, etc.

A large sum of money, approximating \$5,000,000, was spent on these properties in the last 15 years and on April 1, 1913, debts against the company amounted to over \$95,000. The English managers sent a representative to settle up the claims and to avoid bankruptcy compromised with the creditors for 40 cts. on the dollar. The money spent was used for the erection of smelters, concentrators and leaching plants, when underground development had not yet shown sufficient ore reserves to supply the reduction plant. The 2 Nevada properties and a small railway in that state, together with the Montreal mine in Utah, were attached as the result of a suit for \$2,250,000 brought by Peter Coats, of the J. & P. Coats Thread Co. of Scotland, for money advanced to the company.

A reorganization of the company was effected and mining operations resumed in the Fall of 1913, but the death of Mr. Coats, the guiding financial interest, in Sept., 1913, put an end to all work. In Dec., 1915, all interests connected with the company were being liquidated.

The Montreal, Copper Basin and Copper Canyon properties all possess sufficient merit to justify extensive development.

GLEN LAKE COBALT MINES, LTD. ONTARIO

Inc. July 9, 1914 in Ont. Has a lease on the Foster mine of the Foster Cobalt Mng. Co., Ltd., about 40 acres on and under Glen Lake, Ont. An oreshoot, small but high-grade, was found on the 50' level in March, 1916. A long crosscut has been run from the old Foster shaft out under Glen

Lake to within 40' of the Bailey line. The management expects to run another crosscut parallel to the Bailey line with the hope of finding extension of the Bailey veins.

Company is operating on a royalty basis of 15% for 200 oz. ore and under, and 25% for higher grade ore.

GLENWOOD MINING CO.

UTAH

Office: 1102 West Seventh South St., Salt Lake City, Utah. **Officers:** Abel Grovenor, pres.; E. P. Mowers, v.-p. and gen. mgr.; M. L. Grovenor, sec.-treas. **Inc.** Feb. 21, 1901, in Utah. **Cap.**, \$30,000, shares 10 cts. par, assessable; increased 1912, to \$125,000, shares 25 cts. par. **Property:** 8 claims, patented, in Big Cottonwood district, 6 miles from a railroad, opened by shafts and tunnels, with about 1,600' of workings.

GLOBE CONSOLIDATED LEASE, INC.

CALIFORNIA

Inc. 1916. **Cap.**, \$100,000. Practically all of stock is held by Crown Reserve Mining Co., Ltd., of Ontario, which see for terms of lease. **Property:** the Bailey, Chloride and Globe groups, 200 acres, at an elevation of 6,100', in Canyon Creek mining district, 4 miles north of Dedrick, in Trinity Reserve, Trinity county. Claims, said to have 4 veins in hornblende schist, of which the Globe and Bailey are the main veins. The Globe is 6' wide with a known oreshoot of 1,500' length; the Bailey can be seen 500' below this. Ore is free milling, assaying \$9 per ton.

Development: to date, by 6 tunnels, from 250' to 1,700' long, greatest depth on vein 620' with several thousand feet of underground workings. A large body of fair grade ore is said to be blocked out. The mine is 27 miles from a railroad; transportation is by auto.

Equipment: includes a 5,600' gravity tram from mine to mill, compressor, electrical plant, sawmill and dwellings. There is a 20-stamp mill and 125-ton cyanide plant. Water power is obtained from Canyon Creek. Plant is said to have cost over \$300,000.

Production: said to have produced \$750,000 in gold under previous owners, who had insufficient ore blocked out to operate at a profit. See U. S. G. S. Bull. 540, pp. 76-78; Mines & Min. Res. Trinity Co., State Mineralogist's Report, 1915, pp. 145-7.

GLOBE & LOST GULCH SILVER-COPPER MINES CO.

ARIZONA

Office: 423 McPhee Bldg., Denver, Colo. Mine in Lost Gulch, Gila Co., Ariz. Mary E. Brooke, pres. and gen. mgr.; V. G. Hills, v. p.; H. A. Wimbush, sec. **Inc.** April 1, 1907, in Arizona. **Cap.**, \$1,000,000; shares \$1 par, nonassessable. **Property:** 10 claims, patented, 180 acres, and other locations; also a mill site at the head of Lost gulch, 1½ miles N. of Inspiration and Miami, Ariz., showing quartzite, granite and limestone, cut by porphyritic dikes.

Development shows lead ore in diabase, silver-chloride ore in granite and limestone and copper silicate ore in dacite.

GLOBE MINING CO.

ARIZONA

Globe, Gila Co., Ariz. **Officers:** Hon. J. F. Hechtman, pres. and gen. mgr.; M. A. Patterson, v. p.; Walter M. DeKalb, sec.; Geo. L. Beach, treas.; preceding officers, F. B. Walker, L. E. West and R. A. Jamison, directors. **Inc.** Feb. 19, 1903, in Arizona. **Cap.**, \$2,500,000; shares \$1 par. Property leased to Mineral Farms Co., 1912. Both companies idle.

Property: 21 claims, patented, 335 acres, 2½ miles north of Globe, shows granite-porphry, syenite, quartzite and diorite, carrying fissure veins in diorite of 2 to 100' width, with gossans giving assays of 2 to 6% copper, 4 to 30 oz. silver and \$2 to \$28 gold per ton. The Mineral Farm group of 21 claims, 3 fractional, includes the Vacey-Constance mine, worked 1886 for silver, and said to have produced upwards of \$100,000 worth of ore

under former ownership, this group having upwards of 20 old pits and shafts, of 10 to 165' depth. The Mineral Farm group shows altered sedimentary and igneous rocks, with iron dikes and a complex fissure system. The Mineral Farm vein, of about 4' width, gives assays of 4.8% copper and up to 132 oz. silver and \$7.44 gold per ton, and the group also shows a 20' vein, said to sample 22% copper, 9% zinc, 2 oz. silver and \$4.96 gold per ton, which seems excessive. The Eagle Pass group has a 215' two-compartment shaft, between 2 iron outcrops.

Equipment: includes a 60-h. p. boiler, 8x10" hoist and air compressor. There are 6 mine buildings.

GLOBE MINING CO.

MICHIGAN

Office: 15 William St., New York. R. D. Rickard, pres.; J. R. Stanton, sec.-treas.; preceding officers, Frank McM. Stanton and W. H. Leggett, directors. **Inc. May, 1911, in Michigan. Cap., \$78,250; shares \$25 par; fully paid and fully issued.**

Property: 3,200 acres, Secs. 1, 2, 3, 4 and 5, T. 53 N., R. 35 W., extending entirely across the Keweenaw trap formation, from the eastern to the western sandstone, lies next south of the Champion, and immediately north of the Challenge, carrying about 6,000' of the strike of the Baltic and all parallel beds. Mine was developed by the Copper Range Consolidated Co., under option, but option was relinquished, Feb. 1, 1909, after expenditure of upwards of \$500,000.

Development: diamond-drill borings, to locate the Baltic bed, gave some cores with excellent values, but disclosed a heavy overburden of sand and boulders, rendering it necessary to reach the solid rock by a vertical shaft. Work was begun early 1905, but the first shaft was abandoned, owing to quicksand, and was replaced by a new vertical shaft, about 700' south of the Champion boundary. The shaft is telescopic, inside measurements of timbers at the collar being 13' 3"x23' 3", with a second section below of 9x19' 6", and a third section of still smaller size.

The shaft is 1,040' deep, with first level 356' below surface, and flats were cut thereafter at 100' intervals. The Baltic amygdaloidal bed was tested by some diamond-drill boring, and about 900' of drifting on the seventh level, which is about 1,000' from surface, and showed a little copper, in patches, but on the whole was unpayable, and work was suspended Jan. 31, 1909, and property has been idle since. Notwithstanding the unfavorable results secured by the work done so far, the property is by no means devoid of promise.

GLOBE SMELTING & REFINING CO.

COLORADO

Denver, Colo. Controlled by American Smelting & Refining Co., and described thereunder.

GODIVA MINING CO.

UTAH

Office: Kearns Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab Co., Utah. **Officers:** Edw. Packard, v. p. and gen. mgr.; J. E. Berkley, sec.; L. S. Hills, treas.; Jackson H. McChrystal, supt.; preceding officers and W. Van Cott, directors. **Cap. increased, 1908, from \$100,000 to \$1,000,000; shares \$1 par. Company related to the Gemini Mining Co., and is operated as a close corporation. Has paid dividends, but figures are not made public. Listed on Salt Lake Exchange.**

The mine is one of the pioneers of the Tintic district and was once a notable producer. Owns 9 claims, 8 patented, carrying gold-silver bearing copper and lead ores. Has a shaft 1,200' deep, 1,000' tunnel and several thousand feet of crosscuts and drifts. Surface equipment includes engine, hoist, air compressor and 100-ton concentrating mill.

Production: from 1898 to 1915, 16,930.57 dry tons. Mine under 2-year

lease to Fairhairn Leasing Co. Reported developing on 1,200' level and employing 12 men. Said to have 25,000 tons ore in sight.

GOLCONDA CONSOLIDATED.**ARIZONA**

A. W. Clapp, mgr., Golconda, Ariz. Inc. Dec., 1915, in Ariz. Cap., \$1,250,000; \$1 par. Has a lease and bond on the Fredonia and Fredonia No. 2 lode claims, owned by the Ryan Cattle Co., and situated N. of Kingman, in the Wallapai mining district. Company is promoted by a Mr. Wills and well advertised as a neighbor of Mr. Amster's Golconda mine.

GOLCONDA EXTENSION MINING CO.**ARIZONA**

O. A. Turner, mgr., Kingman, Ariz., and Golconda, Ariz. Inc. Dec., 1915, in Ariz. Cap., \$1,500,000; shares \$1 par. Property: adjoins the Golconda mine on the N., 16 miles N. of Kingman; 5 claims in one group, 2 in another and a bond and lease on the Golden Gem mine, 6 patented claims, 1½ miles from the Golconda.

Development: by 400' shaft, with a 300' drift on 280' level, said to expose a 4' vein, carrying some \$50 ore with values in gold, silver and zinc, and drift N. on 400' level. Production: \$300,000 in former years.

GOLCONDA LEDGE CO.**ARIZONA**

M. R. Tomlinson, mgr., Golconda, Ariz. Company owns the Kramer gold mine and a 10-stamp mill, remodeled to 30 stamps.

GOLCONDA ZINC MINE.**ARIZONA**

See Union Basin Mining Co.

GOLD BAR MINING CO.**ARIZONA**

J. A. Twitchell, pres., Phoenix, Ariz. F. X. O'Brien, mgr., Wickenburg, Ariz. Property: the mine and mill of the Interior Mining & Trust Co., 14 miles N. E. of Wickenburg, shows gold quartz ore developed by a 330' shaft, with level at 330'. Mill has Nissen stamp and a capacity of 90 tons per day.

GOLD BOND CONSOLIDATED MINES CO.**COLORADO**

Offices: 415 Kittredge Bldg., Denver and Cripple Creek, Teller Co., Colo. Officers: G. A. Hummer, pres.; S. R. Herber, v. p.; C. R. Slusser, sec.-treas.; with I. W. Herber and F. H. Beers, directors. Inc. 1900 in Colorado. Cap., \$1,350,000; shares \$1 par; outstanding 1,350,000 shares. In treasury Jan. 1, 1916, \$54.12. One-half 1913 taxes unpaid. Gross production to 1916 said to be \$100,000. Company office transfers stock. Exchange Guaranty & Registry Co., Colorado Springs, registrar. Listed on Colorado Springs Exchange.

Property: 4 patented claims, 18 acres, on S. W. slope of Gold Hill, Cripple Creek. Ore: gold in fissure veins in granite, said to average \$5 to \$32.50 per ton with 1915 shipments of \$12 ore. Development: 300' vertical shaft with over 2,500' underground workings. Worked by lessees, 1916.

GOLD BOND MINING & MILLING CO.**UTAH**

Office: 27 Latimer Block, Salt Lake City, Utah. Officers: A. A. Crome, pres.; Walter Crome, v. p.; Wm. Crome, sec.-treas.; with W. C. Howe and C. F. Stanley, directors. Inc. 1898 in Utah. Cap., \$25,000; shares 5c par, assessable; 200,000 shares outstanding; has levied 9 assessments.

Property: 2 patented claims, 4 miles from a railroad, in Tooele Co., Utah, shows a contact fissure vein, traceable on surface and carrying streaks of copper, gold, silver in limestone formation. Assays average 4% copper. Is merely a prospect reported to have good showings. Developed by a shallow shaft and 120' tunnel, with about 300' of workings. Tunnel being driven, 1916, to tap orebody.

GOLD BULLION MINING CO.**ALASKA**

Donald Harris, supt. Property: 8 claims, on the S. E. wall of Craigie Creek valley, 4 miles above mouth of Creek, in Willow Creek district, south

central Alaska. **Ore:** gold quartz in vein from 2' to 14' wide. **Development:** by several tunnels. Vein is said to be proven for a length of 3,500'.

Equipment: includes 2 aerial tramways, the longest 3,253' with a rise of 850'; a 7-stamp mill and small cyanide plant. Water power is used. About 70 men were employed in the 1915 season. Company reported to have taken an option in 1915 on property of the Brooklyn Dev. Co., located at the head of Willow Creek.

Operating costs in the Willow Creek district are high, due to short season of 100 to 150 days each year, and the isolated location of property. District will be made accessible by the Government railroad from Seward to Fairbanks, now being built. See U. S. G. S. Bull. 607, pp. 66, 71.

GOLD BUTTES MINING & MILLING CO.

ARIZONA

Jos. and Daniel Fraser, incorporators, Duncan, Ariz. Inc. Dec., 1915, in Ariz., to operate the New Strike gold property, near Twin Peaks. Ore contains gold and is developed for 800'.

GOLD CHAIN MINING CO.

UTAH

Provo, Utah. Mine office: Mammoth, Juab Co., Utah. **Officers:** C. E. Loose, pres. and gen. mgr.; J. T. Farrar, v. p.; P. G. Peterson, sec.-treas.; preceding officers, G. Simmons and John R. Turloes, directors. W. D. Loose, asst.-mgr. Inc. Dec., 1910, in Utah. **Cap.**, \$250,000; shares 25 cts. par. Dividends: to date, \$130,000. Company absorbed the Ajax Mining Co., said to have paid upwards of \$1,000,000 in dividends.

Property: the Gold Chain group and Ajax mine in the Tintic district. Recent development on the 1,500' level has shown an orebody which averages 15 to 20 oz. silver, 40 to 50% lead and \$2 to \$3 gold per ton. **Development:** from the Lower Mammoth mine into the west end of the property, 900' below the deepest previous work, disclosed another orebody said to carry 3% copper, 44 oz. silver and \$2.50 gold per ton. **Production:** about 100 tons per day, from the 200 to 700', inclusive, and 1,500' levels. Ore shipped is medium grade. **Equipment:** includes hoist, compressor and electric power.

GOLD CLIFF EXPLORATION CO.

ARIZONA

Oatman, Ariz. Stephen E. Barren, pres. and mgr.; Thos. Devine, sec.-treas. Inc. 1915 in Arizona. **Cap.**, \$1,000,000; shares \$1 par; 510,000 shares outstanding. **Property:** 300 acres, adjoining the Tom Reed Gold Mines Co. property, near Oatman. Was sinking a shaft at last accounts. Property is a prospect.

GOLD & COPPER DEEP TUNNEL M. & M. CO.

NEW MEXICO

Idle. Beaver Falls, Beaver Co., Pa. Mine office: Elizabethtown, Colfax Co., N. M. A. T. McIntyre, pres.; Jas. E. Glasson, v. p.; W. H. Martin, sec.-treas.; W. P. McIntyre, gen. mgr. and supt.; preceding officers and Geo. E. Dachtler, directors. Inc. Oct. 10, 1900, in New Mexico. **Cap.**, \$200,000; increased 1912 to \$500,000; shares \$1 par, nonassessable; issued, \$225,000. Annual meeting, third Tuesday in July.

Property: in the heart of Cimarron range, on the west slope of Baldy mountain, 12,500' high, comprises 13 claims, 260 acres, in the Moreno district, 18 miles from the St. L. R. M. & P. R. R. at Ute Park. Orebody, a contact between slate and monzonite, is developed by 2 shallow shafts and a 2,300' crosscut tunnel, planned to penetrate the mountain with a final length of 3,500', cutting 2 bodies of low-grade copper ore. Total underground work, 3,100'. **Equipment:** includes a 12-h. p. gasoline air compressor and 10 buildings. The 20-ton stamp mill has a 5' Huntington mill and gravity stamps. See U. S. Geol. Survey Prof. Paper, 68, p. 95, for geology of this district.

GOLD CROWN MINING CO., LTD.**MONTANA**

Idle. Mine near St. Regis, Missoula Co., Mont. A. A. Mayo, Henderson, Mont., pres. Cap., \$1,000,000; shares \$1 par. Lands: 5 claims, 7 miles from a railroad, show a vein said to be 7 to 15' wide between quartzite and diabase, carrying ore with values in copper, silver and gold. Development by tunnels. No recent returns secured.

GOLD CUP MINING CO.**COLORADO**

Care Albert Sutcliffe & Co., 60 State St., Boston, Mass. Mine near Central City, Colo. Officers: F. W. Cramer, pres.; W. D. Drake, v. p.; Hugh Rouse, sec.; H. K. Dean, treas.; above, with H. K. Dean, directors. Inc. in Colo. Stock listed on Boston Curb. Commonwealth Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar.

Property: 9 claims, 54 acres, patented, in Quartz Valley district, Gilpin Co., developed by 3 shafts, each 100' deep, and a 300' adit tunnel. The mine has several fissure veins, carrying lead sulphide ore with gold and silver values. Shipments were made in 1915-16 to the A. Sm. & Ref. Co. plant at Globe. Ore is said to assay 1-2 oz. gold, 11 oz. silver, 25% lead and 14% zinc per ton. Management plans development at depth. A prospect.

GOLD DOLLAR CONSOLIDATED MINING CO.**COLORADO**

Cripple Creek, Colo. Officers: H. L. Shepherd, pres.-treas.; J. R. Young, sec. Cap., 2,500,000 shares; par value 10c. In treasury Jan. 1, 1916, \$370 cash; no stock. Transfer office: 125 East Pike's Peak Ave., Colorado Springs, Colo. Liabilities, \$11,000. Dividends: paid to date, \$100,000; last dividend, \$12,500, paid December 1, 1912. Listed on Colorado Springs Exchange.

Owens about 62 acres, patented, being a part of the Arequa townsite, Cripple Creek mining district. Gold ore occurs in vein 2' to 4' wide, said to average \$20 gold per ton. Under lease to A. J. Campbell, operating under name of Gold Dollar Lease.

Development: the 1,050' Mabel M. and Union shafts, from which there has been considerable drifting and crosscutting. Mine has recently been sampled with a view to building a mill. About 10 men are employed.

Gross production in 1915 was \$43,893; net to company \$3,730.

GOLD HILL CONSOLIDATED CO.**NORTH CAROLINA**

Office: Room 309, No. 42 Broadway, New York. Mine at Gold Hill, Rowan Co., N. C. Walter Geo. Newman, pres. Inc. 1910 as successor of Gold Hill Copper Co., a notorious promotion that caught many Wall Street operators. New company, under same management, became bankrupt and property sold at auction, Jan. 27, 1910, for \$45,000. Company does not own the adjacent Union Copper mine.

Property: consisted of 1,050 acres in Rowan and Stanley counties, the Gold Hill mine, where gold was discovered, A. D. 1799. Gold quartz veins were discovered 1831, and in 1845 this mine was the largest gold producer in the United States. Development: by 2 shafts of 615' and 830', and 2 lesser shafts. The mine was operated in 1913 and part of 1914. Shipments to the Perth Amboy smelter returned 1.5% copper and about \$3 gold per ton, with small silver values. Copper occurs in minute particles of chalcopyrite in hard quartz schist and recovery by wet concentration is not commercially profitable. Equipment: includes ten 100-h. p. boilers and a 10-stamp mill.

This company and its companion, the Union Copper Mining Co., enjoyed decidedly checkered careers. Operations conducted on a considerable scale, 1901-1903, were unsatisfactory and failed to show up the much advertised orebodies. A receivership ensued which was ended early 1906, but a receiver was again appointed, Aug., 1906; for the old company, on the application of Walter Geo. Newman, on claims aggregating \$352,000. In June,

1915, the Court again appointed a receiver for the property, which has been shut down and apparently abandoned by the company.

Mr. Newman evidently used this property solely for stock-jobbing purposes. The mine is considered worked out and low grade, but worthy of some drilling in depth. At best the company could never have paid honest dividends on its capitalization and under its present president is not regarded as worthy of any confidence whatever.

GOLD HILL & IOWA MINES CO.

IDAHO

Quartzburg, Boise Co., Idaho. **Property:** Gold Hill & Iowa groups at Quartzburg, said to show gold-quartz ore averaging \$5 per ton. **Development:** 6,000' tunnel and shaft. **Equipment:** 20-stamp mill, cyanide plant, compressor, stamps, electric power. Employs 35 men. A production of \$5,000,000 is claimed for the property.

GOLD HILL UNITED MINES CO.

COLORADO

Office: Bailey Bldg., 1218 Chestnut St. Philadelphia, Pa. **Inc.** June 1, 1910, in Delaware. **Cap.**, \$2,000,000; shares \$1 par. Registrar & Transfer Co., New York, transfer agent. Listed on New York Curb. **Properties:** in the Kerber Creek, Manitou and Hull mining districts, Saguache Co., Colo. Inactive for several years, doing assessment work only.

GOLD HUNTER MINING & SMELTING CO.

IDAHO

Mullan, Idaho. Dennis Ryan, gen. mgr. **Cap.**, \$2,000,000; shares \$10 par. Close corporation; no stock ever offered publicly. **Property:** 9 patented claims, including the Hunter or Gold Hunter mine, discovered 1885. 20-acre mill-site and 100-acre ranch, East of Mullan. Is a large producer.

Ore: lead-silver containing some copper, is developed by tunnels; main tunnel, No. 6, driven from mill level, cuts vein 1,600' vertically below apex; a winze down 800' below tunnel level is being sunk to 1,200'. Main ore extraction on 800' level, 2,000' below apex. Two oreshoots have been explored to depth: the north shoot, said to be 12', the south shoot 20'-22' wide. Best ore reported coming from east part of Yolande and west part of West Hunter claims; upper tunnel is Yolande, driven 400', said to show 250' of an oreshoot 6' wide.

Equipment: property is well equipped. A flotation plant, using Callow units, was completed early in 1915, and is said to have raised extraction from 75% to 90%.

Results of operations in 1915:

Tons Ore	Gross Value	Cost Extr.	Trans. & Red.	Improvements	Net Profits
118,764	\$614,590	\$333,904	\$214,315	\$34,707	\$31,662 (a)

(a) Compared with a loss of \$45,926 in 1914, though in that year \$370,000 was charged to improvements from gross earnings of \$421,318.

GOLD KEY MINING CO.

ARIZONA

Offices: 733 Central Bldg., Los Angeles, Cal., and Oatman, Ariz. **Officers:** Wm. H. Wise, pres. and treas.; H. M. Hall, v. p.; B. E. Shaw, sec.; with W. K. Ridenour and R. A. Carr, directors.

Inc. in Ariz. **Cap.**, \$1,250,000; shares \$1 par. Listed in San Francisco.

Property: at Oatman, developed by 300' shaft, now being sunk to the 500' level. In March, 1916, management reports 2' of ore averaging \$28.11 gold per ton on the 200' level. Property is a prospect, with a good vein and ample indications of making a mine.

GOLD KING LEASING CO.

COLORADO

Mine at Gladstone, via Silverton, San Juan Co., Colo. Harry L. Frank, mine supt.; Louis C. Bastian, mill supt. Operates the Gold King and Sampson mines, formerly owned by the Gold King Cons. Mines Co., reorganized as New Gold King Mines.

Ore: claims show fissure veins carrying irregular stringers of lead-

copper ore with gold-silver contents, in altered andesite, free gold occurring in white quartz associated with iron pyrite, galena or blende. **Development:** by 600' shaft and 3,000' tunnel. **Equipment:** includes complete steam and electric power, compressor, tramway, 300-ton mill, converted into flotation plant in 1915, 80 stamps, etc.

Production: the Gold King mine is credited with a production in excess of \$12,000,000 to end of 1915. Shipments in 1915 averaged about 400 tons of \$20 ore per month. Present work confined to 2nd, 3rd and 4th levels with about 70 men employed.

GOLD KING MINING CO.**ALASKA**

Chas. R. Crawford, mgr., at last accounts, Valdez, Prince William Sound, Alaska. **Property:** Gold King mine, at elevation of 3,750' on east end of an ice-surrounded mountain rising out of Columbia Glacier, 6 miles from Shoup Bay and 15 miles from Valdez. Reached by 8-mile trail from head of Shoup Bay. **Ore:** free milling gold in quartz veins in graywacke. Veins vary in width from 2" to 36". Development by tunnels.

Equipment: includes 2-stamp mill, amalgamating plates, and a concentrator, operated by gasoline engines during about 6 months each year; production said to be about \$15,000 monthly. Transportation charges are high.

GOLD KING MINING CO.**COLORADO**

Cripple Creek, Teller Co., Colo. **Inc.** 1892. **Cap.**, \$1,000,000; shares \$1 par. A close corporation. Owns the El Paso Gold King mine, worked under lease by Owen Roberts, on a royalty basis, said to net the company substantial profits.

Property: about 40 acres at the head of Poverty Gulch, Cripple Creek, developed by shaft, is said to show gold ore running from \$10-\$20 per ton. **Production:** about 20 cars of ore per month.

GOLD LEAF CONSOLIDATED MINING CO.**IDAHO**

Reorganized under name of Wisconsin Mining Co. and described under that title.

GOLD MOUNTAIN MINING & MILLING CO.**NEVADA**

Properties: about 13 miles from Bonnie Claire and 6 miles from Horn-silver, Nev., operated under lease by J. W. Crane. Veins are silver-gold deposits carrying copper. Developed by two 240' shafts and connected by a 200' drift. Estimated reserves, 2,000 tons of milling ore, valued at \$20 per ton, blocked out on the 200' level. An outcropping oreshoot 20" wide said to have yielded ore assaying from \$100 to \$500 per ton.

GOLD ORE MINING CO.**ARIZONA**

Oatman, Ariz. **Officers:** C. E. Sperr, pres.; J. J. Mitchell, sec.; A. F. Pollock, treas.; A. C. Werden, gen. mgr. **Inc.** in Ariz. **Cap.**, \$500,000; shares \$1 par. Listed on San Francisco Exchange.

Property: 6 claims, at Oatman, ½ mile north of Gold Road mine, shows gold ore in vein 2' to 6' wide, said to average \$20 per ton. Ore occurs in andesitic formation. **Development:** by 2 shafts, deepest 530, and drifts, totaling about 1,200'. In the upper levels an oreshoot was stoped to surface that is said to have yielded high-grade milling ore. Company claims to have a 6' orebody on the 530' level from which daily shipments of 20 tons, averaging \$15, were recently started.

GOLD PRINCE MINING & LEASING CO.**NEVADA**

E. L. Luker, sec.-treas., Grand Island, Neb. **Officers:** Dr. A. H. Farnsworth, pres.; Jos. Kotik, St. Paul, Neb., v. p.; Chas. O. Orr, Goldfield, Nev., gen. mgr.; with E. L. and E. S. Luker, directors. **Inc.** in 1914. **Cap.**, \$500,000; shares \$1 par. Has lease and bond on the Gold Crater mine, formerly

owned by the Gold Crater Cons. Mng. Co., about 30 miles S. E. of Goldfield, Nev.

Ore: gold, milling grade, said to run about \$15 per ton. **Development:** 265' shaft and crosscuts. Management claims large ore reserves in sight. **Equipment:** includes a 12-h. p. hoist and small mill.

GOLD QUEEN MINING CO.

COLORADO

Idle. Office: Room 408, 40 Dearborn St., Chicago, Ill. **Mine office:** St. Elmo, Chaffee Co., Colo. C. Kirchner, pres. **Inc.** 1904 in Wyoming. **Cap.,** \$2,500,000; shares \$1 par. **Property:** 13 claims, about 125 acres, on Barren mountain, in the Chalk Creek district, has several tunnels, longest 600' with 900' of workings, developing a vein carrying gold-silver ores.

Stockholders planned reorganization of company, 1914, and refunding its indebtedness, amounting to \$2,000, and interest on bonds long past due. Property unpromising and company regarded with suspicion.

GOLD RANGE MINING & MILLING CO.

ARIZONA

Oatman, Ariz. Company reorganized, March, 1916, with H. J. Sayers, pres., Los Angeles, Cal.; T. A. Wetzel, supt. **Cap.,** \$1,000,000; shares \$1 par. **Treasury** 400,000 shares. Listed on Los Angeles Exchange.

Property: Esmeralda group at Oatman, adjoining the Ivanhoe on the south. Company is sinking a shaft, 135' deep, April, 1916, to 500' level before doing lateral work. Is a prospect.

GOLD ROAD BONANZA MINING CO

ARIZONA

Oatman, Ariz. **Officers:** F. T. Torpey, pres. and treas.; W. B. Ross v. p.; W. P. DeWolf, sec. **Inc.** in Ariz. **Cap.,** \$1,000,000; shares \$1 par. **In treasury** 250,000 shares. Listed in San Francisco.

Property: 90 acres, adjoins the Gold Road mine on the S. W. Said to be installing machinery preparatory to sinking shaft. Is a prospect.

GOLD ROAD MINES CO.

ARIZONA

D. R. Muir, mgr., Gold Road, Ariz. **Inc.** in Maine. **Cap.,** 400,000 shares; \$5 par; entirely owned by U. S. Smelting, Refining & Mining Co., which see for officers.

Property: 15 patented claims, 216.52 acres, at Gold Road, Mohave Co., Ariz., 22 miles west of Kingman, on the Santa Fe R. R. **Ore:** gold-bearing quartz occurring in a fissure vein with E.-W. strike. Company owns about 1¼ miles on the strike of this vein. The mine had a good record of production prior to its purchase by this company in 1912. Stopping operations had been carried down to the 500' level and were extended on the strike of the vein and also in depth to the 900' level. Company now extracting ore from the 800' level. Assay value of ore diminishes with depth as far as explored to date and only a small percentage of ore found on the 800' level is of commercial grade, though the vein continues strong and permanent.

Development: to a depth of 1,100' by 5 miles of workings. There are 2 shafts, one reaching the 800 and the other the 900' level, equipped with cages and skips. Property is fully equipped with power house, air compressors, shops, warehouse and dwellings; has a 40-stamp 300-ton cyanide mill, located within a few hundred feet of the mine. Electric power is purchased from power plant at Kingman.

Production: for 1915 was 96,272 tons. Cost of mining averages \$3.15 per ton; milling about \$2.13 per ton. Recovery of gold per ton is \$6.77.

The mine has considerable unexplored territory within the depth to which it has been worked, and the prospects are that it will yield a small profit for some time to come from ore reserves now existing, or which may be found within this depth. Larger earnings may be expected in case exploration at depth discloses increased ore values.

GOLD SOVEREIGN MINING & TUNNEL CO.**COLORADO**

Office: 203 Burns Bldg., Colorado Springs, and Cripple Creek, Colo.
Officers: Jas. F. Burns, pres. and treas.; M. B. Rapp, v. p.; John T. Hawkins, sec.; with Daniel Thatcher, A. Feringher, directors. C. G. Jackson, supt.
 Charter renewed Oct. 31, 1915. **Cap.**, \$2,000,000; shares \$1 par; in treasury Jan. 1, 1916, 195,228 shares; cash, \$3,074. Listed on Colorado Springs Exchange. Dividends: \$32,559, last dividend of \$5,000 paid in 1912.

Property: Gold Sovereign and J. G. Blaine claim, 7.2 acres, patented, on Bull Hill (Sec. 20), adjoining the Cresson, is under lease to the Union Leasing Co. Management believes firmly that rich Cresson veins extend into the Gold Sovereign ground. Shoots reported as 3' wide and assaying \$50 per ton in gold said to be disclosed on the 15th level.

Development: 1,350' shaft, to be sunk an additional 200'. **Production:** gross production of lessee, Union Leasing Co., for 6 months ending Jan. 1, 1916, \$30,174, netting the company \$6,306 in royalties. About \$19,618 expended by lessees on development in 1915. Ten men are employed.

GOLDEN BELL MINING CO.**ARIZONA**

Mine at Kelvin, Pinal Co., Ariz. L. W. St. Charles, pres.; Geo. H. Sarrick, v. p. and gen. mgr.; G. L. Sarrick, sec.; L. C. St. Charles, treas. Inc. 1910. **Cap.**, \$1,000,000. **Property:** 9 claims, near the Southern Pacific railway, 5 miles west of Kelvin, shows gold-copper ore in veins in altered diorite. **Developed:** by 100' tunnel, shaft and crosscuts. Equipped with 25-h. p. hoist and air compressor.

GOLDEN CENTER MINING CO.**CALIFORNIA**

C. A. Brockington, supt., Grass Valley, Nevada Co., Calif. Initial dividend, \$11,000, at rate of 4c per share, was paid in Sept., 1915. **Property:** 130 acres, including the Golden Center mine in Grassvalley and the Peabody mine on Gold hill, the latter only recently acquired.

Ore: free-milling quartz, occurs in veins, about 16" wide and said to average \$15-\$18 per ton. There are 3 main veins on the Golden Centre which are being worked on the 700' level by incline and vertical shafts. The Peabody has only been developed to depth of 150'. **Equipment:** includes 10-stamp mill.

Production: shipments of concentrates being made to Pioneer Reduction Co. at Nevada City. Employs about 25 men. Company said to be planning a 10-stamp addition and cyanide plant, also sinking the Golden Center shaft to the 1,000' level.

GOLDEN CURRY MINE.**MONTANA**

Formerly owned and operated by the Elkhorn Mining Co. Reported under option, 1915. **Property:** 9 claims, 162 acres, near Elkhorn, Jefferson Co., Mont. Orebody shows oxidized iron cap, lying between limestone and granite and dipping at 45°. Property said to show 5 orebodies, 2 now being developed. Principal oreshoot has a width of 30', length of 295' and a proven depth of 180'. Ore contains chalcopyrite and tenorite in oxidized iron ore, the average contents being: 1.9% copper, 4 oz. silver and 0.35 oz. gold per ton, with 48% excess iron.

Development: 2 shallow shafts and 4 tunnels, total underground work said to be 8,200'. Ore blocked out estimated at 20,000 tons; probable ore 100,000 tons. Average cost of mining \$2.20, smelting charges \$2.10. Mine was operated intermittently by lessees in 1913-14. Geology and history of property given in Bull. No. 527, U. S. G. S., "Helena Mining Region," by Adolph Knopf, pp. 136 to 139.

GOLDEN CYCLE MINING & REDUCTION CO.**COLORADO**

Colorado City, El Paso Co., Colo. **Officers:** A. E. Carlton, pres.; E. P.

Shove, v. p.; I. T. Synder, sec.-treas.; with Spencer Penrose, Richard Roelofs, H. McGarry and L. G. Carlton, directors.

Inc. in West Virginia. Cap., 1,500,000 shares; \$1 par; all issued. No bonded indebtedness or preferred stock. Listed on Colorado Springs Exchange. Balance sheet of Sept. 30, 1915, shows: Assets, \$2,474,697, which included mill, plant and equipment, \$1,113,272; cash, gold and bullion, \$620,012; notes and accounts receivable, \$165,937; stocks and bonds, \$354,725. Liabilities: accounts payable, \$119,795; surplus and reserves, \$760,512. Yearly net earnings for 6 years previous to 1915 averaged over \$625,000. Net earnings, for first 9 months of 1915, \$505,729. Above earnings do not include those from the coal properties, at present about \$75,000 per year. Dividends: to Jan. 10, 1916, inclusive, \$7,338,000; rate 24% per annum, payable monthly. Dividends, 1916, are 3c a month.

Company is an industrial corporation, having disposed of its mining property at Cripple Creek to the Vindicator Cons. Gold Mng. Co. in 1915 for \$1,300,000. Its holdings include practically full ownership of 2,700 acres coal land in Colorado and a reduction plant at Colorado City. This plant is the largest cyanide mill in the U. S., treating 40,000 tons of ore a month; its equipment is thoroughly modern, having been enlarged in 1915. Between 400,000 and 500,000 tons of gold ore from the Cripple Creek district are treated annually.

GOLDEN GATE MINING CO.

OREGON

Greenhorn, Baker Co., Ore. M. F. Douce, pres.-gen. mgr.; G. L. Bender, supt. **Property:** Golden Gate mine at Greenhorn. **Development:** in progress since 1900; tunnels reach depth of 350'. A 9' vein of good milling ore said to have been cut on the 300' level, March, 1916. **Equipment:** 20-stamp mill, 10 stamps in commission since January, 1915. Employs 25 men.

GOLDEN GLOW MINING CO.

IDAHO

Wm. Schultz, supt., Ketchum, Blaine Co., Idaho. **Property:** shows a deposit of low-grade silver-lead-copper ore developed by tunnels. Operated intermittently.

GOLDEN JUBILEE MINE.

CALIFORNIA

Reported in March, 1916, that work had been resumed by Cal. Extraction Co. H. C. Lyon, mgr. **Property:** 8 miles S. W. of Carrville, Trinity Co., Calif., 150 acres, patented, said to show a 2½' vein between slate foot-wall and diorite hanging-wall. **Development:** tunnels, with several hundred feet of underground workings. Mine is said to have produced \$250,000 in gold. **Equipment:** includes compressor, hoist and 10-stamp mill. Employs 30 men. Plans building cyanide plant and developing at depth.

GOLDEN LINK CO.

NEW MEXICO

Jackson, Grant Co., N. M. **Property:** 8 claims, along the Big Dry canyon, 6 miles from Jackson, in the Cooney, or Mogollon district, Socorro Co., N. M. J. G. Barnesdale, Superior, Wis., treas. **Development:** by 3 tunnels, lowest 120' long, and a vertical shaft, all in ore, vein said to be 8' wide. Equipped with 100-h. p. water-power plant, 3-stamp mill and 500' tram. No returns secured. Probably idle.

GOLDEN PEN MINE.

NEVADA

G. H. Miller, supt., Rand, Mineral Co., Nev. Reported, April, 1915, under option to Jesse Knight, of Provo, Utah; Adams O'Neill, of Los Angeles, and J. H. Miller, of Hawthorne, Nev., for \$200,000. Has been operated by them for several months under lease and bond.

Property: 11 claims, at Rand, a new mining camp, 18 miles south of Rawhide, is said to have produced \$50,000 in gold in 1915, with only two men working. The lowest carload shipment is said to have assayed over \$100 per ton. Present owners have continued the tunnel development work and

are reported to have opened up good milling ore in addition to high-grade ore. In April, 1916, a 4' vein was said to have been found 150' from the main ledge, with the richer portions assaying from \$100 to \$500 per ton. Fifteen men are employed.

GOLDEN REWARD CONSOLIDATED GOLD

M. & M. CO.

SOUTH DAKOTA

Office: 475 Fifth Ave., New York. **Mine office:** Deadwood. **Lawrence Co., S. D. Officers:** C. C. Tegethoff, pres.; Harris Franklin, v. p.; with R. W. Goelet, Henry de Forest, W. B. Devereux, Walter Luttgen, Ed. de Witt and W. A. Harriman, all of New York, directors. W. J. Johnson, sec.; N. E. Franklin, Deadwood, asst. sec.; Henry Schnitzel, gen. mgr.; F. R. Baldwin, gen. supt.

Inc. June 25, 1896, in South Dakota. **Cap.**, 1,000,000 shares; \$10 par; 841,793 shares issued to June, 1916. Stock transferred at company's office. Annual meeting 1st Tuesday in August at Deadwood, S. D. Gross earnings for 1915 were \$804,068; operating expenses amounted to \$703,837. Balance sheet shows assets, \$10,710,511, and liabilities, accounts payable, \$70,647.

Property: 442 patented claims, 3,391 acres at Terry, in Whitewood and Bear Butte mining districts, near Deadwood, includes the Union and Astoria mines. **Ore:** occurs as contact deposit in shale, carrying gold-silver values and 75% silica. Pay ore occurs in shoots from 5-100' long, said to give average assays of \$5 per ton.

Development: by several tunnels and vertical shafts from 100-350' deep, with about 15 miles of workings. **Equipment:** includes electric power, electric double-drum hoist, compressor, 150-ton cyanide plant and 75-ton Wedge roaster. Average gold extraction is 75.55%.

Ore reserves: estimated by management June, 1916, at 2,000,000 tons. Production for 1915 amounted to 57,770 tons, yielding 16,428 oz. gold and 20,196 oz. silver.

GOLDEN RULE MINING & MILLING CO.

MISSOURI

Fred Kincannon, mgr., Granby, Mo. **Inc.** in Mo. **Cap.**, \$8,000. Company leasing and operating 30 acres land at Granby, developed by 5 shafts, 100' deep. **Equipment:** 100-ton concentrating mill, compressor and steam power. Produces zinc-lead concentrates.

GOLDENVILLE MINING CO.

NOVA SCOTIA

Goldenville, N. S. R. Verner Neily, mgr., at last accounts. **Property:** a gold mine on St. Mary's river. Production for year ending Sept. 30, 1914, was 6,806 tons ore, yielding 895 oz. gold. Employed 48 men. Later returns not available.

GOLDFIELD BLUE BELL MINING CO.

NEVADA

Bert Ward, sec., P. O. Box 992, Goldfield, Nev. D. S. Johnson, supt., Berlin, Nye Co., Nev. **Property:** the Berlin Group, 50 acres, patented. Veins carry gold and silver-bearing lead-copper ores, developed by a 175' shaft. Equipped with steam hoist, air compressor and a 30-stamp concentrating mill.

Property operated under 3-year lease from March, 1915, by H. B. Lind, of Goldfield; who plans sinking a 2 compartment shaft to the latite-shale contact, estimated to be at 500' depth.

GOLDFIELD CONSOLIDATED MINES CO.

NEVADA

Goldfield, Nev. Exploration Dept office: c/o E. A. Julian, Crocker Edg., San Francisco, Calif. **Officers:** Geo. Wingfield, pres.; J. D. Hubbard, v. p.; A. H. Howe, sec.-treas.; J. W. Hutchinson, gen. mgr.; with J. H. Carstairs, F. M. Monson and H. M. Hoyt, directors. K. M. Simpson, asst. mgr.; Jos. B. Kendall, mine supt.; J. B. Lain, mill supt.; Robt. Sterling, chief engr.; Fred Scars, Jr., geologist; F. M. Moore, purch. agt.

Inc. Nov. 13, 1906, in Wyo. **Cap.**, \$50,000,000; shares \$10 par; issued, \$35,591,480. Stock listed on San Francisco and Salt Lake Exchanges and New York and Boston Curbs. Stock was stricken from N. Y. Stock Exchange list, Dec. 26, 1914. **Dividends:** to date, \$28,998,831. John S. Cook & Co., Goldfield, Nev., registrar. Company office, Goldfield, transfer agt. Annual meeting, third Monday in March. Company is a merger of Goldfield-Mohawk, Red Top, Jumbo, Laguna Goldfield, Goldfield and Combination mining companies. In 1911, company acquired Vinegerone Fraction and the Bull Dog and Jumbo Fractions. Company owns entire stock of the Goldfield Cons. Milling and Transportation Co.; 25% stock interest in the C. O. D. Cons. Mining Co., and 87% stock interest in the Aurora Cons. Mines Co., of Aurora, Mineral Co., Nev., described under that title.

Annual report for 1915 shows gross value of ore treated, \$4,101,247, or \$1,558,308 net; \$3,515,833 came from mines alone; expenses, \$1,957,525; dividends, \$1,601,616; cash in hand and due Dec. 31, 1915, \$678,363, and loans outstanding, \$400,000. **Dividends:** 20c in 1907; 90c in 1909; \$2 in 1910; \$2 in 1911; \$1.60 in 1912; 70c in 1913; 30c in 1914; 45c in 1915, and earnings at rate of about 20c per share in 1916.

Property: 26 patented lode claims, and 1 unpatented claim, 390 acres, at Goldfield, Nev., with 6 working shafts, Combination, Mohawk, Red Top, Jumbo-Clermont, Jumbo No. 2 and Laguna, 50% of the ore coming from the Mohawk shaft. Deepest shaft is 1,200'. Output is from several mines working fissure veins whose stoping width varies from a few feet to as much as 20 or even 30'. Veins show orebodies with variations in which the commercial limit is not dependent upon structural planes, the shoots swelling out and pitching with but slight relation to the vein walls.

Development: during 1915, 34,603' of work was done at an average cost of \$5.73 per foot. **Ore reserves:** estimated Jan. 1, 1916, at 105,000 tons of ore.

Equipment: includes 100-stamp mill treating 1,057 tons per day with an average recovery of 90.45% in 1915; a 50-ton flotation plant installed and operated successfully in 1916; a 1,790' electrically operated cableway, a 3-drum electric hoist and a 1,000 ton cyanide plant, etc. The ore is amalgamated, cyanided and concentrated.

Production: from 6 shafts aggregated 390,054 tons in 1915, valued at \$3,540,459 gross, or \$1,558,308 net. The Jumbo Clermont yielded 5,442 tons copper ore in 1914 of an average value of \$29.00 per ton.

Production, Costs and Profits Since Completion of Mill

	Ore, Tons	Rec. per Ton	Total Cost per Ton	Operating Profit per Ton	Total	Dividends
1915.....	390,054	\$10.37	(c) \$5.16	.....	\$1,558,308	\$1,601,617
1914.....	338,192	11.61	6.19	\$ 5.42	1,835,224	1,067,744
1913.....	349,465	14.14	6.32	7.82	2,731,945	2,491,403
1912 (a)...	415,786	18.40	6.65	11.75	4,886,399	5,694,637
1911 (b)...	330,549	30.74	7.97	22.77	7,526,846	7,118,296
1910 (b)...	266,867	38.50	10.97	27.53	7,347,692	7,118,271
1909 (b)...	194,479	34.72	8.88	25.84	5,026,620	3,201,239

(a) 14 mos. ending Dec. 31, 1912. (b) Year ending Oct. 31. (c) Average value per ton.

Owing to the remarkable decrease in ore values and ore reserves in the mine, the Goldfield Consolidated management has decided on exploring, purchasing and developing promising properties at Goldfield and Aurora. The Aurora Cons. Mng. Co.'s property, 30 miles west of Hawthorne, Mineral Co., Nev., comprising 52 patented claims and a 500-ton mill at Aurora,

was acquired 1914 through purchase of 85%, or 592,000 shares, for \$763,011. (See Aurora Cons. Mng. Co.)

As a stock investment the buyer is taking a chance on a rapidly liquidating proposition, for the irregularity of the gold in the orebodies makes it impossible to give an accurate estimate of ore reserves; the discoveries each year about balance extraction and the records show a well sustained yearly average tonnage treated, but the ore shows decreasing value ranging from \$38.50 per ton in 1910 to \$10.37 per ton in 1915.

The 1915 figures show lowered mine and mill costs and it is evident that the management is making every effort to offset decreased values by decreased costs so as to maintain earnings.

Company is one of the largest gold mines in the world, and also produces copper ore from one of its veins. Ore is shipped to the Mason Valley smelter at Wabuska, Nev.

GOLDFIELD MERGER MINES CO.

NEVADA

Office: Goldfield, Esmeralda Co., Nev. **Officers:** Elmer H. Cox, pres.; J. Ross Clark, v. p.; A. H. Howe, sec.-treas.; with Geo. Wingfield, John Erikson, Edgar Ames, directors. Willis Lawrence, mgr. Inc. 1908 in Wash., and reorganized 1911, when Geo. Wingfield obtained control. **Cap.**, \$5,000,000, increased Aug. 4, 1915, to \$6,000,000; shares \$1 par. Company had \$30,000 cash in treasury at end of fiscal year, 1915. Majority of the stock is held by the Goldfield Deep Mines Co.

Property: the St. Ives group, 9 claims, 120 acres, shows veins with shoots of copper-silver-gold ore, developed by 1,750' shaft with crosscuts at 1,325' and 1,725' into Consolidated and Atlanta ground. A crosscut was being driven Jan., 1916, to the N. E. at a depth of 1,175' through the northern extremity of the Algae Fraction, into the Sunflower claim to open up the Jumbo Extension ore channel.

Alleging that the property was being operated for the benefit of Geo. Wingfield; that valuable concessions had been made to Wingfield and Clark railroad interests; that officers of the Merger Co. had illegally received 21,000 shares of Jumbo Extension stock when the latter company took over the Velvet claim for \$85,000 cash and 171,000 shares of Jumbo Extension stock; that the sale of these shares at 33c was unauthorized and the result of collusion between the directors of the 2 companies, a suit was brought for recovery of the Velvet claim, or payment of \$680,000, based on the highest market value of Jumbo stock since the sale.

On application of Lucy Ames, John Erikson and other minority stockholders, the company was thrown into receivership Jan. 30, 1915, which terminated in August, 1915, after an agreement had been reached whereby the Merger company admits that the Jumbo Extension is the lawful owner of the Velvet lode and all minerals within the extension boundaries thereof, extending downward vertically.

GOLDFIELD SHALE MINING CO.

NEVADA

Goldfield, Nev. R. S. Wilbur, F. S. Hunt, Frank Friedman, G. K. Ford and Albert Billett, all of Goldfield, directors at last accounts. Inc. Dec., 1914, in Nevada. **Cap.**, \$1,000,000; shares \$1 par. Listed on San Francisco Exchange.

Has a 2-year lease on the south 700' of the Spearhead claim, belonging to the Spearhead Gold Mng. Co., at Goldfield. **Ore:** gold, occurs in stringers, 2-7" wide, and said to assay as high as \$40 per ton. **Development:** 215' Maloney and 250' Wilbur shafts. **Equipment:** 60-h. p. gasoline hoist and compressor.

Company pays from 10 to 25% royalty on all ore mined. At last accounts was sinking to depth of 750' to reach the shale-latite contact.

GOLD KEY MINING CO.**ARIZONA**

Office: 733 Central Bldg., Los Angeles, Calif. J. C. Denton, supt., Old Trails, Mohave Co., Ariz. **Officers:** W. H. Wise, pres.; H. M. Hall, v. p.; B. E. Shaw, sec.; with W. K. Ridenour and Raymond A. Carr, directors. **Inc.** 1915 in Arizona. **Cap.**, \$1,250,000; shares \$1 par. Listed in San Francisco.

Property: the Treasure Key group, 4 claims, 50 acres, between the Boundary Cone and Orion groups, west of Old Trails and near Oatman, Ariz. Contains the Oatman type fissure veins in andesite, showing gold quartz ore. The one under development is 20' wide.

Development: by a 310' shaft with drifts on 300' level. The east drift exposes an ore-shoot 75' long and 4'-6' wide, showing 3' of \$30 ore. A second shoot 75' to the west is said to average \$12. Property is a "likely" prospect.

GOLDSTRIKE BONANZA MINING CO.**UTAH**

Officers: H. G. Snyder, pres.; C. J. Price, v. p.; Rolla E. Clapp, sec-treas., 603 Newhouse Bldg., Salt Lake City; with B. N. C. Stott and C. A. Peet, directors. **Inc.** May 25, 1915. **Cap.**, \$100,000; \$65,000 issued.

Property: 2 groups, 11 lode claims, in the Goldstrike district, about 1 mile W. of Hamburg, and 36 miles from Modena on the S. L. R. R. **Ore:** oxide, occurs in fissure veins in porphyry, said to be from 2' to 4' wide and to average better than \$20 per ton. Ore is free milling and carries manganese. **Development:** 35' shaft, tunnel and crosscuts. Reported sacking high-grade ore at last accounts, Sept., 1915.

GOLDSTRIKE CONSOLIDATED MINING CO.**UTAH**

Office: 603 Newhouse Bldg., Salt Lake City, and Goldstrike, Utah. **Officers:** Rolla E. Clapp, pres.-gen. mgr.; Bishop Geo. A. Holt, v. p.; F. A. Johnson, mgr. and supt.; with Thos. Marionaux and P. P. Canfield, directors; J. S. Farrington, sec.-treas. **Inc.** May, 1915, in Utah. **Cap.**, \$160,000; shares 10c par; assessable. Transfer office: 605 Newhouse Bldg.

Property: 16 unpatented claims, in Goldstrike mining district, about 38 miles S. of Modena on the S. I. R. R. **Ore:** gold, occurs in fissures in limestone and quartz porphyry dikes traversing the limestone formation. Assays taken from shaft showed from \$3.65 to \$31 per ton in gold and silver. **Development:** 100' shaft, crosscut and surface cuts. Property is a prospect.

GOLDSTRIKE MINING & LEASING CO.**UTAH**

Office: 603 Newhouse Bldg., Salt Lake City, Utah. **Officers:** H. G. Snyder, pres.; E. J. Lund, v. p.; Rolla E. Clapp, sec.-treas.; with Clyde McQuarrie, Louis R. Lund and H. A. McQuarrie, directors. **Inc.** April 16, 1915. **Cap.**, \$100,000; shares 10c par.

Property: lease Nos. 1 and 2 on Hamburg claim of Bull Valley Gold Mines Co., 3 claims of the Herd Girl group, Last Chance and Cripple Creek groups in Goldstrike district, Washington Co., Utah. Said to show gold ore occurring in fissure vein, 4' wide and averaging from \$7 to \$20 per ton. **Development:** 500' adit, at depth of 300' with several winzes, drifts and upraises.

Equipment: two 3-stamp mills of 20 tons daily capacity, 20-h. p. engine and compressor. **Ore reserves:** 10,000 tons blocked out, according to published reports. Employs 15 men.

GOLINSKY MINING CO.**CALIFORNIA**

Idle. Mine near Kennett, Shasta Co., Cal. George Bayha, pres.; W. D. Tillotson, v. p. Sold to the Golinsky Copper Co. in 1911. **Property:** 14 claims, adjoining the Mammoth mine on the east and 4 miles west of Kennett, shows an ore shoot 30' wide carrying low-grade copper ore with gold

values. Equipment includes electric power. Reported held under bond by Mammoth Copper Co. in 1915.

GOOD SPRINGS ANCHOR CO.**NEVADA**

Office: 1202 Hollingsworth Bldg., Los Angeles, Calif. Mine at Jean, Clark Co., Nev. Officers: Frank A. Keith, pres.; Philip Wiseman, v. p.; R. I. Rogers, treas.; J. W. Keith, sec.; with Seeley W. Mudd, directors. Ray W. Moore, mgr. Inc. Dec. 20, 1913, in Nevada. Cap., \$1,000,000; shares \$1 par; issued, \$550,000. Annual meeting, second Monday in May.

Gross earnings from ore sales, 1914-1915, \$219,904.74; for 1915, \$165,659. First dividend paid in June, 1915; total for 1915, 16 cts. per share; total to date, including March, 1916, \$103,285.

Property: 7 patented claims, 140 acres, at Jean, said to show lead-zinc ore occurring as replacement deposits in limestone; strike N.-S., dip 50°. Developed by 212' winze from a 110' tunnel; greatest depth of workings 400'; total underground workings, 1,400'.

Equipment: includes a 6-h. p. gasoline hoist, 2,000' gravity tram, and a 50-ton dry concentrator using Stebbins table.

Production:

	Tons Crude Ore		Mixed Ore	Concts. Tons	
	Lead	Zinc	Tons	Lead	Zinc
1915.....	251	2184	....	32	35.4
1914.....	62	1998	239	....	....

Grade of ore and concentrates shipped:

	Crude		Mixed Ore		Zinc	Lead
	Zinc ore	Lead ore	% Lead	% Zinc	Concts.	Concts.
	%	% Lead	Oz. sil.	% Lead	% Zinc	% Pb. Oz. Ag.
1915.....	35.9	57.7	5.8	....	....	33.0 67.1 14.4
1914.....	38.2	71.6	7.2	23.0	25.9	....

GOONEY MANOR COPPER CO., INC.**VIRGINIA**

Front Royal, Warren Co., Va. Hugh E. Naylor, pres., gen. mgr. and purch. agt.; Lewis F. Cooper, v. p.; S. G. Waller, sec.; Geo. H. Bowman, treas.; preceding officers, H. C. Sheetz, N. S. Waller, S. M. Chiles, S. R. Millar, J. S. West, A. J. Sager, H. R. Kern, directors. Inc. July 12, 1909, in Virginia. Cap., \$500,000; shares \$100 par; issued 3763. Annual meeting third Tuesday in July.

Property: 84 acres, 5 miles south of Front Royal, reported to carry a fissure vein in porphyry and contact deposits between limestone and porphyry, with generally N. E.-S. W. strike and dip of about 55°. Main orebody is reported to average 7' width, and to be traceable 800', carrying a little malachite near surface, with chalcopryrite at depth, averaging 5% copper, 1 to 6 oz. silver and \$2.50 gold per ton. Orebodies apparently are lenticular. Development: by a 40' open cut, a 65' tunnel and by shafts of 250 and 228' without laterals, estimated by the company to show 35,000 tons of ore. Equipment: includes a 150-h. p. steam plant, with a 50-h. p. hoist good for 800' depth, and a 1-drill Rand air compressor. Buildings include a smithy, engine house, tool house and dwelling. Company plans developing the orebody for about 500' in length and building a mill. No shipments made since 1907.

GOOSE LAKE COPPER CO.**MONTANA**

Cooke, Park Co., Mont. John Martin, supt. Operating Copper King group, in 1912. Developed: by a 350' tunnel driven on the strike. Ore occurs in fissure veins in granite, carrying copper and silver values.

GOWGANDA COPPER CO.**NEVADA**

Letters returned from Goldfield, Nev., address. C. A. Braconier, pres.; Herman Krieger, sec.; S. H. Thompson, Reese Wampler, W. H.

Brock, directors. Inc. July, 1913, in Nevada. Cap., \$100,000; shares 10 cts. par. Property: 9 claims, near Round mountain, 14 miles south of Goldfield, said to show a deposit of low-grade copper ore. Workings are as yet shallow. Probably idle.

GRAFTER COPPER MINING CO.

YUKON

Geo. Armstrong, E. A. Dixon and J. P. Whitney, owners. Property: 1 claim, crown-granted, 50 acres, elevation 3,822', 1 mile N. of the Arctic Chief, near White Horse, Yukon, Can., has a 7-mile wagon road to the terminus of the White Pass & Yukon R. R.

Mine lies in an area of alternating bands of limestone and diorite, with aplitic cross dikes. Ore: consists of magnetite containing bornite and chalcopryrite, with a garnet-augite gangue. Ore is estimated to carry 8% copper and \$3 gold per ton. Mine opened 1900, but idle until 1907, has a shaft of about 90' depth, with 150' of workings, including some stopes nearly to the surface.

Equipment: includes steam power. Estimated 200 tons of high-grade copper ore on dumps. Operations resumed and mine unwatered in 1915.

GRAHAM COUNTY COPPER CO.

ARIZONA

Owns group of claims in Graham mountains, near Cedar Springs, Navajo Co., Ariz. W. C. Rohns, mgr., at last accounts.

GRANADENA MINING CO.

MEXICO

Closed down by revolution. Mine at Santa Barbara, Hidalgo, Chih., Mex., produces silver-lead ore with a small amount of copper. Fully described Vol. X.

GRANBY CONS. M., SM. & POWER CO., LTD. BRITISH COLUMBIA

Office: 52 Broadway, New York. Mine at Phoenix, Boundary district, B. C. Smelter at Grand Forks, Boundary district, B. C. Officers: Wm. H. Nichols, pres.; E. P. Earle, W. H. Robinson, v. p.'s.; Edwin Thorne, v. p.; F. M. Sylvester, gen. mgr., Vancouver; Northrup Fowler, sec.; Geo. W. Wooster, treas.; preceding officers, J. P. Graves, B. Hochschild, M. K. Rodgers, Sanford H. Steele, J. B. F. Herreshoff and Wm. A. Paine, directors; C. C. Mailloux, asst. to pres.; O. B. Smith, supt.; Wakeley A. Williams, smelter supt.; C. M. Campbell, supt.; J. C. McDonald, supt.

Inc. March 29, 1901, by special act of the British Columbia parliament. Cap., \$20,000,000, originally \$15,000,000; shares \$10 par, changed, 1906, to \$160 par; issued 149,985.15 shares. Bonds authorized Feb. 25, 1913, \$5,000,000, first-mortgage, 6%, 15-year, convertible at par. Series A of \$1,500,000 bonds underwritten Feb., 1912, at 96 by Speyer & Co. Bonds redeemable at 105 plus interest after 10 years, 4% to be retired by purchase at \$110, annually; \$3,440,000 outstanding June 30, 1915. Shares listed on Boston Stock Exchange. Boston Safe Deposit & Trust Co., Boston, registrar; American Trust Co., Boston, and Title Guaranty & Trust Co., New York, transfer agents. Annual meeting, first Tuesday in October.

Company was organized to purchase the property and assets of the Old Ironsides Mining Co., Knob Hill Gold Mining Co., Ltd., Gray Eagle Gold Mining Co., Ltd., Granby Consolidated Mining & Smelting Co., Ltd., and the Grand Forks Water & Light Co., at an aggregate cost of \$12,097,030. Stock to the amount of \$1,402,970 was issued for cash and services, rendered.

Comparative General Balance Sheet, years ending June 30:

Assets:

	Prop. & Equip.	Investments	Supplies Accts. Rec.	Cash. Ore & Metals	Total
1915.....	\$19,965,755	\$430,517	\$568,465	\$1,756,543	\$22,721,281
1914.....	19,630,026	514,809	525,097	1,375,794	22,045,726

Liabilities:

	Capital Stock	Bonds	Loans Unsecured	Current	P. & L. Surplus	Total
1915...	\$14,998,515	\$3,390,000	.....	\$ 664,680	\$3,668,087	\$22,721,281
1914...	14,998,515	2,290,000	\$960,000	1,057,296	2,739,914	22,045,726

Comparative Income Account, years ending June 30:

	Gross Sales.	Oper't'g Expenses.	Int. & Deprec.	Net Income.	Div. Paid.	Prev. Surplus.	P. & L. Surplus.
1915	\$5,058,886	\$8,713,329	\$411,898	\$929,164	.....	\$2,788,922	\$8,668,086
1914	4,504,786	3,882,695	182,520	489,651	\$899,901	3,199,272	2,788,922

Net profits for half year ending Dec. 31, 1915, were \$1,513,180. leaving a surplus of \$962,104.

Dividends:

\$133,630.....	1903	\$270,000.....	1909
339,991.....	1905	248,481.....	1910
1,620,000.....	1906	449,955.....	1913
1,215,000.....	1907	899,900.....	1914
540,000.....	1908	449,955.....	1915
		449,955.....	1916 (a)

(a) first half; present rate \$6 per share, payable quarterly.

Properties: include original Granby group at Phoenix in the Boundary district, B. C.; the Hidden Creek mine on Granby bay, Observatory inlet, B. C.; Copper Key and Belcher groups at Belcher mountain, Wash., taken over, 1910, under a working bond and lease; the Oversight group; the Bonanza mine on Bonanza creek; 30 quartz claims on Granby Peninsula; Mamie and Dean mines on the Kasaan Peninsula; the Midas mine at Valdez, and an option on the It mine adjoining the Dean on Prince of Wales Island. Also owns a large interest in the coal mine and coking plant at Crow Nest Pass, and a 100,000-h. p. waterpower plant at Kettle Falls, both together valued at \$2,000,000; a smelter at Grand Forks, operated since 1901, and one at Anyox, blown in 1914.

The Phoenix Mines.

C. M. Campbell supt., Phoenix, B. C.

The Granby or Knob Hill properties at Phoenix, B. C., 43 claims and fractions, 1,050 acres, 15 claims being in the mineralized area, include the Old Ironsides, Knob Hill, Victoria, Gray Eagle, Banner, Tip Top, Triangle, Gold Drop, Curlew, Monarch, Tamarack, Monte, No. 13, and others. Claims form a compact tract of about 8,000x9,000' size, carrying 8,000' of the strike of the mineralized zone. The Phoenix property has 2 distinct sets of orebodies. The largest and longest worked are those of the Knob Hill-Ironsides mines; the other one, one-half mile east, is the Gold Drop. The first named has 3 mines with separate crews and equipment.

Geology: of the district is not simple. Paleozoic rocks, limestones, tuffs and argillites overlie beds of fragmental volcanic rocks with small amounts of limestone. These rocks are intensely altered by contact metamorphism, due to igneous intrusions, and orebodies formed in basin-shaped troughs in the zone of mineralization. They are replacements of limestone by garnet, epidote, quartz-calcite, with magnetite and finely-divided copper pyrite. The footwall is either jasperoid or limestone; the hanging wall is determined by assays.

The Old Ironsides-Knob Hill claims carry the main orebody, the Gold Drop ore deposit being irregular in shape, and of limited size. The main orebody has an approximately N. S. strike, with an eastward dip of 60° at surface and 30° at depth. Ore now being mined at Phoenix yields slightly less than 15 lbs. copper and about 79 cts. in gold and silver per ton. The mine is opened by an immense pit, or glory-hole, 400x1,000' in size,

which, however, is worked out and present extraction is mainly through tunnels. On the Gold Drop only 61,400 tons of ore remain to be extracted, and the Snowshoe, Curlew and Monarch claims are almost worked out. Practically all reserve tonnage is in the Ironsides.

Development: 5 shafts, the more important being the 300' Aetna shaft, 400' No. 2 shaft, and the 485' Victoria shaft. Principal extraction is by tunnels, including the 250' Knob Hill tunnel; 250' No. 1 Gold Drop tunnel; 1,000' No. 3 Gold Drop tunnel; 2,500' No. 2 tunnel; 3,000' No. 3 tunnel, and 1,500' No. 4 tunnel. The ore stoped is milled through chutes to lower levels, the mine having electric haulage on the 200', 300' and 400' levels, with double-tracked tunnels, equipped with 75-h. p. locomotives drawing 10-ton ore cars. Development for 1915 included 16,842' of underground work and 5,416' diamond drilling, or about 1,000' per month, adding 14 cts. per ton to cost of ore mined. Total shipments up to June 30, 1915, have been: above No. 3 tunnel, 5,882,468 tons; Victoria shaft, 3,799,767 tons, and Gold Drop mine, 1,369,600 tons.

Average cost per ton crushed on cars including all development was 85.1 cts. Ore is smelted direct; cost of copper after crediting gold and silver values is slightly more than 13 cts. per lb. The mechanical equipment at the mine is fully described, Volume X.

The 3 main haulage tunnels are each equipped with 150-ton crushers, and bins of 2,000 and 3,000 tons capacity. The main crusher house, at the portal of No. 3 tunnel, has a 30x42" Farrell-Bacon crusher, driven by a 150-h. p. Westinghouse motor, the crusher being capable of breaking masses of nearly a cubic yard in size to chunks not larger than 7 to 8". This crusher was shipped to Anyox, when the properties closed down in August, 1914, following the declaration of war in Europe. A 42" rubber belt conveyor, with capacity of 250 tons hourly, handles the ore. An electric shovel installed in 1915 proved very satisfactory. Operating costs were about 75 cts. per ton crushed in cars; 5 new 10-ton cars with automatic side-dump arrangement being constructed in 1916.

The mine is connected with the smelter at Grand Forks, 24 miles distant, by 2 railways, the Canadian Pacific and the Great Northern. By means of extensive ore bins at the Victoria shaft and the 3 main tunnels a train of 35 thirty-ton cars can be loaded in 25 minutes or less.

Hidden Creek or Anyox Mines.

H. J. C. MacDonald supt., Anyox, B. C.

The Hidden Creek mine is located on Granby (formerly Goose) bay, Observatory inlet, south of and parallel to Portland canal. It is probably the largest copper mine of British Columbia. The 9 claims cover the top and sides of a hill 920' high, enclosed by 2 branches of Hidden creek and 2 miles from Anyox, the smelter site and seaport town of the company.

The ore occurs as a mass of solid sulphides, pyrite and chalcopyrite, or mixed with country rock in shear zones, in crushed and schistose argillite. The rocks are folded and mashed but are part of the cover of the great granite mass forming the Coast range. There are 2 deposits, one 25 to 40' wide, traced 1,400', said to average 6%, the other estimated to be 100' wide and of unknown length. Development by diamond drill holes shows the ore to extend 300' below sea-level, a vertical distance of 1,250' below outcrop.

Development: by tunnels with principal workings on the 750' cross-cut main tunnel, which is about 450' from the surface.

Company also owns the Bonanza group, adjacent to the Hidden Creek mine. No development work was done on this property in 1915.

The Midas Mine.

The Midas mine, 12 claims, 9 in 1 group and 3 in another, in Solomon basin, 790' above tidewater and 6 miles from Valdez bay, was acquired in 1915. Claims show an ore deposit from 25 to 200' feet wide, stripped in 8 places and traceable 1,500' running N. 70° W. and dipping 45° S. W. Ore carries chalcopyrite mixed with pyrite in a slaty gangue.

Development: by a 2,000' crosscut tunnel with 400' upper level and 700' lower level, all in 7% ore. Development made under a \$540,000 bond by the Alaska Syndicate, Sept., 1912, to June, 1913, consisted of 1,700' of workings said to block out 200,000 tons of 7% ore. Ore as a whole is said to average about 6% copper and \$2.40 gold. **Equipment:** includes an aerial tramway, compressor and necessary mine buildings. Shipments will be made as soon as power is secured.

The Mamie, Dean and It mines were under development in 1915. Shipments amounted to 15,000 tons of 1.5% copper ore, with reserves of 130,000 tons, June 30, 1915. For calendar year 1915 the Mamie mine is said to have produced 40,000 tons ore; 70 men reported working in May, 1916, producing 200 tons ore daily.

Ore reserves: estimated, June 30, 1915, exclusive of Midas mine:

	Tons	% Copper
Phoenix Mines	4,232,405	....
Hidden Creek	9,205,837	2.2
Hidden Creek	8,628,000	0.63
Bonanza	414,775	2.6
Bonanza	489,580	0.7
Mamie and Dean.....	130,000	1.5
Total	23,100,597	

Note: Phoenix mines estimated to give returns of 17 lbs. copper and 40 cts in gold and silver per ton ore. At present rate of production they will be exhausted in about 5 years or less.

Grand Forks Smelter: company's reduction plant at Grand Forks has up-to-date smelting, converting and power plants, with 2,000 acres of land and 68 town lots. Smelter has 4,400 tons daily capacity, being the largest in Canada, and among the largest in the world. Steel storage bins hold 8,000 tons of coke and 13,000 tons of ore. Ore is handled by 4 electric locomotives, each drawing two 2-ton cars, constituting a single charge; the ore being practically self-fluxing, is charged without concentration, or assortment, just as it comes from the mines, with the addition of limestone and fuel.

The 8 blast furnaces are 4x22' in cross-section at the tuyeres. A steel dust chamber, set 22' above the charging floor, is 13' wide, 15' high and 313' long, with a floor of 28 hoppers, having a conveyor underneath for flue dust. Slags now granulated are dewatered, carried on conveying belts to a height of 120' and discharged.

The first-fusion 40% matte is taken in ladles by a 40-ton electric traveling crane to the converter house, which has 3 stands, electrically operated by 25-h. p. motors, with ten 84x126" shells of barrel type. There are 3 mould carriers under each stand and the product is blister copper of 98.5% tenor, containing an average of 18 oz. silver and 4 oz. gold per ton, sent to the Laurel Hill works of the Nichols Copper Co., for electrolytic refining.

The smelter power plant is driven by electricity. Equipment includes 9 small blowers and 2 Connersville Jumbo blowers, with capacity of 100,000

cu. ft. of free air per minute, driven by two 300-h. p. motors. Converter blast is furnished by an Allis-Chalmers double-cylinder air compressor, with capacity to reduce 10,000 cu. ft. of free air per minute to a pressure of 15 lbs. per square inch, driven by a 500-h. p. direct-connected electric motor.

Operations were suspended Aug. 7, 1914, to Dec. 7, 1914.

In March, 1914, the new smelter at Anyox on Observatory inlet was blown in. The plant has 4 furnaces, 52" wide and 30' long, and is the largest pyritic smelter in the world. Daily capacity is from 2,000-2,500 tons. Company has laid out a town, installed water works, electric plant, graded streets, built stores, hospitals, etc.

Recent production: for years ending June 30, except 1916, which is for 9 months ending March 31:

	Ore			Cost per Ton		Lbs. Cu. Tot. per Ton	Copper Lbs.	Silver Oz.	Gold Oz.	Cost Cu. (b)
	Tons (a)	Mng.	Sm.	\$...	\$....					
1916..	.....	\$...	\$....	\$....	.....	28,122,261	.....	.....	.....	.....
1915..	1,098,020	.85	1.19	3.18	23.99	26,638,912	377,881	31,388	10.66	
1914..	1,289,000	.80	1.22	2.73	16.89	23,320,097	435,275	43,882	11.5	
1913..	1,279,869	.75	1.21	2.65	17.68	22,688,614	324,336	47,266	10.6	
1912..	739,519	.77	1.26	2.90	18.01	13,231,121	225,305	33,305	11.1	

(a) In 1914 and 1915 approximately 2% of ore treated was custom ore. (b) after crediting gold and silver.

Note: In 9 months' period ending March 31, 1916, company produced 28,122,261 lbs. copper, of which 15,971,786 lbs. were produced at the Anyox smelter. Anyox mines, from 516,381 tons ore, yielded 105,951 oz. silver and 28,254 oz. gold. Cost of copper produced from Anyox and laid down in New York was 10.36 cts. and from Grand Forks, 13.71 cts. Copper unsold in New York reported as 11,093,318 lbs. Total net income for this period was \$2,373,863, of which all but \$39,157 was net operating profits of the Anyox and Phoenix mines; added to surplus \$1,531,588.

The production cost of 13+ cts at Phoenix will not be reduced materially during the remaining life of the mines, but the cost, 9.72 cts at Anyox, should be lowered. Production, 3,555,411 lbs. copper and 33,622 oz. silver, in March, 1916, will be increased to 4,000,000 lbs. copper monthly. At this rate and with copper selling at 30 cts. per lb and silver at 75 cts. per oz., the company will earn at the rate of \$55 per share annually, or sufficient to write off the entire cost of the new smelter at Anyox, and its mining properties at Hidden Creek. With 15 ct. copper Granby should earn \$2,500,000 per year.

Granby is under efficient, progressive management and its future looks bright.

GRANBY MINING & SMELTING CO. OF MISSOURI MISSOURI (Subsidiary of Amer. Zinc, Lead & Smelting Co.)

Granby, Newton Co., Mo. Inc. in 1864. In June, 1916, net quick assets exceeded \$2,750,000, of which nearly \$1,000,000 was in cash; current liabilities, less than \$300,000. Reported in June that company had declared a dividend of \$2,000,000 in the form of 10-year, 5% bonds, secured by mortgage of its real estate, and the company subject to this mortgage, had been taken over by the Granby Co. of Maine, to be then taken over by the American Zinc, Lead & Smelting Co. Purchase price, \$8,000,000. The \$2,000,000 bond issue has been taken as part payment; and it is proposed to furnish \$2,000,000 additional by an issue of 40,000 shares of common stock of the American Z. L. & Sm. Co., to be offered stockholders at \$50, stock to be underwritten without commission; remaining \$4,000,000 to be

paid for out of earnings. Value and earning capacities of properties based on a 5-ct. spelter market.

Property: owns in fee simple about 30,000 acres of land in the zinc district of southwestern Missouri. For nearly 50 years its revenues have come from royalties paid by lessees operating on these lands. Within the past 3 years it has itself developed a large tonnage of rich ore near Granby. Company has been a dividend payer almost from its inception, and has, out of earnings, acquired 10,000 acres of coal land in Illinois; built a new coal zinc smelter and sulphuric acid plant in East St. Louis; bought and improved a gas zinc smelter at Neodesha, Kansas, and acquired a small lead smelter at Granby. Approximately 75% of the Granby spelter to be produced during balance of 1916 has already been sold on firm contracts, together with a considerable tonnage through 1917, and all its sulphuric acid has been sold up to and through 1920.

GRAND CENTRAL MINING CO.

UTAH

Office: Provo, Utah. **Mine office:** Mammoth, Juab Co., Utah. **Officers:** Jos T. Farrar, pres.; H. L. Holbrook, v. p.; Preston G. Peterson, sec.-treas.; Col. Edwin C. Loose, gen. mgr.; W. D. Loose, Kansas, Inc. Feb. 1902, in Colorado. **Cap.,** \$600,000, increased 1909 from \$250,000; shares \$1 par, nonassessable; issued 500,000. Stock listed on Salt Lake Exchange. Last dividend 2½ cts; total dividends to Jan. 1, 1915, \$1,615,250.

The Grand Central is the deepest mine of the Tintic district. It adjoins the Centennial Eureka and is opened to the 2,600' level, carrying a vein with an orebody 200' feet wide in places and of low average grade, though it is the largest orebody in the Tintic camp. A second ore shoot, 700' west of the old one, and with parallel strike, was opened, 1910, on the 2,000' and 2,100' levels. This ore shoot averages 15 to 20% copper on the 2,380' level and has been opened up on the 1,600' level for a distance of 1,200', showing a width of 50 to 100'. At this point the ore is bunchy, requiring careful sorting. Mine producing, 1915, from the 600' to the 2,300' levels, inclusive.

Equipment: includes hoist, tramway and electric power. Mill to be constructed after the Knight Christensen plant has proved successful.

Production: for 1915 was 9,100 tons of ore. Employs about 35 men. Property and management good.

GRAND GULCH MINING CO.

ARIZONA

Office: 503 McIntyre Bldg., Salt Lake City, Utah. **Officers:** Wm. H. McIntyre, pres.; Frank R. Snow, v. p.; W. P. Jennings, sec.-treas.; preceding officers, Jas. E. Jennings, Wm. C. Jennings, Jos A. Jennings, directors; S. R. Calloway, supt. St. Thomas, Clark Co., Nev. Inc. Sept. 15, 1874, in Utah. **Cap.,** \$750,000; shares \$2.50 par; issued, 600,000. Total assessments to end of 1915 were \$14,400. Dividends: total \$7,195; last dividend 1 ct. per share declared in Dec., 1915. Annual meeting, first Monday in February.

Property: 9 claims, 1 patented, 180 acres, in the Bentley district of Mohave county, Ariz., but more easily accessible from Nevada than from southern or central Arizona, owing to the barrier to access presented by the Grand canon of the Colorado river. Property shows sandstone and limestone carrying an apparently circular zone of copper impregnations, also having copper in the bedding planes. Ores occur as cuprite, melamnite, malachite, azurite and chalcocite, estimated by management to assay 35% copper and 4 oz. silver per ton. **Development:** by a 500' shaft. Mine is 45 miles from St. Thomas, Nev., railroad terminal on the San Pedro railroad. The mine has been in practically continuous operation since 1899.

Equipment: includes a 22-h. p. gasoline hoist, good for 800' depth, and a 2-drill air compressor. There are 9 buildings and a small and antiquated smelter, of no present value. Production, to end of 1909, was 299,154 lbs. fine copper. In 1915 shipments amounted to 824 tons ore running 20% copper. Employs 40 men.

GRAND REEF MINE.**ARIZONA**

R. V. Dey, owner, 28 W. 88th St., New York. **Property:** 14 claims, patented, in the Aravaipa district, Graham Co., Ariz. **Ores:** occur in fissure veins between granite and porphyry with average values of 3½% copper, 24% lead, 12 oz. silver and \$2.30 gold per ton. Developed by 7,500' of workings in which superintendent estimates 175,000 tons of ore blocked out. **Equipment:** includes steam hoist and 7-drill air compressor.

Property worked under lease by Laurel Canyon Mng. Co. in 1915-16 and reported shipping 1-2 cars of concentrates per week to El Paso smelter. Thirty men employed.

GRAND TRAVERSE & ARIZONA MINING CO.**ARIZONA**

Idle since 1910. **Office:** 129 East Front St., Traverse City, Mich. Mine near Cave Creek, Maricopa Co., Ariz. Owns 3 patented claims. Fully described Vol. X, Copper Handbook.

GRANDINA MINING CO.**NEVADA**

Goldfield, Nev. **Officers:** Chas. S. Sprague, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas.; with P. J. Somers, Jr., and S. A. McCandless, directors. Inc. Nov. 1904, in Ariz. **Cap.,** \$1,500,000; outstanding \$1,468,000; shares \$1 par. Company reported in February, 1916, that a reorganization was soon to be effected, capitalization increased and stock placed upon an assessable basis. Annual meeting, first Tuesday in Nov. Listed on Salt Lake Exchange.

Property: 1 patented claim, 18½ acres, at Goldfield. Company was planning to acquire 20 to 40 acres adjoining ground upon reorganization. Property is bounded on the west by Kewanas, on the east by Blue Bell, and on the south by Spearhead. The Spearhead vein is said to outcrop on Grandina ground, though location of the claims precludes apex litigation. Property has been idle for some time. Little development work has been done to date, but work is to be resumed upon completion of reorganization.

GRANITE COPPER CO.**UTAH**

Beaver, Beaver Co., Utah. A. L. Fotheringham, pres. and mgr.; Jos. McEwen, v. p.; J. F. Tolton, sec.-treas., at last accounts. **Cap.,** \$1,000,000; shares \$1 par. **Property:** in the Mineral range between Milford and Beaver, Utah, has a 2' vein, carrying high-grade silver-lead ore with some copper, opened by a 250' shaft and tunnel. Was developing, 1914.

GRANITE GOLD MINING CO.**ALASKA**

Valdez, Alaska. **Officers:** B. F. Millard, pres. and treas.; W. R. Millard, 1st v. p.; O. S. Larsen, 2nd v. p.; J. W. Gibson, sec.; above, with Nick Carter and Jafet Lindeberg, directors. Inc. 1913, in Alaska, upon purchase from original locators for \$50,000. **Cap.,** \$500,000; shares \$1 par; outstanding 430,000 shares. Annual meeting first Tuesday in October. **Transfer office:** Chilberg Bldg., Seattle, Wash. Listed on New York Curb, Spokane and Seattle Exchanges.

Company claims to have spent \$330,000 to March, 1916, on the property, and to have had a total production of \$277,000. Monthly expenses \$8,000 to \$10,000, with a monthly output of \$20,000; surplus claimed March 1, 1916, \$21,000. Initial dividend, 2 cts. per share, paid April 10, 1916, and 2 cts. paid in May.

Property: 3 claims, 60 acres, unpatented, on the west side of Port

Wells, on the coast between Hobo Bay and Harrison Lagoon, covers 3,000' of a vein of 3-3½' average width, strike N. 60° W., dip 31° N. Country rock consists of interbedded slates, graywackes and argillites cut by large masses of granite. Present development is said to indicate a split in the vein on the 200' level, continuing as two veins below this level. Metallic ore minerals are gold, and the sulphides of iron, zinc, lead and antimony. Ore said to run from \$6 to \$50 with average of \$12 per ton. See U. S. G. S. Bull. 622, pp. 136-138.

Development: 200' incline shaft and tunnels, with 4 levels opened up from 300' to 500' in length. Total underground workings about 3,000'. Two levels are worked through the shaft, the other two through the 900' lower tunnel. Reported in April, vein had been cut on lower tunnel level about 900' from portal, said to give an additional 300' of back.

Equipment: includes 15-h. p. gasoline hoist, 180-h. p. oil-burning engine, 5 gasoline engines of from 7 to 36 h. p., 150-h. p. electric generator, 100-h. p. motor operating an air compressor, 600 cu. ft. capacity, 4,800' transmission line, and a 70-ton concentrator equipped with a 10-stamp Hendy mill, 7' Lane mill, crushers and rolls.

Production: April, 1916, averaged 60 to 70 tons per day, yielding about \$20,000 gross per month.

Reported in June that mill had been closed down, that a mistake had been made in figuring ore reserves and that development work was being done in an attempt to open up ore.

GRANITE GOLD MINING CO.

COLORADO

Officers: 301 Mining Exchange, Colorado Springs, and Victor, Colo.

Officers: C. M. MacNeill, pres.; C. C. Hamlin, v. p., treas. and gen. mgr.; C. B. Garnett, asst. treas., with Michael Finnerty, J. W. Graham, C. L. Tutt, directors. D. L. McCarthy, supt.

Inc. 1905, in Wyoming. **Cap.**, \$1,750,000; shares \$1 par; nonassessable; outstanding \$1,650,000; stock transferred at company's office. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, 4th Monday in April. Stock has been very closely held, but was listed on Colorado Springs Exchange in July, 1915.

Owns all the stock, excepting 3 shares, of the Little Montana Mining Co. Those portions of the Granite Gold property lying within the City of Victor were incorporated as a separate company, the Little Montana Mining Co. Financial statement of this company for 1914 shows: gross income, \$19,845; expense, \$21,241; net loss, \$1,396.

Gross production for 1915: (Granite Gold Mining Co.), \$534,459, with a net production of \$337,705. Financial statement for 9 months ending Dec. 31, 1914, showed an operating profit of \$17,367, but with general expense, \$27,768, and depreciation \$28,055, charged off, there was a net loss of \$38,456. Total production to 1916, approximately \$14,500,000.

Dividends: paid to date, \$286,500. Last dividend paid Nov. 15, 1912, \$16,500.

Property: 11 claims, 40.5 acres, patented, in the Cripple Creek district. In 1914, to avoid apex litigation, the Dead Pine claim, owned by the Raynor Gold Mining Co., was bought for \$87,500. The main production of the company is now coming from this claim. For geology of the Cripple Creek district, see U. S. G. S. Prof. Paper 54.

Development: by shafts with several miles of underground workings. The Dillon shaft is 1,600' deep, the Gold Coin shaft, 1,300' deep. The Roosevelt tunnel will, when completed, drain Granite Gold ground and deeper development will be possible. In March, 1916, an orebody said to be over 450' long, was being developed on the 1,400' level of the Dil-

lon shaft, the ore shoot following the contact of the Little Montana phonolite dike with the granite. There is 550' of unprospected ground between the bottom of the Dillon shaft and the Roosevelt tunnel level. Upper levels of the various properties are operated under lease; lower levels are worked by company.

Equipment: mines are well equipped; a new hoisting plant good for 2,000' is being installed at the Dillon shaft. Employs 75 men.

Production: a heavy tonnage of ore is mined and shipped monthly from the Granite, Dillon, Gold Coin, Monument and Dead Pine mines of the company. Production in Jan., 1916, reported as 3,300 tons, average value \$30 gold per ton.

GRANITE HILL COPPER MINE.

NEVADA

Property: 14 miles N. W. of Reno, Nev., now owned by Nixon-Nevada Mining Co., which see.

GRANITE MINING & MILLING CO.

UTAH

Santaquin, Utah. **Officers:** E. O. Bylund, pres.; Jos. Tietjen, v. p.; Jas. Goodall, sec.; C. A. Linstrom, treas. and supt.; preceding officers, T. B. Heelis, R. J. Armstrong, and Jos. Crook, directors. **Property:** 12 claims, unpatented, near Santaquin, includes the Granite mine, claims show limestone with ore-bearing fissures, carrying replacement deposits of copper and silver-lead ore developed by 1,000' tunnel. Tunnel driven 44' in 1915.

GRANITE TUNNEL CO.

COLORADO

Jacob C. Kirsch, supt., Granite, Chaffee Co., Colo. **Property:** the Yankee Blade mine, shows lead-copper ores in D. C. C. vein, from 2-7' wide, said to assay \$30. Developed by 1,700' tunnel. Operated intermittently.

GRANT CONSOLIDATED COPPER MINING CO. WASHINGTON

Chesaw, Okanogan Co., Wash. Geo. A. McLeod, mgr.; A. D. McPhee, supt., at last accounts. Inc. 1907, in Washington. **Cap.**, \$1,650,000. **Property:** 14 claims, on Copper mountain, near Chesaw, developed by an open cut and tunnel planned to be driven 1,500', cutting 2 strong veins carrying medium-grade chalcopryrite in considerable quantities. Shipments said to have returned about 6% copper and \$3 gold per ton. **Equipment:** includes two 80-h. p. boilers and an air compressor. Letters neither answered nor returned.

GRANT MINE.

NEW YORK

Mine near Carmel, Putnam Co., N. Y. The orebody consists of a complex of arsenical sulphides, carrying copper, quicksilver, gold and iron. The crude ore is estimated to have a gross value of about \$25 per ton, but, on account of its refractory nature, has no present commercial value, and cannot be utilized without special metallurgical treatment. Closed down for several years.

GRASS VALLEY CONSOLIDATED GOLD MINES CO.

CALIFORNIA

Recently incorporated. **Cap.**, \$900,000; shares \$1 par. C. A. Brockington, supt. Owns the Golden Center mine in Nevada county. During the year ending March 1, 1916, 2,200' of development work was done; 7,969 tons of ore crushed: gold recovered \$112,352, and concentrates \$21,638, a total of \$133,991, an average of \$16.81 per ton. Company paid \$58,000 for property; erected plant costing \$35,401; made a profit of \$49,843; and paid \$21,990 dividends.

Company is planning additions to mill and building a cyaniding plant. Reported to have purchased the Allison Ranch mine, south of Grass Valley which has been closed since July, 1902.

GRATIOT MINING CO.**MICHIGAN**

Idle. **Office:** 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. **Officers:** Rodolphe L. Agassiz, v. p.; Geo. A. Flagg, sec-treas.; Jas. MacNaughton, gen. mgr.; Walter Hunnewell and Francis L. Higginson, directors. **Inc.** Feb. 16, 1906, in Maine. **Cap.,** \$300,000; shares \$3 par, fully paid. Is controlled, through ownership of 50,100 shares, by the Calumet & Hecla Mining Co. Ended year Dec. 31, 1914, with debit balance of \$400,833.

Property: 600 acres, the N. W. $\frac{1}{4}$ of Sec. 26, N. E. $\frac{1}{4}$ of Sec. 27, S. E. $\frac{1}{4}$ of Sec. 23, and S. E. $\frac{1}{4}$ of Sec. 22, except the N. W. $\frac{1}{4}$ of the N. W. $\frac{1}{4}$, T. 57 N., R. 32 W. Property lies S. and E. of the Seneca and N. and E. of the Mohawk, carrying the Kearsarge amygdaloidal bed under about 175 acres, to a maximum depth of about 2,700'. Extensive drill borings were made before the shafts were started. The Kearsarge bed averages about 12' in width, with strike of N. 42° E., and average dip of 33 to 36° with the horizon, and its copper contents are painfully low.

Development: by two 3-compartment shafts, exact duplicates, sunk at an angle of 36° on the Kearsarge bed. Levels are opened at 100' intervals.

No. 1 shaft, about 1,500' from the Seneca boundary, is 1,900' deep, having a bed up to 18' in maximum width. Drifting has been done on the alternate odd-numbered levels, from the 1st to 9th, inclusive.

No. 2 shaft, 1,475' S. W. of No. 1, and 1,800' N. of Mohawk No. 1, is 1,520' deep, and drifting has been done on the 2nd, 3rd, 5th, and 7th levels, the best showing being on the 5th.

Property is served by a $2\frac{1}{4}$ -mile spur of the Mineral Range railway, built north from the Mohawk mine.

Production: begun July, 1910, was 28,552 tons of rock, yielding 265,869 lbs. fine copper, and in 1911, was 1,347 tons rock, yielding 14,275 lbs. fine copper, or about 9.3 lbs. copper per ton of rock milled. The mine was shut down April 3, 1911. It is obvious that, owing to its comparatively small size and shallow depth, the Gratiot cannot work the Kearsarge bed profitably at the average price of copper, except on a very large scale, and it could be operated much more advantageously in connection with the Seneca than alone.

GRAY COPPER MINING CO., LTD.**IDAHO**

Osburn, Shoshone Co., Idaho. E. F. Hall, pres.; W. H. Herrick, sec. and mgr. **Cap.,** \$375,000; shares 25 cts. par. **Property:** 7 claims, 2 very hard miles from a railroad, on McFarren gulch, 12 miles from Osburn, shows a vein of 6 to 20' surface width, developed by a combination cross-cut and drift tunnel, showing mainly gray copper ore, said to average 17% copper, 20 oz. silver and \$10 gold per ton. No recent returns secured. Probably idle.

GREAT BRAS D'OR MINING CO.**NOVA SCOTIA**

Baddeck, Victoria Co., N. S. **Mine office:** Middle River, Victoria Co., N. S. D. J. Patriquin, mgr. Operates a gold mine which during year ending Sept. 30, 1914, produced 775 tons ore, yielding 262 oz. gold.

GREAT BRITAIN GROUP.**ALASKA**

Owned by a Vancouver and Victoria syndicate. **Property:** at Whalebone cove, on the western shore of South Valdez island, Alaska, comprises 4 claims, showing bornite, tetrahedrite and chalcocite ore, occurring in the contact between limestone and altered lime. **Developed:** by 3 tunnels, showing 4 to 12% copper ore. Ore blocked out estimated at 1,800 tons by F. J. Crossland. Shipments of 700 to 800 tons have been made to the Tacoma smelter, said to average 3% copper. A 500-ton bunker was

being erected on the beach for loading shipments on vessels. Probably idle. No returns secured.

GREAT COPPER KING MINING CO.

UTAH

Inc. Aug., 1904, in Utah. **Cap.**, \$50,000; shares 10 cts. par; issued, \$47,500, assessable; last assessment 1/10 ct. delinquent March 7, 1914. **Lands:** 10 claims, unpatented, including 4 claims, 1 fractional, held under bond and lease, near the mouth of Little Cottonwood canyon, 7 miles from Alta, Salt Lake Co., Utah. Mine has shallow shafts and a 330' tunnel, with about 800' of workings, showing auriferous and argentiferous copper and lead ores. Ore occurs in fissure veins as contact deposit in granite and quartzite.

Samples taken from main tunnel on 300' level said to assay from 19-33% copper. J. E. Smith, a director, is developing property under contract in 1916.

GREAT DIVIDE MINES CO.

UTAH

Inactive. **Office:** 422 McCornick Bldg., Salt Lake City, Utah. **Mine Office:** Lincoln, Tooele Co., Utah. **Officers:** Henry A. McCornick, pres.; Walter A. Cooke, v. p. and gen. mgr.; Jos. H. Hurd, sec.; Rodney T. Badger, treas.; John B. Taylor, supt. Inc. Aug. 15, 1903, in Utah. **Cap.**, \$2,000,000; shares \$5 par, nonassessable. Company controls Western Mining & Milling Co. and Homestead Tunnel & Copper Co.

Property: 108 claims, mainly patented, 1,735 acres, 600 considered as well mineralized, with 160 acres mill and smelter sites, lying on the Tooele side of the Oquirrh mountains and on the summit of the range, west of the holdings of the Utah Consolidated. Property shows Cambrian quartzite, monzonite-porphry and altered limestone, with a number of fissure veins and contact deposits between limestone and quartzite. Claims cover 11,600' on the westerly course of the mineralized limestone beds of Bingham. This tract is 2 1/6 miles from E. to W. and 10,800' N.-S., and contains the apexes of many ore-bearing fissures, and the westerly extensions of the ore-bearing limestone bed worked in the Utah Consolidated, Bingham, New Haven, Utah, Apex and Yampa mines.

Development: includes the 400' Homestake tunnel in Pine Canyon; 525' North tunnel at 6,600' elevation, and the 2,457' Spring tunnel. These tunnels are prospect work only, but ore is cut in the last named at 1,050' in, and shows a 5' width for 40' along the drift and in a 25' raise. A vertical E. W. fissure 100' wide is also cut at 2,250' from the portal and shows kidneys and stringers of silver-lead ore.

Equipment: includes a 35-h. p. electric plant, with a 1-drill Ingersoll air compressor, and there are 10 buildings, including a small power house, 2 smithies, a bunk house, stable and dwellings. Electric current is taken from the Telluride Power Co., over this company's private line from the sub-station at Bingham. Property considered promising.

GREAT EASTERN GROUP.

NEW MEXICO

Santa Rita, Grant Co., N. M. Al. Owen, owner. **Property:** 8 claims, 160 acres, adjoining Chino Copper Co.'s lands on the east side of the Santa Rita basin. The S. W. side of the group shows a quartzite capping and iron gossan, with limestone covering porphyry over other parts of the claim. Veins with a N. E. course outcrop and show small percentages of copper. Developed by shallow shafts. Owner was preparing to drill property in 200' blocks, at last accounts.

GREAT EASTERN MINING CO., LTD.

IDAHO

Wallace, Idaho. **Officers:** John Carlson, pres.; Edwin Erickson, v. p.; John C. Furst, sec.-treas. John Carlson, Chas. Solberg and John C. Furst,

directors. **Inc.** Sept. 19, 1900, in Idaho. **Cap.**, \$1,000,000; outstanding \$800,000; shares \$1 par. Annual meeting in April.

Property: the Great Eastern group, 14 claims, patented in Lelande mining district, 4½ miles N. E. of Wallace, said to show silver-lead-zinc ore in fissure veins. **Development:** by shafts and tunnels, longest tunnel 3,000'. Claims are still in the development stage, and have been for a number of years. Management states that \$6,000 was spent in 1915 on development work. Property is easily accessible to Northern Pacific and Union Pacific (O.-W.) railroads.

GREAT FALLS MINE.

MARYLAND

Formerly called the Hill-Townsend Gold Mine, in Montgomery Co., Md. In 1914 the old workings were cleaned out, the shaft retimbered, and new drifts run. The 25-ton tube mill was only used to make tests of ore mined. Small shipments were made to the smelter and results said to have been satisfactory.

GREAT NORTHERN COPPER CO.

MINNESOTA

Idle since 1911. Was to be reorganized in 1914, but no recent information has been received. **Office:** 504 Globe Bldg., Minneapolis, Minn. Mine at Hinckley, Pine Co., Minn. Fully described Vol. XI, Copper Handbook.

GREAT NORTHERN COPPER CO.

MONTANA

Owns the Great Northern mine, 1 mile north of Tava, Flathead Co., Mont. **Developed:** by several tunnels, 200 to 500' long, on the strike of the vein. **Ore:** principally gold and copper.

GREAT NORTHERN COPPER CO.

NEWFOUNDLAND

Idle. **Office:** Commonwealth Bldg., Pittsburg, Pa. **Mine office:** Twillingate, Newfoundland. **Officers:** Obadiah Hodder, pres. and gen. mgr.; W. S. Tannehill, v. p.; Roselle C. Burns, sec.; Geo. B. Klein, treas.; preceding officers, Jeremiah Doody, Titus Hodder, Robt. M. Ewing and Chas. Hardenberg, directors. Wm. Brown Sterrett, chemist. **Inc.** 1905. **Cap.**, \$100,000; shares \$1 par. Company was combined with Notre Dame Copper Co. and Hodder Supply Co. of Pittsburg, in 1912.

Lands: 320 acres, freehold, on Twillingate, North Island, on the eastern coast of Newfoundland, in the vicinity of the Tilt Cove mine. Company claims a vein 163' wide, uncovered for one-half mile and tested to depth of 200', carrying chalcopryite assaying 2 to 27.4% copper, and company claimed, early in 1909, that ore then being mined averaged 12% copper, which claim is too high for credence. Ores of this district, as developed elsewhere, average about 4% copper, 50% sulphur and \$1.50 gold per ton, and are somewhat lumpy, with sphalerite frequently found in connection with the chalcopryite. Mine is worked opencast.

Equipment: includes steam power and a hoist, with a tram line and 2,000-ton ore bins on the sea.

GREAT NORTHERN DEVELOPMENT CO.

ALASKA

Office: 2 Rector St., New York. **Operating office:** Valdez, Alaska. **Mine and works office:** Phillips, Alaska. **Officers:** Jas. Phillips, Jr., pres.; E. F. Gray, v. p.; Walter M. Briggs, sec.-treas.; Edwin F. Gray, gen mgr.; preceding officers, J. C. Fairchild, H. F. Knoblauch and H. I. Gaskill, directors. **Inc.** 1906, in Maine. **Cap.**, \$1,000,000; shares \$10 par, nonassessable; issued, 70,100. Is a holding company. Annual meeting, first Tuesday in November. Petley Morse & Co., auditors, 43 Exchange Place, New York.

Property: a solid tract of about 130 claims, in process of patenting, about 2,600 acres, immediately south of the camp, which is on the south bank of the Kotsina river, below the mouth of Roaring creek, near the Copper River railroad, and about 60 miles from the Bonanza mine of the

Kennecott Co. Lands apparently lie in the greenstone formation. **Development:** by 600' adit with 20 crosscuts. Ore said to average 12 to 17% copper with some gold. Company has a 50-mile telephone line to Ton-sina, the nearest rail station. Company did 5,000' of new underground development work in 1912. Only assessment work done in recent years.

GREAT OHIO COPPER MINE.

BRITISH COLUMBIA

Sargent & Munro, owners, New Hazelton, B. C. **Property:** adjoins the Butte Rocher de Boule mine and is operated by Jennings and Trimble, under lease and bond. Ore occurs in a well defined fissure vein in granodiorite, traceable at surface for 700'. Main orebody, 4' wide, gave assays of 22.5% lead, 9.5% copper, 134 oz. silver, 8.6% zinc and 0.04 oz. gold. **Developed:** by 355' tunnel, open cuts and drifts. Ore occurrence and conditions are similar to those in the Rocher de Boule, but further development necessary to determine value of mine.

GREAT WESTERN CONSOLIDATED MINING CO.

NEVADA

In 1915, control of this company was acquired by the Greenwater Copper Mines & Smelter Co. **Property:** 11 unpatented claims, about 300 acres, at Tonopah. **Development:** by a 2-compartment shaft, 1,150' deep, which enters one of the ore-bearing formations at about 1,000'. Considerable exploration work was done on the 860' level, but it is said to have been all in cap rock and commercial ore was not found. The new management intends to explore the ground thoroughly and at last accounts was crosscutting on the 1,130' level.

GREAT WESTERN COPPER CO.

ARIZONA

Courtland, Cochise Co., Ariz. Wm. J. Young, Jr., pres.; Edw. A. Young, sec.; C. H. Young, treas., all of Clinton, Iowa; W. G. McBride, gen. supt. Inc. Oct. 22, 1900, in Arizona. Cap., \$1,000,000; shares \$10 par, nonassessable; fully issued.

Property: several copper mines in the Courtland district acquired about 14 years ago, and the Mammoth-Collins mine near Mammoth, Pinal county, taken under bond in 1913. The Courtland property embraces 23 claims, patented, 407 acres in the Turquoise, or Courtland district, showing limestones intruded and altered by monzonite and quartz monzonite porphyry. The Humboldt mine first opened, yielded high-grade ore from the surface to a depth of 200', where it played out. In 1908, workings on the Mary claim developed a payable orebody and the Mame mine opened up shipping ore in 1909. At the present time there are 3 orebodies which show rusty capping over a leached zone, followed by oxidized ores, succeeded by secondary sulphides, the 2 forms grading irregularly into each other. The mines are opened by 25,000' of workings, including 3 vertical shafts, the Mary of 310', Mame of 300', Monarch 430' and Humboldt, 200'.

Equipment: includes a 300-h. p. electric plant driven by steam power and having two 150-k. w. generators, a 500' 8-drill air compressor, 2 electric hoists, electric pump, etc.

Production: begun Aug., 1908, has continued intermittently ever since. In 1913 company shipped 26,178 tons, one-half of which came from the Mame mine. In 1914, the ores yielded 898,110 lbs. fine copper and in 1915 the production was 1,022,534 lbs. copper from ores that averaged nearly 6.5%.

It is generally understood that the Courtland properties have proven disappointing, the limits of the orebodies being known and the exploration work unsuccessful. The company has, however, acquired the Mammoth mine at Schultz, near Mammoth, a well-known gold mine. Claims show strong quartz veins cutting porphyritic granite and schist and carrying pyritic gold ores with abundant wulfenite. On the 700', the bottom level,

the vein becomes copper-bearing and shows a shoot $2\frac{1}{2}$ ' wide of 4 to 6% copper ore with \$9 gold per ton. The company has installed new machinery at the mine, deepened the shaft to 1,100' and opened up the vein on several levels. Company suspended operations in 1914 and mines worked by lessees since then.

GREAT WESTERN GOLD & COPPER CO.**UTAH**

Merged 1916 with Mountain Lake Mining Co. and Thor Mining Co. under title of Great Western Mines Co., which see.

GREAT WESTERN GOLD & SILVER CO.**ARIZONA**

Idle. Dragoon, Cochise Co., Ariz. Inc. about June, 1908. Lands, in the Dragoon mountains, show lead and copper ores with gold-silver values.

GREAT WESTERN MINE.**COLORADO**

Armstrong and Vanetta, lessees. Mine near Lake George, Park Co., Colo. **Property:** shows vein with gold-copper ore, developed by 218' vertical shaft, 800' of crosscuts and drifts. Equipped with steam power and air compressor. Development work continues and small shipments of sulphide ore were made, 1913 and 1914.

GREAT WESTERN MINES CO.**UTAH**

Office: Knight Bldg., Provo, Utah. **Officers:** Jesse Knight, Pres.; J. W. Knight, v. p.; W. L. Mangum, sec.-treas., with Jas. H. Moyle, W. I. Snyder, R. A. Brighton and K. N. Jordan, directors.

Inc. 1916, in Utah. **Cap.**, \$750,000; shares 10c par; outstanding in May, 1916, 1,270,000 shares. Listed on Salt Lake City Exchange. Debts reported, \$6,036. Company is a merger of the Great Western Gold & Silver Co., Mountain Lake Mining Co., and the Thor Mining Co., all described in Vol. XI, Copper Handbook.

Property: 98 claims, in the Big Cottonwood and Snake Creek districts, in Salt Lake and Wasatch counties. **Ore:** gold, silver, copper, and lead, mainly in contact deposits; no estimate of ore in sight. **Development:** 500' of shafts, 8,500' of tunnels, 350' winzes and raises, and 2,000' of crosscuts. Reported in May 1916 that operations would start in the near future. Ten cars of copper ore said to have been shipped from the property. No special equipment. Company has a transportation agreement with the Snake Creek company for use of the 14,000' tunnel.

GREAT WESTERN MINING CO.**IDAHO**

Burke, Shoshone Co., Idaho. **Officers:** W. W. Russell, pres. and mgr.; Victor Huot, v. p.; G. T. Edmiston, sec.-treas.; preceding officers, F. P. Robinson, John J. Jenkins, R. R. Carnes and C. H. Kratzer, directors.

Property: 7 claims, patented, 3 miles from Burke, show vein traced for about 1,200' by trenching, carrying copper and lead ore. **Development:** tunnels of 1,270' and 900' and a 207' shaft. Work was begun Aug. 12, 1904. A raise being driven, 1914, reported to have opened up a 12' orebody. Assays average 7% lead, 1.54% copper and 0.4 oz. gold. **Equipment:** includes hoist and small Rand air compressor, driven by a 6-h. p. motor.

GREENE CANANEA COPPER CO.**MEXICO**

Office: 42 Broadway, New York. **Officers:** Thos. F. Cole, pres.; John D. Ryan, v. p.; Jos. W. Allen, treas. and sec.; W. S. Harper, asst. treas.; H. B. Paull, aud.; Myron M. Parker, Philip L. Foster, Chester A. Congdon, Jas. McLean, Wm. E. Corey and John D. Ryan, Thos. F. Cole, Jos. B. Cotton, and Jos. W. Harriman, directors.

Inc. Dec. 26, 1906, in Minnesota. **Cap.** \$60,000,000; shares \$100 par; issued, 48,801,050. New York Trust Co. and Old Colony Trust Co., Boston, transfer agents; Bankers Trust Co., New York, and State Street Trust Co., Boston, registrars. Shares listed on the New York and Boston Stock Exchanges.

The Greene Cananea is a securities holding company only, but it is practically the only one in which the public now own shares. The relations of the company with its subsidiaries is as follows: Green Cananea Copper Co. controls, by stock ownership, the Greene Cons. Copper Co., a West Virginia corporation, and the San Pedro Copper Co., S. A., a Mexican corporation. The Greene Cons. Copper Co. owns nothing but the entire capital stock of the Cananea Cons. Copper Co., S. A., Mexico. The Cananea Cons. Copper Co., S. A., and the San Pedro Copper Co., S. A., own, jointly, the property formerly held by the Indiana-Sonora Copper & Mining Co. The company also owns the Superior Bonanza Mining Co. and through this, the Mexican operating company, the Bonanza Mining Co., S. A. The subsidiary corporations named are listed and described elsewhere in this volume, so far as organization, finances and officers are concerned, but the physical properties are described here because the properties are operated together and no description would be complete, or easily understandable, if the properties were described separately. The Cananea Duluth, Cananea Central Copper Co., America Mining, Cananea Development, Sierra de Cobre Mining and Indiana Sonora companies, are all dissolved.

The Greene Cananea Copper Co. was organized for the purpose of acquiring the outstanding capital stock of Greene Cons. Copper Co. and Cananea Central Copper Co. To that end there was authorized to be issued 2,500,000 full paid shares of the aggregate par value of \$50,000,000.

The Greene Cananea exchanged its shares for the stock of the two subsidiary corporations on the basis of $1\frac{1}{2}$ shares for each share of Greene Consolidated, and $1\frac{3}{4}$ shares for each share of Cananea Central. By this transaction the corporation has become the owner of 961,398 shares out of 1,000,000 outstanding shares of Greene Cons. Co.'s stock and has acquired all of the 600,000 full paid shares outstanding of the Cananea Central stock. The privilege of exchanging the balance of the Greene Cons. Copper Co.'s stock not owned by the Greene Cananea Copper Co., is still open, the exchange basis being $\frac{1}{3}$ of a share of Greene Cananea stock, par value \$100. for each share of Greene Cons. Copper Co.'s stock, par value \$10, and stock is reserved for such exchange.

On July 18, 1913, par value of the shares was changed from \$20 to \$100 per share. All shares of \$20 par value have been exchanged for shares of \$100 par value, with exception of 6,931 shares, so that there are now issued and outstanding: 486,851 shares, \$100 par; 6,931 shares, \$20 par; 191.8 shares, \$100 par. the latter represented by fractional scrip which was issued when par value of shares was changed and which scrip is not entitled to dividends but, which is exchangeable in aggregates of \$100 for full shares, making a total outstanding capitalization of \$48,842,900.

Dividends:

	Rate	Shares	Amount
1916 (a).....	\$4.00	\$100	\$1,953,534
1915.....	0.00	100	.....
1914.....	2.00	100	972,645
1913.....	1.25	100	1,093,143
1912.....	0.75	20	1,819,877

(a) includes dividend paid May 29th. Present rate is \$8 per share per annum.

Income for 1915 was \$550,571; all from dividends of subsidiaries; expenses totaled \$44,532.

Cananea is a community of 16,000 inhabitants, located 40 miles south of the international boundary line, on a branch railway of the Southern Pacific Lines of Mexico.

The ores from all of the mines of the various companies are treated at the works of the Cananea Cons. Copper Co., S. A., the principal Mexican corporation, producing blister copper.

The following description covers all of the subsidiary companies of the Greene Cananea Copper Co.:

Property: mineral lands held under title from the Mexican government amount to 14,062 hectares, or approximately 34,738 acres. The surface lands owned by the company comprise 130,414 hectares, or approximately 322,123 acres. All of the mines, works, offices, warehouses, stores, etc., of the company are located on its own land and in addition the company owns valuable residence properties in Cananea, which are occupied by its local officials and employees.

Geology: the producing mines of the company are situated in the Cananea mountains, which rise from the headwater valleys of the San Pedro and Sonora rivers in northern Sonora. The mines are distributed along a mineral belt, or series of belts, about 6 miles long, in a N. W.-S. E. direction, and about 2 miles wide. The oldest geological formation of the Cananea mountains is pre-Cambrian granite, which is overlaid by Cambrian quartzite, in turn overlaid by Cambrian limestone. Breaking through these rocks, and covering much of the mineral belt, is a series of eruptives of Tertiary age, in which 12 different rocks may be recognized, one, a bedded tuff, the others massive. Three main classes of ore deposits may be recognized: (1) Deposits containing secondary chalcocite together with iron pyrite either massive or disseminated along shear zones in diorite porphyry; (2) Contact deposits containing chalcopyrite associated with iron pyrites and some zinc blende in a matrix of altered limestone; (3) Disseminated chalcopyrite associated with zinc blende in a diorite porphyry breccia.

The principal producing mines of the Cananea property are the Cobre Grande, Kirk, Veta Grande, Oversight, Capote, Chivatera, Sierra de Cobre, Eureka, Elisa, Henrietta and Puertecitos mines. Also owns the Cananea Duluth and American mines. The Henrietta and Cobre Grande mines were idle in 1915.

The **Cobre Grande** mine was the original mine of the Cananea Consolidated Copper Co. Idle for some years; has been worked for ore to be used in the converters. The ore occurs in a strong and wide vein traversing both altered limestones and igneous rocks.

The **Kirk** mine is situated in an extensive area of highly-altered limestone capped with diorite porphyry and cut in places by small, irregular dikes and intrusions of the same material. The ore is not adapted to concentration and it is necessary to hand-pick it as mined. The sorted ore carries a desirable high percentage of lime and iron.

The great mines of Cananea are the **Veta Grande**, **Oversight** and **Capote**, which have had large bodies of high-grade ore and now have large bodies of direct smelting ore and also contain great deposits of concentrating ore. This ore and the associated first-class ore contains copper in chalcocite, disseminated through diorite porphyry in broad shear zones.

The Capote mine differs from the Veta Grande and Oversight in that the ore occurs not only disseminated in diorite porphyry but also in the underlying granite. There are 3 principal ore shoots connected by continuous ore on the various levels. The ore in the upper levels is chiefly chalcocite, but the new shoot now being developed, consists of massive pyrite with primary chalcopyrite and bornite in granite. This mine has attained a depth of 1,050', and has ore on each level from the 1st to the 10th. The Capote mine yields both concentrating and direct smelting ores. A new 5-compartment shaft has just been completed to the 12th level to provide an outlet for the new orebody on the lower levels,

Much of the ore is lean pyrite, a mass on the 5th level, 220' long with a maximum width of 100', carries over 2½% copper, but there is much leaner ore in the mine which is unprofitable at present.

The **Chivatera** has a large body of oxidized ore containing about 2% copper, but averages 12-15 oz. silver and some gold. As the orebody now stands it contains several years reserves on the basis of 150-200 tons daily production, and there is a considerable territory lying ahead of present developments that gives promise of important development.

The **Sierra de Cobre** property was acquired by purchase from the Phelps-Dodge interest several years ago, and since its acquisition has proved to be one of the largest and most profitably productive mines of the Greene Cananea Copper Co.

The ore from this mine occurs in limestone. Fissures extending out from the "Eureka" fault have acted as channels for mineralizing solutions, making ore along the veins and for a considerable distance into the walls, replacing the limestone by pyrite and chalcopyrite along the bedding planes. There appear to be notable bodies of heavy sulphides on and below the level of the Combination tunnel which passes through this property to the Elisa mine, and these are now being developed with very satisfactory results. The Sierra de Cobre property also has an extensive area of undeveloped ground lying in the limestone areas, along which smelting ore has been found in the Kirk mine and elsewhere.

The Elisa mine contains a number of lenses of ore lying approximately parallel to a nearly vertical fault between limestone and the diorite porphyry. These lenses occur in the limestone at the fault and back of it for a distance of 150', along a zone some 1,500' in length. The ore consists of a garnet matrix containing chalcopyrite and iron pyrites. It is a very desirable ore for the smelter, being more than self-fluxing, containing about 20% of lime in addition to the iron. Recent developments in the Elisa mine have been exceedingly satisfactory and a large amount of first-class ore has been opened up on the deeper levels. The ore from this mine is now delivered through the Combination tunnel to bins at the Capote mine.

The **Henrietta** is a small mine whose ore occurs on a contact between diorite porphyry and quartz porphyry. The orebodies are not large and the ore is silicious. New development work in the vicinity of Henrietta has not yet shown workable orebodies.

The **Puertecitos** mine and the town of that name are located at the N. W. end of the mineral belt and at the terminus of the narrow-gauge railroad of the company. The Puertecitos mine ore deposit has a great outcrop of limestone altered by contact metamorphic action to lime-iron-garnet rock and containing carbonates of copper and some chalcopyrite and bornite. Large areas of this outcrop contain enough copper to warrant mining, which is carried on by means of large quarries. The ore as mined is not sufficiently rich to be sent direct to the smelter but has to be broken and hand-sorted, yielding about 4 tons of waste material to each ton of ore.

Recently a large amount of underground development work has been done at Puertecitos with highly satisfactory results, the ore being fit for direct smelting; the mine is developed sufficiently to yield 450 tons a day if needed.

The **Elenita** mine, one of the earliest producers of the camp, located southwest of Puertecitos, has been reopened with a view to again putting it in the producing class. The ore from this mine is similar to that of Puertecitos.

The Cananea Duluth mine has an orebody about 1,200' long with a maximum width of 200'. This orebody is a neck of diorite intruded in bedded tuffs. The intrusion is shattered, altered and for 200 to 300' below the surface is impregnated throughout with pyrite and copper minerals. On the 600', the lowest level, the central portion is not commercial; the values being concentrated around the border of this long canoe-shaped orebody. The ore carries good silver and gold values, with about 2% copper. Practically all of the product of this mine is concentrated before smelting.

The American mine, idle since 1907, produced only such ore as was obtained through development work. Not fully developed, though there are sufficient indications of ore occurrences to warrant a resumption of development operations. Mine has a 3-compartment shaft to the 100' level and ore bins of 900 tons capacity.

Development: total development work since the organization of the company, Dec., 1906 to 1916, is 453,991', which does not include 279,200' done under previous management. Development work done in 1915 amounted to 17,870', compared with 31,859' in 1914 and has kept well ahead of mining.

Equipment: power is delivered from a central power plant located at the smelter, and electrical power is used exclusively except for the steam pumping plant at Ojo de Agua. The power house, also containing the boiler plant, contains three 1,500-kw. horizontal Curtiss turbines, delivering current to the switchboard at 2,300 volts. The entire electrical equipment of turbines and engines has a capacity of 5,850 kw. alternating current and 500 kw. of direct current. Electrical energy is transmitted to various parts of the camp at from 2,300 to 11,000 volts. The furnace blast is supplied by 7 Curtiss engines and 1 piston blower, having a combined capacity of 176,000 cu. ft. of free air per minute. The blast is conveyed to the furnace through a pipe 6' in diameter. Converter blast is supplied by 5 blowing engines having a total piston displacement of 55,000 cu. ft. of free air per minute, and is conveyed to the converters through two 30" pipes. In the power house there is also one 6,000-cu. ft. capacity Ingersoll-Rand compound condensing air compressor, furnishing air to the mines for drilling and other purposes; also one 1,200-cu. ft. Ingersoll-Rand compressor, used to furnish air for ramming converter lining and for sundry pneumatic tools around the works.

The boiler has 11 boilers, with a total capacity of 4,260 b. h. p. Crude oil, imported free from the United States, under a Federal concession, is used as fuel. The waste-heat boiler plant nearby consists of 8 water-tube boilers having a combined nominal capacity of 2,450 b. h. p., heated by the waste gases of 2 reverberatory furnaces. In connection with this waste-heat plant there is a battery of 4 Green economizers, consisting of 288 tubes each. All boilers are equipped with Foster superheaters. The feed water is carefully measured after a simple treatment for the removal of scale-forming material, and is fed to the boilers by means of electrically-operated plunger pumps. The power house is equipped with 2 counter-current barometric condensers, each having a separate water pump and separate dry air pump. All engines are operated condensing excepting those whose exhaust is used in heaters.

The principal water supply of the company comes from Ojo de Agua, 9 miles from the town, where a pumping plant, with water-tube boilers, using crude oil as fuel, runs a Reidler high-duty compound condensing engine delivering 1,500,000 gals. of water per day against a pressure of 967'. A 10" main connects the pumping plant with a 600,000 gal. tank located on a hill near the concentrators. The Ojo de Agua water is used exclu-

sively for domestic purposes and for feed water for the boilers and is delivered under substantial working pressure. A very well equipped fire department, with a complete system of mains to pressure tanks, is maintained. Water from the mines is delivered to the concentrator through wooden pipes and is there used in milling operations.

At the Sierra de Cobre mine, in the Capote basin, there is an Ingersoll-Rand air compressor having a capacity of 2,500 cu. ft. of free air per minute, which is directly connected to a 2,300-volt A. C. motor. This machine is used to boost the pressure in the mains in the outlying districts. Fuel oil is stored in 3 main tanks with a capacity of 10,000 bbls. each.

The main shops near the smelter include machine, boiler, blacksmith, foundry, pattern and electric shops, all well-equipped, up-to-date, and served by both standard and narrow-gauge tracks. A large warehouse, for the company's supplies, and a framing mill, in which timbers for all of the mines are framed, are located on the southern slag dump.

The concentrating department has a capacity of 2,800 tons per day, and consists of a crushing plant, sampling mill, 2 concentrating mills, a settling system and a slime plant. The concentrator is now being re-modeled and oil flotation system added.

The crushing plant has storage bins holding 2,000 tons, ore from the mines being delivered in Ingoldsby side-dump cars of 30 tons capacity each. From the storage bins ore is fed to a 30" conveying belt by automatic feeder. This belt delivers the ore to 2 grizzlies, inclined at 48° with 1" openings. The screened ore falls on an 18" conveyor, transferring it to a 24" conveyor, taking it to the mill bins of 4,800 tons capacity.

The oversize from the grizzly goes to two 36" picking belts, where first-class ore and also pieces of wood and steel are sorted out. The ore left on belt is then delivered to crushing bins and fed by automatic plunger feed to five 10x20" Blake crushers of the Cananea type, which reduce the ore to 1½" size. This crushed ore passes to 16x36" rolls, breaking to pieces that which passes a 2" ring. This product is delivered to a 24" conveyor, which delivers to the mill bins, together with the grizzly undersize. The crushing plant is electrically driven and has a capacity of 2,000 tons per 10 hours. An automatic sampler at the head of the 24" conveyor cuts one-fortieth of the total ore, which is ground and automatically cut to sample. All rejects drop to elevator and return by conveyor to mill bins.

No. 1 mill consists of 2 sections of 600 tons capacity each. No. 2 mill is a steel structure, containing 2 sections of 800 tons capacity each. The mills are supplemented by a settling system and a slime plant containing 100 vanners. The 2 mills have practically the same flow sheet, although in Mill No. 1 fine grinding is carried further in rolls.

The ore from the 4,800-ton storage bins is fed by automatic feeders into each section. Concentration begins on all material finer than 2" ring. The course of the ore in all 4 sections is as follows:

The ore is delivered to two 5/8" trommels, the undersize passing to two 3/8" trommels. The undersize of the latter goes to two 3/16" trommels and the undersize from these to four 2 mm. trommels. The various coarse sizes from screenings are passed to Hartz jigs, and all tailings from jigs coarser than 3/8" ring are passed through rolls, elevated and returned to screen, so that no material coarser than 3/8" goes to the Hardinge mills. The coarser material is concentrated on 20 concrete Hartz jigs in each section. The jig tailings finer than 3/8" pass to 3 Hardinge mills and are ground to about 2 mm. The discharge from the Hardinge mills is deslimed in a drag belt classifier, the coarser sands are classified, the resulting product being treated on 30 tables. The very fine sands and slimes are treated on 36 vanners.

Tailings from tables and vanners are settled out and sent to the slime plant for further treatment.

The tailings, containing a gross value of nearly \$2 per ton in copper, silver and gold, are impounded in a coarse tailings dam, the slime settling above the dam. The clear water is pumped back for re-use in the mills but is first passed through precipitating tanks, where the dissolved copper is precipitated and recovered. The concentrates are delivered in narrow-gauge cars to the spreading beds.

All ores, concentrates, fluxes and secondaries for blast-furnace treatment are weighed and delivered to the main receiving bins by the company's narrow-gauge railroad. The bin system consists of 11 wooden and 8 steel bins, having a combined capacity of about 3,000 tons. From the receiving bins all material is discharged on a conveyor belt, which passes through the sample mill on its way to the spreading bed plant. In the sample mill the ore is crushed to about 4" through a 24x36" Farrel crusher. One-tenth of the ore stream is cut out and passes through a 10x20" crusher of the Cananea type; one-tenth of this is cut and passed through a Gates gyratory crusher, then one-fifth is cut and passed through a set of 17x27" rolls, when the final sample is cut out, amounting to about one-four-thousandth of the original material. This final sample is quartered down, dried and prepared for the laboratory. The reject from the sample mill is elevated back to the main conveyor system. All material is sampled in this manner with the exception of concentrates, which are hand sampled.

The ore after passing the sampling mill is conveyed to the spreading beds and distributed evenly over the entire length of the bed by an overhead belt which is automatically tripped. The bedding plant is of steel construction, being 453' long, and 198' wide, and contains 3 ore beds of about 9,000 tons capacity each. The composition of each bed is known in advance and in this way an even mixture is assured to the furnaces. When a bed is completed it is reclaimed by a machine which advances into the face of the pile and discharges on to a conveyor which delivers the mixed charge into bins over the blast furnaces, each bin having a capacity of 75 tons. The reclaiming machine has a capacity of about 175 tons per hour. The charge is dropped by gravity from the 75-ton bins above the furnaces into measuring hoppers holding 2,000 lbs. There are 5 such hoppers to each furnace, and these are discharged either directly into the furnace or on to the feed floor by means of arc gates.

The blast furnace building contains 8 blast furnaces, 48x210" at the tuyeres. There are 4 settlers, 10' 5"x19' inside of brick lining, each settler serving 2 furnaces. The slag overflows continuously into self-dumping slag cars of 45-cu. ft. capacity. Trains of 6 to 8 cars are hauled to the dump by electric locomotives. The matte is tapped from the settlers into 66-cu. ft. cast-steel ladles and transferred to the converters by electric cranes.

The gases from the furnaces are discharged into a steel balloon flue, thence through 2 cross-flues and 2 goose-necks into the main brick dust chamber. From here the gases pass through a flue to another chamber, thence to a brick-lined steel stack. All flue dust is drawn from the dust chamber and balloon flue into small cars and trammed to the reverberatory furnaces. The coke bins at the west end of the furnace building have a capacity of about 3,000 tons.

The roaster building contains ten 18' six-hearth McDougal calciners. There is a special bedding plant for the roasters, consisting of 4 bins of 500 tons capacity and 2 beds of 3,000 tons each. The mixed roaster charge is

reclaimed and delivered by conveyor belts into 60-ton bins over and charging into the roasters. The roaster product is hauled by electric motor in 5-ton cars to the reverberatory furnaces.

The reverberatory plant consists of two 19' 6"x100' oil-fired furnaces. The waste gases fire three 300-h. p. and five 250-h. p. boilers placed parallel, and then pass through 4 units of Green economizers containing 1,152 tubes, thence through a brick flue 130' long to a stack 12' 6" in diameter by 152' in height. The slag is skimmed into 112-cu. ft. electrically-tilted slag cars and hauled to the dump by electric locomotive. The matte is tapped into 66-cu. ft. ladles and hauled to converter buildings in ladle cars, from which it is transferred to the converters by electric cranes.

The converter building contains 3 electric cranes of 40, 50 and 60 tons capacity, 6 electrically-operated stands of the Great Falls type of converter, with 7 basic-lined shells, 12' in diameter, for same.

The copper from the bessemer converters is poured into the ladles of 2 straight-line electrically-operated casting machines, each equipped with tilting ladles of 66 cu. ft. capacity. Each machine has a chain of 39 molds, casting bars weighing about 260 lbs., dumping into bosh from which they are removed by drag conveyor to the bullion platform. The bar bullion is then stacked by an air-operated radial crane, picked up on trucks, weighed, and loaded into standard-gauge railroad cars. The converter slag is skimmed into ladles, transferred by crane to slag cars, hauled by electric motor to pits and reclaimed by a 10-ton steam shovel. It is then delivered in narrow-gauge cars to the receiving bins of the main spreading bed system.

The converter gases pass through balloon flues of steel construction and enter into a steel dust chamber, with a circular arch roof having a 13' radius. The gases then pass to a steel stack 12' in diameter by 125' high.

The daily capacity of the entire reduction works is 3,600 tons of gross charge.

The company owns and operates 36 miles of standard and narrow-gauge railway, including branches, spurs and sidings. The narrow-gauge line is double-tracked from the smelter to Capote basin, and laid with 50-lb. steel rails. The equipment includes 2 standard-gauge and 9 narrow-gauge locomotives, all oil burners, and about 140 cars, most of which are 25 and 30-ton steel ore cars. The railway system has direct rail connection with the Nogales and Naco branches of the Southern Pacific Lines of Mexico, and by this line with the El Paso & Southwestern railroad at Naco, Ariz.

The Cananea Consolidated Copper Co. operates practically all of the public utilities in Cananea. Its Public Service Department operates the water system; an electric light system; a telephone system operating 200 drops and approximately 450 telephones; and sundry other minor public utilities. The company's Mercantile Department operates a lumber yard, a large department store located near the smelter and 9 branch stores scattered throughout the various camps. The rental properties of the company include 619 buildings, consisting of rooming houses for its employees, residences, bunkhouses, etc.

Production, output and earnings since beginning of operations:

	Tons Mined.	Mng. Cost per Ton.	% Cu.	Copper Lbs.	Silver Oz.	Gold Oz.	Cost per Lb. Cu.	Earnings.
1916	(d)			25,212,000	885,852	5,288		
1915	285,701	\$2.498	2.700	16,335,081	635,997	3,778	11,086c	\$1,410,543
1914	413,766	3.146	2.201	21,858,920	907,310	6,055	10.724	638,955
1913	765,063	2.854	2.363	44,480,513	1,497,938	8,021	9.631	2,344,592
1912	1,121,346	2.962	2.146	48,157,847	1,559,946	7,232	10.310	2,580,749
1911	945,160	2.355	2.414	44,897,466	1,339,839	5,892	9.843	1,818,478
1910				45,771,925	1,187,820	5,463	11.487	459,202
1909				44,547,689	958,569	5,877	11.612	544,107
1908				18,619,609	447,663	2,879		214,141
(b)				58,180,856	766,422	6,100		3,220,247
(a)				247,144,706	2,006,678	13,795		9,870,762

(a) July 31, 1906. (b) Aug. 1, 1906—Dec. 31, 1907. (c) First 5 months.

In 1915 the concentrator treated 79,642 tons ore at a cost of \$0.8263 per dry ton. The smelter treated 220,049 dry tons ore at a cost of \$2.7146 per ton.

The property was closed down in Aug., 1914, due to revolutionary conditions in Mexico; operations started in June, 1915, were suspended in Oct., resumed again in December, 1915, and have been continuous to date.

GREENE CONSOLIDATED COPPER CO. MEXICO

Office: 42 Broadway, New York. **Officers:** Wm. D. Thornton, pres.; C. D. Fraser, v. p.; J. W. Allen, sec.-treas.; preceding officers, L. D. Ricketts, Alfred Romer, P. L. Foster and Geo. Notman, directors. **Inc.** Sept. 15, 1899, in West Virginia. **Cap.** increased, 1904, and again increased, 1906, to present amount of \$10,000,000; shares \$10 par. Has paid 28 dividends, totaling \$9,544,400, to 1916. Annual meeting, second Tuesday in June.

The only asset of the Greene Cons. Copper Co. is the total stock issue of the Cananea Cons. Copper Co., S. A., a Mexican corporation.

The Greene Cons. Copper Co. is controlled, through ownership of 961,398 shares, by the Greene Cananea Copper Co. Financial statement is included under description of the Cananea Cons. Copper Co., S. A., which is to all intents and purposes the same company under another name. The mines and other properties of this and of all affiliated corporations are described under title of the Greene Cananea Copper Co.

Company was organized and controlled by Col. Wm. C. Greene and his friends until Feb. 18, 1907. The early history of the company fully given Vol. X.

GREEN HILL CLEVELAND MINING CO. IDAHO

See Federal Mining & Smelting Co.

GREEN HORN MOUNTAIN COPPER CO. CALIFORNIA

Offices: 401 Mills Bldg., San Francisco, and Green Horn Mt., Shasta Co., Calif. **Officers:** Albert Hanford, pres.; M. E. Dittimar, v. p.; F. M. Lee, sec.-treas.; preceding, with Luther Elkins and Andrew Turner, directors. M. E. Dittimar, supt., Redding, Calif. **Inc.** Sept. 25, 1915, in Nevada. **Cap.** \$400,000; shares \$1 par; outstanding May 5, 1916, \$250,000. Annual meeting, Jan. 15.

Property: 12 claims, 360 acres, 160 acres patented, on Green Horn Mt., in French Gulch mining district, includes the Green Horn mine. Said to show gold-silver-copper sulphide ore, occurring as a fissure in porphyry. Vein strikes N. 61° W., dips 40°. Assays said to average 4.5% copper per ton. **Development:** 3,000' of tunnels. Greatest depth of workings, 480'. Management claims 120,000 tons of ore blocked out.

Production: for 1914, 25,118 lbs. copper; 1915, 36,283 lbs. copper; all from 442 tons ore. Concentrator planned for 1916.

GREEN MONSTER MINE. NEVADA

Office: care of W. R. Hearst estate, San Francisco, Calif. W. C. Neal, supt. Mine in Platina mining district, 6 miles N. W. of Platina, Lincoln Co., Nev., is opened by a 350' two-compartment vertical shaft, said to disclose an orebody 6-30' wide, carrying 15 oz. silver and up to 40% in zinc. Zinc ore occurs as silicate, oxide and carbonate. Was originally worked for copper. Mine reopened in 1915 and shipping about 300 tons monthly.

GREEN MONSTER MINING CO. ARIZONA

Jerome, Ariz. **Officers:** Neill E. Bailey, pres. (gen. supt., United Verde & Pacific Ry. Co. and Verde Tunnels Smelter R. R. Co.); Thos. Taylor, v. p. (smelter supt., United Verde Copper Co.); David Morgan, sec.-treas. (supt., United Verde Extension Mng. Co.); W. S. Humbert, Phoenix, Ariz. (director Phoenix National Bank), and W. A. Drake (gen. mgr., A. T. & S. Fe lines),

directors. Leroy Anderson, Prescott, Ariz., sec. and counsel. **Inc.** Dec. 8, 1915, in Ariz. **Cap.**, \$750,000; shares 50c par.

Company made contract Dec. 16, 1915, to issue 500,000 shares for \$25,000 cash and deeds to (1) Manzanita group of 8 lode claims; (2) Big Jim group of 23 claims; (3) option to purchase Cliff group of 22 claims and an undivided $\frac{1}{2}$ interest in Green Monster and Green Monster Extension claims, for \$100,000, payable \$25,000 Jan. 21, 1917, and equal amounts yearly thereafter; (4) assignment of purchase option on Missouri group of 8 claims for \$20,000, $\frac{1}{2}$ of which has been paid by Green Monster Co. out of the \$25,000 put in treasury; balance in 2 equal payments July 21, 1916, and a year thereafter.

All this property is in the Verde district, the Green Monster and Green Monster Extension claims being $\frac{1}{2}$ mile S. of the United Verde Extension and 1 mile S. E. of the United Verde mine. The remaining claims form a compact group of about 1,200 acres, north of Sen. Clark's Equator mine and $2\frac{1}{2}$ miles from the United Verde mine at the extreme easterly end of the Verde district.

Recently the company issued 700,000 shares stock at 75c. With \$500,000 in the treasury the management is beginning active development work. Nothing but assessment work has been done in the past. Secretary of the company says: "Green Monster is purely a gamble.—We have made no promises and will make none, save that every dollar will be expended in a businesslike way;—if there is a copper deposit of any magnitude on the property, we promise the stockholders that their money will be used to find and develop it."

GREEN MOUNTAIN COPPER MINES.

CALIFORNIA

Mine in S. E. part of Mariposa county, 7 miles N. W. of Raymond, on the S. P. R. R., and 12 miles from La Grande, on the Santa Fe R. R. W. R. Sundberg and J. L. Sydney, owners. O. R. Sydney, mgr. Property considered promising. Probably idle. Fully described Vol. XI, Copper Handbook.

GREEN MOUNTAIN MINING & MILLING CO.

UTAH

Officers: Dr. R. S. Millbee, Marshfield, Wis., pres.; Dr. H. H. Millbee, v. p.; A. E. Goodell, sec.; S. Amberson, treas.; with B. S. Rich, directors. **Inc.** 1915 in Utah. **Cap.**, 1,500,000 shares; 100,000 issued.

Property: Green Mountain group in Miners Basin, Grand Co., Utah. 35 miles S. E. of Cisco, on the Denver & Rio Grande R. R., formerly owned by the Green Mtn. G. & C. Mng. Co. and fully described in Vol. XI, Copper Handbook.

Ore: gold, silver and copper, low-grade ore said to average about \$8 per ton; also said to show some high-grade ore. Developed by Dewey cross-cut tunnel. **Equipment:** 30-h. p. gasoline engine, 2 sets of power drills, compressor and pumps.

GREENBACK COPPER CO.

CALIFORNIA

Mine at Woody, Kern Co., Cal. Joseph Weringer, owner. **Lands:** 1,520 acres, 18 miles east of Jasmin, on the Porterville branch of the Southern Pacific railroad. Country rock is granodiorite, showing an ore zone carrying lenses of 20' maximum width, with granite walls irregularly impregnated with chalcopyrite. **Development:** by a 185' incline shaft, with 3 levels opened. Carbonate ores stoped from the upper levels have averaged 19.4% copper and 5.7 oz. silver per ton. Work resumed, 1913, after several years and 1 carload of copper ore shipped to Selby smelter. Credited with a total production of \$40,000 in high-grade copper ore.

GREENDALE EXPLORATION CO.**MONTANA**

Controlled by Rainbow Lode Development Co. When the Rainbow Lode Dev. Co. wished to acquire the Butte & London property at Butte, Mont., several years ago, it was not practicable to recall a majority of the outstanding stock of that company; the Greendale Exploration Co. was organized to meet the emergency. The property of the Butte & London was transferred to this company, the Rainbow Lode Dev. Co. receiving 51% of the stock in return for certain development work (see Rainbow Lode Dev. Co.); the remaining 49% is held by Butte & London Copper Dev. Co.

GREENWATER COPPER MINING & SMELTING CO. CALIFORNIA

Lloyd E. Marsden, sec.-treas., Room 515-E, 30 Church St., New York. Chas. R. Miller, pres.; M. R. Ward, v. p.; preceding, with Max E. Bernheimer, Chas. Gold, W. G. Denham, Clyde Milne, Oscar A. Daube, F. I. Mallory, B. H. Campbell and W. H. Drayton, 3rd, directors. John McGee, supt. at Tonopah. Inc. Dec. 12, 1906, in Delaware. Cap., \$25,000,000; shares \$5 par. Was a securities holding company only, and owned stock in a number of Greenwater promotions, all dead, described Vol. VIII, Copper Handbook. Company, on Dec. 31, 1910, had \$144,727 invested in choice bonds, after losing about \$170,000 through the failure of Chas. Minzesheimer & Co., New York brokers, who failed Oct. 15, 1910. Reorganized Oct., 1914, and capitalization reduced to \$500,000; shares 10c par; 3,000,000 issued. Stock listed on the N. Y. Curb. Annual report Dec. 31, 1914, showed cash assets of \$72,000 and \$51,834 on Dec. 31, 1915. Corporation Trust Co., Jersey City, N. J., transfer agents. Annual meeting 2nd Friday in February.

In August, 1911, company took over the O. K. and Supply groups, gold mines at Dale, Calif. Considerable work was done on the Supply mine. In 1915 a crosscut on the 700' level cut the Armenian and Jeane veins, showing practically no values. Two winzes were sunk and drifts extended on the 800-1,100' levels of the Supply vein with negative results. The values decreased with depth and on the 1,200' level no pay ore was found. All development and prospect work gave unsatisfactory results and the property was abandoned in Oct., 1915.

In November, 1915, the company acquired stock control of the Tonopah Bonanza Mining Co. and the Gréat Western Cons. Mining Co., at Tonopah, Nev. Property, 25 claims, is extensively developed and located on the trend of known ore veins. Company now hopes to recoup losses sustained in California operations. Holdings described under their respective titles.

GREY'S SIDING DEVELOPMENT CO., LTD.**ONTARIO**

Owns the Little Dan mine on Arsenic lake, 3 miles from Grey's Siding, T. & N. O. R. R. John McMartin, pres.; William Marshall, managing director; J. E. Wilson, supt. at last accounts. Property: 3 claims covering diorite containing bunches and impregnations of arsenical pyrite and chalcocopyrite, said to carry several dollars per ton in gold. Deposit opened up by open-quarry work and shallow shaft. No recent returns secured.

GRIBBELL ISLAND COPPER CO.**BRITISH COLUMBIA**

Office: 203 First National Bank Bldg., Bellingham, Wash. Mine at Gribbell Island, Skeena River division, Cassiar district, B. C. Idle since 1906, owing to lack of funds. Fully described, Vol. XI, Copper Handbook.

GRIFFITH CONSOLIDATED MINE.**COLORADO**

See Salida Copper Co., Colo., which owns mine through stock ownership in Mountain Mining Co.

GRIJALVA NUEVA MINING CO.**ARIZONA**

Wickenburg, Yavapai Co., Ariz. Officers and directors: J. H. Mulholland, pres. and gen. mgr.; J. J. Heard, v. p.; T. B. Inglis, sec.-treas. A. R.

Schloesser, supt. Inc. May 15, 1915, in Ariz. Cap., \$500,000; shares \$1 par; all outstanding. Annual meeting, first Monday in April.

Property: 13 claims, 2 patented, 220 acres, 10 miles N. W. of Wickenburg, includes the old Grijalva mine. **Ore:** free milling gold in granite occurs in an elliptical shaped oreshoot 30'x60', said to average \$13.29 per ton. Developed by tunnels. Management claims 20,000 tons ore blocked out.

Equipment: includes an 80-ton amalgamating and concentrating mill. A pumping plant of 150 gal. per min. capacity will deliver water from the Hassayampa river, a distance of 4,000' and at an elevation of 600'. Company started operations in Dec., 1915.

GRIZZLY MINE.

OREGON

Cottage Grove, Lane Co., Ore. Property has an orebody reported to be in a porphyry dike 20' wide, the vein showing good walls with 12" of high-grade ore on the footwalls, 4' consisting of mixed lead and copper sulphides with gold and silver values. The discovery is a mile from the mill and 2,000' lower.

GRIZZLY MINING CO.

UTAH

Succeeded by Michigan-Utah Mining Co., March, 1912.

GRUTLI MINING CO.

UTAH

Mine at Eureka, Juab Co., Utah. Inc. Dec., 1908, in Utah. Cap., \$100,000; shares 10c par. Listed on Salt Lake Exchange. **Property:** 7 claims, patented, adjoining the East Tintic Consolidated on the north, 2 miles from a railroad. Mine has a 250' main shaft, winze and crosscuts, showing gold, silver and lead ores. **Equipment:** includes steam hoist and compressor. Developing at last accounts.

GUANACEVI TUNNEL CO.

MEXICO

Address: Room 2009, 55 Liberty St., New York. Mine at Guanacevi, Santiago Papasquiaro, Durango, Mex. Inc. 1904 in Arizona. Cap., \$5,000,000; shares \$5 par. Property in hands of trustee until conditions in Mexico permit of financing company sufficiently to carry on the extensive development planned.

Lands: 22 properties, about 700 hectares, including timber rights and original concessions, said to possess large bodies of gold and copper ore. The mine has 3 shafts, of 100' depth each, with tunnels of 1,250' and 1,400', the main tunnel, 7x9', planned to be driven about 3 kilometers, management estimating that in this distance a large number of veins carrying lead and copper ores should be cut, the tunnel being estimated as likely to cost about \$250,000.

The Mexican Western railroad from Tepehuanes to Guanacevi should add materially to value of property.

The L. Diamond Co., of Boston, was never a representative of this corporation, but a number of brokers bought stock and combined to unload on the public at unduly high prices. Debts amounted to \$150,000 in 1912 and have since been increased.

GUANAJUATO CONS. MINING & MILLING CO.

MEXICO

Office: 15 Broad St., New York, and Guanajuato, Gto., Mex. **Officers:** Fred G. Corning, pres.; Robt. Mulford, v. p.; C. Van Rensselaer Cogswell, sec.-treas.; preceding, with R. A. Walker, W. Lawrence Green, Chas. G. Molin, Sidney Green, all of New York, and Geo. A. McGlone, Charlestown, W. Va., directors.

Inc. 1899 in West Virginia. Cap., \$3,000,000; outstanding, \$2,830,920; shares \$5 par; \$169,080 of the unissued stock has been set aside to retire the outstanding 7% bonds. State St. Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting in Jan., at Charles-

ton, W. Va. Listed on Boston Stock Exchange and dealt in on New York Curb.

Bonds: authorized \$300,000; outstanding \$128,000 convertible debenture 7's, dated 1904, due Jan. 2, 1924. Interest Jan. 2 and July 2, at office of company, New York. Coupon and registered bonds, \$100, \$500 and \$1,000; convertible at 120 into stock at par; 10% of net earnings is set aside for redemption of this bond issue. Trustee, Columbia Trust Co., New York.

Dividends: 1¼%, 6¼c per share, paid July 31, 1906; 1½%, 7¼c per share, Oct. 31, 1906; none since.

Balance sheet Dec. 31, 1913, the last reported, showed assets of \$3,495,586, which included mines, plants, etc., \$3,136,890; supplies, \$78,896; cash, \$96,996. Liabilities included: 7% bonds, \$128,000; refunding notes, \$53,800; surplus, \$200,000; sinking fund, \$28,409; undistributed profits, \$45,019; notes payable, \$10,466.

Income account for 1913, last reported, showed: Receipts—bullion and concentrates, \$670,142; expenditures, mining, etc., \$302,452; ore bought, \$176,585; treatment charges, \$39,186; bullion expense, \$23,413; taxes, etc., \$26,674; total, \$568,312. Gross profit, \$101,830. Deduct: bond interest, \$13,412; depreciation, \$33,427; bond redemption reserve, \$5,494; total, \$52,333. Net profit, \$49,498; undistributed profit forward, \$45,522; total, \$95,019. Forward to surplus accounts, \$50,000. Undistributed profit, Dec. 31, 1913, \$45,019.

The company is reported to own \$1,000,000 of the \$2,000,000 capital stock of the Republic Mines Co., N. Mex., also owns a large interest in the Carmen-Guanajuato Gold Mining Co.

Property: owns a number of silver-gold mines in the Guanajuato district; of these the Sirena is the oldest, having been worked for 100 years. Under normal conditions it has a monthly output of 7,500 tons milling ores. **Ore:** silver-gold, with values mainly silver. Vein varies in width from 3' to a maximum of 200'. Ore reserves of the Sirena mine were estimated 1913 as 800,000 to 1,400,000 tons blocked out, pillars and fill; Penafill lease, 180,000 tons. **Development:** by shafts to depth of about 1,000'.

Equipment: includes 80-stamp mill, cyanide and electrical plants.

The revolution has greatly interfered with operations during the past few years, the property having been run on half time for a large part of the time.

GUANAJUATO DEVELOPMENT CO.

MEXICO

Office: 50 Broad St., New York. Corporate office: Jersey City, N. J. Mine office at Guanajuato, Gto., Mexico. **Officers:** Willard P. Reid, pres.; C. A. Decker, v. p.; P. E. Sharpless, v. p.; W. H. Porter, sec.-treas.; preceding, with Jas. T. Potter, Ross Vanderhoven, Wm. B. Field, F. B. Medbury, John A. Martin, directors. John Pritzl, asst. treas.

Inc. Feb. 24, 1906, in New Jersey. **Cap.,** \$300,000 com. and \$600,000 pfd., decreased June 24, 1916, from \$1,000,000, 6% cum. pfd.; \$3,000,000 common; shares \$100 par. Preferred stock has preference as to assets and is subject to call at par and accrued dividends on any semi-annual dividend date. Stock transferred at company's office. Annual meeting, first Thursday after first Monday in April, at Jersey City, N. J. **Dividends:** preferred, paid semi-annually Jan. and July 1, from 1906 to 1910, inclusive, none since.

Company controls the Pinguico Mines Co., Mexican Milling & Transportation Co. and Peregrina Mining & Milling Co. Properties are located at Guanajuato, Gto., and are held under Government titles by leases, options, etc. **Ores:** gold-silver bearing quartz found in veins cutting bedded volcanic tuffs and intrusive rocks.

Company refuses to supply information.

Peregrina Mining & Milling Co.

Controlled by Guanajuato Dev. Co. Same officers, with Levi Holbrook, H. J. Milligan, Delavan Smith, W. B. Field and J. A. Martin, directors. **Inc.** Feb. 21, 1905, in New York. **Cap.**, authorized and outstanding, \$1,000,000, 7% cum. pfd., and \$2,000,000 common. Shares: preferred, \$100; common, \$10. Annual meeting in April in New York.

Dividends: preferred paid 3½% in 1905; 1906 to March, 1911, inclusive, 7% per annum; none thereafter until April 15, 1915, when 3½% was paid. Common none. Preferred dividends, payable March 1 and Sept. 1, at 27 William St., New York. Last one, of 5% paid April 15, 1916.

Balance sheet for year ending Dec. 31, 1914, shows assets \$3,306,254, which included: property account, \$3,033,829; cash, \$66,984; accounts receivable, \$39,130; metal pending settlement, \$62,683; supplies, \$38,185; investments, \$43,333; deficit, \$22,110. Liabilities included: current liabilities, \$2,920; accrued preferred dividends, \$303,334.

Profit and loss account for 1914 showed: balance, surplus, Dec. 31, 1913, \$50,539; 1914 earnings, \$66,332; total, \$116,871. Of this accrued preferred dividends absorbed \$70,000; sundry items of 1913, \$11,197; depreciation, \$57,784; total, \$138,981. Deficit Dec. 31, 1914, \$22,110.

Property: about 175 acres, which include a group of old producing silver mines near Guanajuato. Output under normal conditions, 13,000 tons per month. **Ore reserves:** estimated Jan. 1, 1915, at 98,000 tons.

Equipment: includes milling and cyanide plants. Ore milled in 1914, 119,202 metric tons, with an operating profit of \$168,492. Revolutionary conditions have greatly hampered mining operations during the past few years.

Pinguico Mines Co.

Controlled by the Guanajuato Dev. Co.; same directorate. **Inc.** Sept. 13, 1906, in New Jersey. **Cap.**, authorized and outstanding, \$2,000,000 6% cum. pfd. and \$5,000,000 common. Shares: preferred, \$100; common, \$10. Preferred stock has preference as to assets and is subject to call at par, and accrued dividends on any dividend date. Stock transferred at company's office. Annual meeting, first Tuesday after first Monday in April at 15 Exchange Place, Jersey City, N. J. Fiscal year ends Dec. 31.

Dividends: preferred, 1907, to Oct., 1913, inclusive, 6% per annum; none reported since. Common, none. Preferred payable April and Oct. 1 at 27 William St., New York.

Property: 5 claims, 300 acres, covering 3,200' on the main Pinguico vein, near Guanajuato, Gto. **Ore:** silver-gold. **Development:** Pinguico shaft, 800' deep, and the Fortuna, 670' deep, with several miles of underground workings. **Equipment:** includes a 40-stamp mill and a cyanide plant. Capacity, under normal conditions, about 8,000 tons per month.

Political disturbances have interfered with operations during the past few years.

The Mexican Milling & Transportation Co. built and operates the 2 miles of railroad connecting the mine and mill. The Guanajuato Dev. Co. refuses to give out any information.

GUANAJUATO REDUCTION & MINES CO.**MEXICO**

Columbus, Ohio. Mines and mills at Guanajuato, Gto., Mex. **Officers:** C. L. Kurtz, pres., Columbus, Ohio; Wm. G. Moore, v. p.; Geo. D. Bounton, v. p., Philadelphia; C. J. Kurtz, sec.-treas.; preceding, with C. J. Schlaechter, Wm. D. Sherrerd, Robt. T. Moore and Geo. W. Chase, directors. W. G. Wheaton and H. P. Smith, gen. mgr.

Inc. 1904 in Colorado, as a consolidation of several silver and gold mines in the Guanajuato district. **Cap.**, \$7,500,000; shares \$100 par. Stock trans-

ferred at company's office, Columbus. Empire Trust Co., New York, registrar. Annual meeting, first Tuesday in Feb. at Colorado Springs, Colo.

Bonds: authorized, \$3,000,000; outstanding, \$2,800,000, first mortgage 6%. 20-year, \$100, \$500 and \$1,000 gold bonds, dated July 1, 1904, due July 1, 1924; interest Jan. 1 and July 1, at office of the trustee, Empire Trust Co., New York.

The company was unable to convert its product into cash on account of the Mexican revolution and defaulted, July 1, 1914, interest on its first mortgage 20-year 6% bonds; this interest was paid in Jan., 1915. To Aug., 1915, the interest due Jan. 1 and July 1, 1915, had not been paid.

Comparative Income Account, Years Ended Dec. 31

	Gross Earnings	Optg. Expenses	Net Earnings	Bond Interest	Balance for Year
1914.....	\$1,527,523	\$1,293,523	\$234,000	\$168,000	\$ 66,000
1913.....	1,149,176	838,107	311,069	168,000	143,069
1912.....	1,004,290	693,477	310,813	168,000	142,813
1911.....	930,280	648,159	282,121	168,000	114,121
1910.....	931,562	618,067	313,495	168,000	145,495

Properties: Tepeyac group: in 1915 the Tepeyac mine produced 2,501 tons ore, averaging 314.7 gm. silver and 2.61 gm. gold. (Note: all weights are given in metric tons, 2204.6 lbs.)

Valenciana group: includes the Valenciana, Esperanza, La Union and Nuestra Senora de Guanajuato mines, practically idle in 1915.

Cata group: includes the Cata, Secho, San Lorenzo, Avispero Maravillas mines and part of La Sorpresso. In 1915 the Maravillas-Cata workings were operated for 9 months and produced 5,616 tons ore, averaging 248.6 gm. silver and 2.34 gm. gold. The Cata shaft produced 2,926 tons mine fill.

Mellado-Rayas group: includes the Mellado and Rayas mines and their various annexes, and the San Miguel, Santa Anita, San Roberto, Fraustros mines and part of La Sorpresso. In 1915 the Mellado mine produced from San Miguel shaft workings 19,783 tons, averaging 268.6 gm. silver and 2.3 gm. gold, which is the best grade so far obtained from these workings. The Mellado principal workings produced 3,643 tons ore, averaging 307.7 gm. silver and 3.07 gm. gold. The Kurtz shaft workings produced 22,194 tons ore, averaging 257.8 gm. silver and 2.44 gm. gold; bulk of tonnage coming from the 100-meter and 125-meter levels. The Rayas general shaft workings produced 16,395 tons ore averaging 267.9 gm. silver and 3.06 gm. gold; bulk of tonnage came from Santa Sofia fill body. The Garropata shaft, 195-meter deep, produced 10,279 tons ore, averaging 239.1 gm. silver and 4.2 gm. gold.

Ore Reserves estimated Jan. 1, 1916:

	Tons	Grams per Ton Silver	Gold
Dumps	498,000	166	1.41
Mine ore, blocked out.....	168,972	256	2.91
Mine ore, probable.....	257,849	257	2.73
Total	924,821	208	2.05

Ore from dumps in 1915 totaled 17,856 tons, averaging 170.7 gm. silver and 1.87 gm. gold; average cost of handling, 11.8c per ton, with a profit of \$1.253.

Recent total mine production from the various properties:

	Ore, Tons	Gm. Ag. per Ton	Gm. Au. per Ton	Cost per Ton	Profit per Ton
1915.....	85,329	264.5	2.76	\$0.898	\$1.716
1914.....	129,245	208.7	2.37		

In 1915 tonnage milled amounted to 102,658 tons, averaging 246.3 gm. silver and 2.6 gm. gold, the highest since the company started operations. Total milling and cyaniding cost averaged \$1.309 per ton.

Equipment: includes the 180-stamp Bustos mill and the Flores cyanide plant. Crushed ore from the mill is sent through a 6,000' 8" pipe line to the cyanide plant.

During 1915 operations were much hindered by political disturbances; the mill operated only 47.9% of the time compared with 89.2% in 1914, the worst previous year.

GUERRERO MINING CO.

MEXICO

Is the Mexican incorporation of the Victor Mining & Smelting Co., which owns 2 properties in Magdalena district, Sonora, Mex., 10 miles S. W. of Cananea. Properties about one-half mile apart, contain 15 and 32 per-tenencias, respectively.

GUGGENHEIM EXPLORATION CO.

U. S. & MEXICO

Office: 120 Broadway, New York. Liquidation and dissolution of the company was announced in Autumn of 1915, the assets being distributed on the following basis:

Guggenheim Exploration owned 404,504 shares of Utah Copper, which were sold to Kennecott Copper Corporation, 1 share Utah Copper for 1½ shares Kennecott Copper. Stockholders of Guggenheim Exploration had the privilege of choosing between a payment of \$36.387 per share or taking 0.7277 of a share of Kennecott. Guggenheim Exploration also owned 97,750 shares of Chino Copper, which were distributed to its stockholders in the ratio of 0.1172 of a share of Chino for each of Guggenheim owned. Similarly 69,500 shares American Smelting & Refining common were distributed in the ratio 0.0833 share A. S. & R. for each share Guggenheim; 154,300 shares Ray Consolidated in the ratio of 0.185 share Ray Consolidated for each share Guggenheim. It was announced February, 1916, that a further distribution would be made to shareholders of \$12 cash, payable April 15, 1916, together with a ¼ share beneficial interest in the Yukon Alaska Trust with 208,433 certificates of beneficial interest.

The trustees of the Yukon Alaska Trust are Wm. Loeb, Jr., Chas. K. Lipman, Chas. Earl and Roger W. Strauss, holding residuary assets of Guggenheim Exploration Co. Time of trust limited to lives of Fred'k A. Collins and Wm. Magowan or less if directed by 75% of certificates. The trust was created to avoid shrinkage and loss of values by sale of assets in open market. The holdings comprise cash and demand loans, \$11,000,000; 2,800,000 shares (out of 3,500,000) Yukon Gold Co.; eight 5% notes of \$625,000 each of Yukon Gold Co., issued Feb. 1, 1916, and due one each year thereafter: this \$5,000,000 covers purchase price of the property, dredges, and loans made Yukon Gold by Guggenheim Exploration Co. Also 500 shares preferred stock, series A of American Smelters Securities Co.; also various causes of action, interests, and miscellaneous property rights of uncertain and in part speculative value in various mining properties, prospects and contracts relating thereto.

At a special meeting of the shareholders held March 9, 1916, dissolution was approved.

GULF COPPER CO.

MEXICO

Head office: Phoenix, Ariz. Mine at Angeles Bay, Gulf of California, Mex. **Cap.**, \$1,000,000; shares \$1 par. J. H. Baker, pres. and gen. mgr.; G. E. Anthony, mg. engr.; J. H. Loudon, directors.

Property: 40 hectares, about 100 acres, at north end of Angeles bay, 140 miles N. W. from Guaymas and about 90 miles S. W. from Port Lobos. Claims show silicious schists cut by porphyry dikes and a vein running

N. W., dipping at 45° and varying from 5 to 42' in width. **Ore:** black oxide and sulphide of copper said to average 4.7% with trace of gold and silver.

Development: by tunnels with 1,363' workings, including winze sunk on vein 175'. Has shipped 300 tons, 25% picked ore, and has several thousand tons of low-grade ore on dump. Property considered promising if properly financed and handled. Presumably idle.

GWIN MINE DEVELOPMENT CO.

CALIFORNIA

J. J. Hachman, sec., 267 Mills Bldg., San Francisco, Calif. This famous old gold mine, at Gwin Mine, Calaveras Co., Calif., whose deeper ores carry copper, has been closed down since 1908. Assessment No. 17, 2c a share, delinquent Jan. 6, 1916. See Vol. X, Copper Handbook.

GWINN MINING CO.

WASHINGTON

Meteor, Ferry Co., Wash. Peter Proff, mgr. Company owns a group of claims in the Meteor, or Covada, district, showing fissure veins in sedimentary rocks cut by diorite and carrying complex ore said to average about \$16 per ton in gold, silver, copper and lead. **Development:** by shafts and tunnels, said to have blocked out considerable low-grade ore which is being treated in a 50-ton concentrator. Company is also erecting a dam on Hall creek for its hydro-electric plant.

GYPSY QUEEN MINING CO.

NEVADA

Office: 265 Russ Bldg., San Francisco, Calif. **Officers:** C. F. Wittenberg, pres.; F. A. Burnham, treas. **Inc.** in Nevada. **Cap.**, 1,250,000 shares. Four assessments have been called. Listed on San Francisco and Salt Lake City exchanges.

Property: 53 acres in Tonopah mining district, Nye Co., Nev., said to show silver ore. Ledge is from 1 to 5' wide. Formation is rhyolite, quartz and trachyte. **Development:** by 1,370' shaft. On the 1,350' level a cross-cut was run S. E. for several hundred feet. At 247' from the shaft a 4' vein was cut with ore from 8" to 18" in width. A winze, being sunk on this vein, was down 80' in March, 1916.

Property has been under development for several years without showing any net results.

HACKBERRY MINE.

ARIZONA

Now known as the Sunshine. Located in 1874 by W. B. Ridenour, in the Peacock district, 26 miles N. W. of Kingman. Reported Jan., 1916, to have been taken over on a lease and bond by Seeley W. Mudd, 1202 Hollingsworth Bldg., Los Angeles, Calif.; R. I. Rogers, Philip Wiseman and Frank A. Keith, of Los Angeles.

The mine is credited with a production of \$2,000,000 in high-grade silver ore. In the early days a 500' incline shaft, giving a vertical depth of 360, was sunk on the vein. At this depth water stopped operations, but not before all ore above water level had been stoped out. Ore is said to have occurred in a 2½' vein. In later years a vertical shaft was sunk to the water level, a small amount of exploratory work done and the mine allowed to fill with water.

HAGGARTY COPPER MINING CO.

WYOMING

Idle. **Office:** Electric Bldg., Cleveland, Ohio. Mine at Rudefeha, Carbon Co., Wyo. L. N. Pennock, pres. **Cap.**, \$10,000, increased Nov. 9, 1908, to \$1,500,000; shares \$1 par. Controlled and owned by the United Smelters, Railway & Copper Co. Is a companion of the Ferris Haggarty Co., but like all its sister companies owned by the U. S. R. & C. Co., is bankrupt. No one but a lawyer can tell which of the two owns the copper mine that has been the bait for so many "investors."

HAHN'S PEAK GOLD MINING & MILLING CO. COLORADO

Office: 55 High St., Oshkosh, Wis. Mine at Hahn's Peak, Routt Co., Colo. **Inc.** Jan. 29, 1906, in Colorado. **Cap.**, \$1,000,000; shares \$1 par; 944,633 shares outstanding. **Officers:** H. O. Granberg, pres.; C. A. Spencer, v. p.; Patrick Magill, supt.; E. E. Meeleus, sec.-treas.; preceding, with Dr. H. A. Wolter, M. A. Rasmussen and W. E. Brown, directors.

Property: 25 claims, 248 acres, patented. **Development:** 442' incline shaft and a 950' tunnel on Royal Flush claim, said to cut 5 veins; also the 2,200' Conundrum tunnel 430' lower, cutting 12 veins, values being principally gold and silver. Shipments in 1914-15 assaying from \$92-\$198 per ton. returned \$3,974.

Equipment: includes gasoline engines, compressor, air drills, blower and a 400-ton concentrating mill, which is to be rearranged for the oil flotation process. Development work has been going on since Sept., 1915.

HAHNEWALD LEASING CO. COLORADO

Has a lease on the Abe Lincoln mine in Poverty Gulch, near Pitkin, owned by the Brant Gold & Copper Co., which see. Reported shipping about 100 tons of fair grade ore per week in 1916.

HALE MINING & MILLING CO. ARIZONA

Constellation, Yavapai Co., Ariz. Felix X. O'Brien, supt. Has gold and copper ores in veins. Equipped with gasoline power. Inactive save for yearly representation work.

HALIFAX TONOPAH MINING CO. NEVADA

Offices: 1008 Kearns Bldg., Salt Lake City, and Tonopah, Nev. **Officers:** F. M. Smith, pres.; Thos. Kearns, v. p.; F. J. Westcott, sec.; C. B. Zabriskie, treas.; preceding, with Clyde A. Heller, directors. B. F. Edwards, mgr., Syndicate Bldg., Oakland, Cal. J. W. Chandler, supt.

Inc. Sept. 27, 1902, in Utah. **Cap.**, \$2,000,000; outstanding, \$1,895,000; shares \$1 par. Stock transferred at company's office. Registrar & Transfer Co., 19 Nassau St., New York, registrar. Annual meeting, 2nd Tuesday in October. Listed on San Francisco Exchange.

Property: 4 patented claims, 81 acres, adjoining the central portion of the Belmont property on the east. **Ore:** gold-silver. Developed by a vertical shaft, 1,734' deep, with the deeper levels at 1,000', 1,200', 1,400' and 1,700'. The 1,000' crosscut picked up the easterly extension of the Belmont vein and ore shipments were made. After considerable work the vein was lost through faulting. In Nov., 1915, a crosscut 500' S. from an E. drift, cut a vein, since opened up to the 1,400' level, and said to have a width of 8' in a winze, from which ore was mined in 1916. All ore below the 1,200' level is taken to the 1,400' station and hoisted from there. **Production:** in 1913 valued at \$22,595 gross.

For geology of Tonopah district, see U. S. G. S. Prof. Paper 42.

HALL CREEK MINING & MILLING CO. WASHINGTON

Daisy, Stevens Co., Wash. Herman Camerer, supt. **Property:** the Gwin mine and group of claims, shows a fissure vein carrying gold-copper ore, developed by 400' shaft. **Equipment:** includes steam plant and water power, hoist and 4-drill Fairbanks compressor. Has a 75-ton concentration mill, driven by electric power. Employs about 25 men at mine and mill.

HAMBURG-AMERICAN COPPER M. & M. CO. IDAHO

Kellogg, Idaho. **Officers:** Wm. Schaefer, pres.; D. W. Price, v. p.; J. A. Walden, sec.; W. W. Papesh, treas.; Elmer Brown, Paul Jacobs, H. Froehlich and Frederick Bell, directors.

Inc. Nov., 1908, in Idaho. **Cap.**, \$1,500,000; shares \$1 par. **Property:** 8 claims, between the Handspike and Riverside, on the Little North fork, shows copper ore. **Development:** by 749' tunnel. Mine 18 miles from O. W. R. & N. Co.

HAMBURG MINE.**UTAH**

Property: in Goldstrike district, Washington Co., Utah, owned by the Bull Valley Gold Mng. Co. and operated under lease by the Goldstrike Mining & Leasing Co., which see.

HAMILTON-MONTANA GOLD MINING CO.**MONTANA**

Richard Daxon, mgr., Hamilton, Mont. Company owns group of claims in Missoula Co., Mont. **Developed:** by 400' crosscut, driven to intercept a vein of copper-lead ore.

HAMILTON POWER, MINING & TRANSP. CO.**NEVADA**

W. B. Bierce, pres.-mgr.; McGill, White Pine Co., Nev. Mine in Rocco canyon, near Hamilton, White Pine district, Nev. J. D. Teasdale, v. p. and sec.; Wm. Harwood, mgr.; preceding, with R. G. Henke and John Blair, directors.

Property: the Grand Prize group, 5 claims and power rights on Illipah creek. Ore is a carbonate carrying copper, lead and silver. **Development:** by 235' tunnel cutting ledge at 165' with 36' winze in ore and a 125' shaft sunk on the vein, showing a 12" paystreak of shipping ore. Shipments in 1913, of 20 tons sacked, averaged \$84 a ton, assaying 6.40% copper, 20.5% lead and 107 oz. silver. Shipments averaged 60 tons a month during 1914. Plan installing hoist and electric power plant. Management estimates 1,000 tons of \$65 ore blocked out.

HAMLET MINING & MILLING CO.**COLORADO**

Howardsville, San Juan Co., Colo. Fred Ballard, mgr.; E. A. Ritter, cons. engr., Colorado Springs, Colo. G. Roland, supt. **Property:** the Hamlet mine developed by tunnels, longest known as Mill tunnel, 500' below 5th level of old mine workings, connected by raises with tunnel. **Ore:** a complex mixture of copper-lead and zinc sulphides carrying good gold and some silver values.

Equipment: includes steam power plant, compressor and conical mill with flotation unit, latter reported destroyed by fire, Dec., 1915. Company employs about 15 men.

HAMMOND MINING CO.**WASHINGTON**

Officers: F. C. Hammond, Bellingham, Wash., pres.; Hugh Eldridge, v. p.; Geo. C. Fisher, sec.-treas.; with Frank Wright, Fred J. Wood, directors. **Inc.** 1914. **Cap.,** paid up, \$500,000.

Property: 32 claims, 600 acres in T. 39 N., R. 8 E., in Sec. 5, 6, 7 & 8, of Whatcom Co., Wash., includes the Great Excelsior mine. **Ore:** gold-silver, said to average \$4 per ton, occurs in formation of slate, sandstone and andesite. **Developed:** by 2,500' of underground workings. **Equipment:** includes a 100-ton 20-stamp mill. **Production:** said to be 10,000 tons of ore, with net returns of \$20,276, to 1915.

Company was building a 150-ton cyanide plant in 1915.

HAMPTON CONSOLIDATED MINES CO.**COLORADO**

Granville I. Chittenden, agt., 200 E. and C. Building, Denver, Colo. Mine at Russell Gulch, Gilpin Co., Colo. **Inc.** in Colorado. **Cap.,** \$3,000,000; shares \$1 par. Company reported without funds and indebted to Chittenden estate for taxes, etc. The widow of W. H. Chittenden, organizer and moving spirit of the company, is practically the owner.

Property: 4 claims, patented, very close to the War Dance gold mine and believed to carry an extension of the ore shoot of that mine. The western, or 80' shaft of the Hampton, might strike this ore at 250'. The ore has bornite, tetrahedrite, pyrrargyrite, pyrite and marcasite, said to assay 2.7 to 35% copper, 6 to 35 oz. silver and 0.16 to 5.4 oz. gold per ton. The mine has a 250' tunnel, and shafts aggregating 300', with about 3,000' of workings.

Equipment: includes a 16-h. p. gasoline engine. Development work was resumed March, 1915, and management plans installing electric hoist, compressor and 10 drills. Property believed to have merit.

HANAUER SMELTING WORKS.

UTAH

At Salt Lake City, Utah. Controlled through stock ownership by American Smelting & Refining Co.

HANCOCK CONSOLIDATED MINING CO.

MICHIGAN

Hancock, Mich. **Officers:** John D. Cuddihy, pres.; Capt. Thos. Hoatson, v. p.; John H. Hicok, sec.-treas.; preceding, with Allen F. Rees, Capt. Samuel B. Harris, Capt. Jas. Hoatson and Frederick W. Nichols, directors; John L. Harris, gen. mgr.; Richard Coombs, mg. capt.; Daniel Fisher, clerk; C. W. McDougall, engr.; Fred G. Schubert, master mechanic.

Inc. June 11, 1906, in Michigan. **Cap.**, \$5,000,000; shares \$25 par; issued, \$2,500,000; fully paid with \$3 assessment levied Mch., 1915, payable \$1 each, in May and Sept., 1915, and Jan., 1916. Old Colony Trust Co., Boston, Mass., registrar; State Street Trust Co., Boston, transfer agent. Stock listed on Boston Exchange. Annual meeting, third Wednesday in June.

Company began business with \$1,000,000 and paid \$552,623 for its property. Disbursements were \$264,539 in 1907; \$205,289 in 1908; \$279,973 in 1909; \$383,414 in 1910; \$359,278 in 1911; \$267,542 in 1912; idle in 1913; \$214,971 in 1914; \$501,457 in 1915. Total receipts in 1915 from ore sales, assessment and sale of lands to Quincy Mining Co., \$502,950, as compared with \$229,894 in 1914.

The mine, which had been idle 15 months in 1913-15, 8 months due to the strike, and for 7 months because of the outbreak of the European war, resumed operations in March, 1915, and the Hancock, after several years' development work, is now in the producing stage.

Property: consists of 840 acres of mineral territory, immediately west and south of the old Quincy mine, in T. 55 N., R. 34 W., including the original Hancock mine, 136 acres, set aside, 1859, by the Quincy Mining Co., which reserved the mineral rights to the Pewabic bed. The Pewabic bed, on lands other than the original Hancock tract of 136 acres, is owned by the Hancock Consolidated. Lands carry the Pewabic, Quincy, West and Hancock or Sumner copper-bearing beds.

Perhaps the best part of the Quincy mine is tributary to No. 7 shaft, which is immediately north of the Hancock boundary.

In June, 1916, approximately 75 acres were sold to the Quincy Mining Co. for \$226,000. In part payment therefor the Hancock was granted the right to use Quincy No. 7 shaft and 1 stamp of the Quincy mill. Company also owns lots 6 and 7, Sec. 28, for a mill site.

The old Hancock mine, opened 1859, was closed June 1, 1885, on account of the low price of the metal, after producing 5,709,384 lbs. fine copper. The Hancock or Sumner amygdaloidal bed averaged about 12' in width below the fifth level, to a depth of 1,052', where the mine was bottomed.

The property carries the upper half of the Michigan series of cupriferous traps and conglomerates, and has 4 known copper-bearing beds, the Pewabic being the most important. The property also carries the underlay, but not the outcrop, of the 3 copper-bearing beds of the Quincy, these being the Quincy to the eastward, apparently of little value, followed by the Pewabic, which is the main bed of the Quincy and the so-called West lode of the Quincy. The known copper-bearing beds outcropping on the Hancock property are the Hancock or Sumner, mined in the old Hancock mine, and now known as No. 1 lode, lying about 1,100' west of the Pewabic; the old West bed, now known as No. 2 lode, lying about 300' west of

No. 1, and the New West bed, now known as No. 3 lode, lying about 75' west of No. 2.

Development: No. 1 shaft is the old main 3-compartment shaft of the Hancock mine. It has a remodeled wooden shaft rock house, with a Lake Shore hoist good for 2,000' depth.

The new and main 5-compartment working shaft known as No. 2 is 2,200' N. W. of No. 1. It is vertical, with dimensions 9' 6" x 29' 6", being the second largest in the Lake Superior district, and is 4,001' deep. This shaft intersects No. 3 bed at a depth of 2,038', the bed here showing a pitch of 37°, compared with 47° in the upper workings, this flattening of 10°, at depth, corresponding to a similar flattening shown to the northeast in the No. 7 shaft of the Quincy. The No. 4 lode is intersected by the shaft at a depth of 3,105'; it is 17' thick and carries payable ore.

Ground below the 53rd level, 4,000' below the surface, is reached by 2 subsidiary shafts sunk from the 49th level, connecting with the No. 2 shaft through chutes on the 53rd level and through drift connections on the 49th level. In Oct., 1915, work was started in Quincy, No. 7 shaft; drifts were extended into Hancock ground and although the veins are narrow, the ground is reported to be rich. The 63rd level has been holed through from Hancock's No. 2 shaft to Quincy's No. 7 to provide ventilation. In May, 1916, stoping was in progress on the 68th level, with other stopes to be worked on the 69th, 70th and 71st.

Considerable drifting has been done on both No. 2 and No. 3 beds, No. 3 being opened by a winze from the 10th to 18th levels, with drifts on the 9th to 18th levels, inclusive, several of which are more than 1,000' long. No. 2 shaft has loading stations on the 13th, 18th, 23rd, 27th, 34th, 39th, 44th, 49th and 53rd levels, to which rock broken will be sent by chutes from the levels above.

No. 2 shaft has a shaft rock house that is the most modern in the Lake Superior district. The building has a total height of 128', with working floor 60' above the ground. The bins are of 1,000 tons capacity each.

Equipment: includes two 50-ton Farrel crushers and a smaller crusher to treat waste rock. The 2 large crushers are fed by 2 steel traveling-belt picking tables; crushers each have a 50-h. p. induction motor and each picking table has a 10-h. p. induction motor. Two men per shift are expected to do all work on the crushing floor.

The main engine house at No. 2 shaft is equipped with 2 hoists, main engine being a Sullivan Corliss direct-connected hoist, operating 2 skips in counterbalance, with capacity to hoist 8 tons of rock from a depth of 4,000', at a steam pressure of 150 lbs. There also is a Sullivan first-motion hoist.

The steel compressor house has an electric traveling crane, 13-drill and 16-drill air compressors and a new 35-drill tandem-compound air compressor. The boiler house has 2 batteries of 4 return tubular boilers, each 72" in diameter and 18' long.

Buildings at No. 2 include a machine shop, smithy, office, changing house and a number of dwellings. The main plant at No. 2 shaft is reached by a spur of the Mineral Range railway. Company employs about 200 men when running full time.

Production: in 1915 amounted to 871,000 lbs. refined copper, as compared with 488,678 lbs. in 1914. Shipments of 400 tons daily being made June, 1916, will eventually be increased to 800 tons daily. Ore averages 17 lbs. copper per ton.

The mine has been developed very extensively and given a thoroughly

modern and complete equipment. The ground opened, while by no means as rich as some in the Lake Superior district, is of fair average value and with exceptionally good equipment and an able and experienced management, the Hancock promises to make a successful low-grade mine.

HANEY COPPER CO.**ARIZONA**

Company owns properties at Ramsgate, 12 miles west of Prescott. Did some development work in 1913 and reported to have resumed operations in 1914.

HANNA MINING & MILLING CO.**COLORADO**

Capitol City, Hinsdale Co., Colo. Has copper-lead ores, with steam and electric power and a 100-ton concentrator. Letters returned in 1916. Probably dead.

HANOVER COPPER CO.**NEW MEXICO**

Idle. Hanover, Grant Co., N. M. Geo. A. St. Clair, pres.; with Wm. Elder, M. E. Riley and Arthur Howell, directors. Inc. 1909. Cap., \$50,000; shares \$10 par. Property: 15 claims, north of the Chino Copper property and near the holdings of the Philadelphia Copper Co. Mine has shafts of 70', 100' and 150', and tunnels of 40' and 60', showing copper ore. Company involved in litigation.

HAPPY JACK MINING & REDUCTION CO.**ARIZONA**

Office: 530 Land Title Bldg., Philadelphia. Pa. Mine office: Patagonia, Santa Cruz Co., Ariz. Officers: Alfred W. Barnett, pres. and gen. mgr.; W. H. Barnett, v. p.; Henry W. Scattergood, sec.-treas.; preceding, with Martin Stotz and Theo. Myers, directors. Inc. Oct., 1908, as successor of Happy Jack Mining Co., in Arizona. Cap., \$1,000,000; shares \$1 par, fully paid and nonassessable; issued, 304,709 shares. Property: 9 miles from Patagonia, has a shallow shaft and a 950' tunnel planned to be driven 2,700', showing lead and copper ores. Is said to have shipped considerable ore of good average tenor in the past and is considered promising. Assessment work only done under present ownership.

HARDSCRABBLE MINING CO.**NEW MEXICO**

Pinos Altos, Grant Co., N. Mex. Officers: J. E. Lundstrom, pres.; E. S. Bruning, sec.-treas.; with S. H. Beach and J. T. Janes, directors. J. T. Janes, supt. Inc. 1911 in Colo. Cap., \$150,000; outstanding \$75,000; shares \$1 par. Has a 5-year lease, dating from 1913, on the Hardscrabble mine, 1½ miles W. of Pinos Altos.

The mine is an old one, operated by lessees for a number of years and sold at sheriff's sale in 1909. Present management is said to have opened up low-grade ore, averaging 4.5% copper and 7 oz. silver per ton, and high-grade ore averaging 20% copper and 38 oz. silver per ton. In 1915, 800 tons of high-grade ore shipped, is said to have yielded gross returns of \$12,960. Development is by shaft and tunnels.

HARDSHELL-FLUX MINING & DEVELOPING CO.**ARIZONA**

Patagonia, Santa Cruz Co., Ariz. Officers: Ben Heney, pres.; R. R. Richardson, v. p.; W. E. Francis, sec.-treas.; Frederick John Siebert, cons engr.; Francis J. Heney, counsel; J. C. Hartness, gen. mgr., at last accounts. Property: 30 claims, 6 to 9 miles from Patagonia, including the Flux and Hardshell mines. Ore values are mainly in silver, with some lead, copper and gold. Property regarded as promising, though ore is complex.

HARRIS COPPER CO.**ARIZONA**

Offices: Findlay, Ohio, and 319 Van Nuys Bldg., Los Angeles, Cal. Officers: C. C. Harris, of Findlay, Ohio, pres., treas., gen. mgr. and purch. agt.; W. J. Martin, v. p.-mine supt.; Harry W. Moore, sec.; preceding officers, W. J. Sease, Los Angeles, and Fred F. Harris, San Jose, directors

Inc. July 10, 1910, in Arizona. Cap., \$1,000,000; shares \$1 par; nonassessable; issued, \$710,001. Annual meeting, second Tuesday in January.

Property: 34 claims, 550 acres, in the Tip Top district, about 50 miles north of Phoenix and 30 miles east of Wickenburg, on the Agua Fria river, at the mouth of Black Canyon creek. Claims, partly purchased with stock and partly located by the company, show schists cut by diabase intrusions. The company's map shows 2 groups of claims, the Cascadilla, or western, being in part 3,000' wide, and 1,200' long; the group covers 3 veins running north and south. Development is meager; one shaft in diabase and 2 tunnels with an aggregate of 800' of work, costing \$9,000.

The Copper Reef, or east group, covers 2 veins, 1 alongside the Agua Fria river claimed to be an extension of the vein mined by the Kay Copper Co. Company claims 1,000 tons of \$15 ore blocked out, which is reasonable. One vein said to be 500' wide and another 90' in width, the observers evidently considering altered schist to be vein matter.

The president of the company writes the editor as follows: "We insist that the report speaks the truth quoted as we make the report to you and if any embellishment is placed on the wording of our report, it must conform in meaning to give the information that can be construed from the wording that we give."

The property may have a great outcrop and it may contain copper in commercial quantities, but we defy any mining engineer to find out what the company does have on its property, from the report issued by the management and reprinted as a gem of humor in the Mining & Scientific Press, and in part reproduced herewith: "COPPER.—A red, ductile, tenacious, malleable metal of great and varied use, originally called brass of cypress, copper sand, alacaunte, C group of minerals, mostly soft, included C. suprite, malaconite, malachite, chessylite, chrycopyrite, olivinite, etc. Black C ore, malaconite, gray C ore, Chalcocite, C Purite, yellow C ore, variety Chalcopyrite, the common ore.

"The formation of the Harris Copper Co. have blended with the iron, lime and porphyry with quartz. Many of the above minerals, but more especially the commoner forms with oxides condensed formation on the top with the iron and lime, with a great amount of carbon and sulphur in the schist formation, with an amalgamated condition of the various mineralizations where gold and silver predominates. The schist formation being soft, it stands to reason that when the sulphides appear in the lower rocks, I am led to believe from the geological lay of the uplift that is now held and owned by the Harris Copper Co., there is beneath the surface of this great iron capped ledge a great body of copper ore." Enough said.

Despite the unfavorable impression created by the company's literature, it is understood that the property has genuine merit, has large ore-bodies and with cheaper transportation will make a good mine. Part of property reported leased to Wilson Foster of Los Angeles in 1914 for ten years; lessee is required to spend \$20,000 and company to receive 15% of gross output.

HARRIS COPPER CO.

MEXICO

Oscar Werner, agt., L. A. Athletic Club, Los Angeles. Inc. about 1908. **Property:** 346 hectares, 3 miles east of the Pilares mine of the Moctezuma Copper Co., includes La Caridad group, supposed to have been bought for \$40,000 and said to have 6,000 tons of ore blocked out averaging 4 to 6% copper.

The Caridad mine, about 18 miles east of Nacozari, Sonora, and 10 miles from the Bavispe river, shows N. W. and S. E. shear zones in quartz

porphyry, carrying pyrite in silicified rock. Where crossed by intersecting fissures there are "pipes" of brecciated rock cemented by tennanite (sulpharsenite of copper with 57.5% copper) and chalcopyrite with pyrite. The claims cover precipitous bluffs and pillars of rock, showing porphyry overlaid by coarse, iron-stained breccia (agglomerate). The porphyry shows abundant and widespread traces of mineralization throughout a zone about 2,000x3,000', containing several small "pipe" orebodies of high-grade ore.

Development: 5 tunnels on the Caridad claim, totaling 800', and a few shallow shafts. Diamond drilling has shown that the orebody extends downward, but does not increase in size. Property interesting, but not considered attractive as a large mining proposition.

HARTFORD-ARIZONA COPPER MINING CO.

ARIZONA

Hamburg, Cochise Co., Ariz. Henry Hamburg, pres. and mgr. In Sept., 1913, the Arizona Corporation Commission authorized the company to incur a \$100,000, 6% bond issue, for further mine development. Owns the Wisconsin group in the Huachuca mountains. Company has surveyed a line for tramway to wagon road and will ship to Hereford or to a point on Fort Huachuca branch of the El Paso & S. W. R. R. Property developed by tunnels, has steam plant and compressor and employed 30 men at last accounts. No recent returns secured.

HARTFORD MINING CO.

MISSOURI

Joplin, Mo. **Officers:** L. A. Barbour, pres., Hartford, Conn.; H. H. White, sec.-treas., Joplin, with S. B. Griswold, Carthage, Mo., and C. C. Spencer, Joplin, directors. H. H. White, Joplin, Mo., gen. mgr.; Geo. Elliott, supt., Galena, Kans. **Inc.** 1906, in Missouri. **Cap.**, \$100,000; shares \$100 par, all outstanding.

Output: zinc-lead concentrates; production not available.

HARTWIG MINING CO.

IDAHO

Idle. **Address:** care George Hartwig, gen. mgr., at Vancouver, Wash. Mine at Pollock, Idaho Co., Idaho. **Officers:** Wm. Hartwig, pres.; G. W. G. Geiger, sec.; W. J. Moore, treas.; preceding officers, C. Brinkman, Fred Goldsmith and Gustave Peters, directors. **Inc.** Jan. 3, 1906, in Iowa. **Cap.**, \$72,000; shares \$25 par; fully issued.

Property: 5 claims, patented, 72 acres, and a 5-acre mill site, in the Rapid River district, near Salmon river, said to carry several contact deposits between limestone and diorite, of which 4, under development, are of 30' estimated average width, traceable 400', carrying oxidized and chalcopyrite ores, reported by company to average 14% copper, with traces of lead and zinc, 3 oz. silver and \$10 gold per ton. Figures undoubtedly too high for an average of the orebody. **Development:** 75' shaft, and 3 tunnels of 1,000' aggregate length, an 875' lower tunnel cutting the ore zone, which shows but little ore. Property has 4 buildings but no power equipment. Idle some years, owing to lack of transportation facilities.

HARVARD MINE, INC.

CALIFORNIA

Office: 141 Milk St., Boston, Mass. W. B. Buckminster, gen. mgr.; H. W. Gould, supt. **Property:** 4 claims, and a mill site, 80 acres, on the S. E. slope of Whiskey Hill, one mile S. W. of Jamestown, Tuolumne Co., Calif. Claims cover 5,000' along the strike of the veins.

Ore: 3 veins, the east, central and west, with strike N. 37° W., dip 60° N. E., and average width 10', have been explored. Central vein consists of solid quartz 6' to 12' wide, but values are, as a rule, too low to mine. The east and west veins consist of a mass of quartz stringers cutting the schist and containing free gold. Main footwall is serpentine with hanging-wall of Calaveras slates. Ore occurs W. of the central vein.

There are 7 distinct ore-shoots developed on the property, average length 200', width 6'. Veins are faulted on S. end of orebody between the 1,200' and 1,400' levels, and on the N. end between the 1,100' and 1,200' levels they are faulted 8' to 25' to the S. W.

Development: 3-compartment shaft, 1,650' deep, with levels at 200', 500', 700', 800' and below this at 150' intervals; lowest level is at 1,400'. Total underground workings about 4 miles. Shrinkage stoping is used. Ore pockets, 100 to 200 tons capacity, are in hanging wall of shaft.

Equipment: includes a 300-h. p. double-drum electric hoist; 2 electrically driven Rix compressors of 1,100 cu. ft. and 800 cu. ft. capacity, and a 60-stamp mill driven by two 75-h. p. motors. Weight of stamps, 1,200 lbs. each, drops 7", 100 times per min., crush 5 tons per stamp, through 40 mesh. Mill is 600' from shaft and ore is handled by a 15-h. p. electric motor, in two 1½-ton cars. An 86% extraction is made of the pulp from stamp batteries, by 24 Johnston vanners, driven by 35-h. p. motor. Concentrates assay \$30 per ton. Company employs 116 men. See Mines & Min. Res. of Tuolumne Co., State Mineralogist's Report 1915, pp. 149-151.

HASBROUCK MINE.

NEVADA

Formerly owned by the Hasbrouck Mining Co., but abandoned after doing considerable work. Now owned and operated by Geo. Kernick of Tonopah. Located 5 miles south of Tonopah. Shipments of gold ore were made during 1915, but at last accounts only development work was being done.

HAUXHURST MINE.

ARIZONA

Jas. Hauxhurst, owner and mgf., at last accounts. **Property:** 900 acres, in the Big Horn mountains, about 65 miles W. of Phoenix and 27 miles S. W. of Wickenburg. Mine, formerly owned by the Hauxhurst Copper Co., was under bond for about 3 years to the United States Copper Mines, Inc., which forfeited same, 1909; leased to F. C. Alsdorf, 1913, but apparently relinquished. See Vol. XI, Copper Handbook.

HAVALINA MINING CO.

ARIZONA

Sold its Santa Nino property, Patagonia mountains, S. W. of Duquesne, Santa Cruz Co., Ariz., to J. Wells Smith, Feb., 1913. Property was being developed by 800' crosscut tunnel to reach a rich copper shoot said to have been found in the mine. Litigation has stopped work.

HAYDEN DEVELOPMENT CO.

ARIZONA

Operating the Copper Chief mine of the Copper Chief Mining Co., which see.

HAYES & GRACEY SYNDICATE.

ARIZONA

M. P. Hayes and T. H. Gracey, Los Angeles, Cal., owners. Succeeds the Dragoon Copper Mining & Smelting Co., now dead. **Property:** the Christmas and Eureka claims, carries replacement deposits with silver-lead-copper ores. **Development:** by a 550' shaft. **Equipment:** includes steam power and air compressor. Presumably idle. No returns secured.

HAYNES COPPER CO.

ARIZONA

Succeeded 1916, by Jerome-Victor Extension Copper Co., which see.

HAYSTACK MINES, INC.

NEVADA

Officers: F. L. Reber, v. p.-treas.; Winnemucca, Nev. C. T. Smith, pres. and supt., with W. J. Merryfield, directors. B. Smith, sec.

Inc. June, 1914. No outstanding stock. Annual meeting, first Tuesday in Jan. Gross earnings in 1915, \$7,500 from lessees.

Property: 5 unpatented claims, 35 miles W. of Winnemucca and 7 miles S. of Jungo, on the Western Pacific R. R. **Ore:** occurs as free milling gold, in fissure veins in granite and quartzite. Ore shipped in 1915

said to average \$22 per ton. **Development:** by 70' incline shaft. Management planning to resume shaft sinking.

HAZEL GOLD MINING CO.

CALIFORNIA

French Gulch, Shasta Co., Calif. J. O. Jillson, pres.; E. L. Young, supt. **Property:** 178 acres, patented, and 485 acres, unpatented, at 2,300' elevation, on N. side of Cline Gulch, 5 miles N. E. of French Gulch, includes the Gladstone mine, the largest gold quartz producer in Shasta county. Claims were originally located by T. Cummings in 1896. After exhaustion of oxidized ore the mine changed hands several times until acquired by present company in 1901.

Ore: free milling gold. Two fissure veins with E. W. strike and dip of 60° S. have been mined from adit level to 7th level; below 7th the dip changes to steep N.; average width 2½' to 3'; walls are slate. Ore shoot is 300' long. Milling ore averages about \$10 per ton.

Development: the upper 1,000' of vein has been mined by tunnels, while lower portion is worked from a winze on the main adit (Ohio) level. On the lowest, 1,300' level, a 700' crosscut cut the vein in Nov., 1915. Mine makes about 70 gal. water per minute.

Equipment: includes a 375-h. p. double-drum electric hoist, compressor plant, electric haulage from mine to mill, 9 miles of power and 5 miles of telephone lines. An electrically driven 30-stamp mill is equipped with concentrating tables and electroplating plant. Stamps weigh 1,050 lbs., drop 106 times per min., from height of 6"; capacity, 100 tons in 24 hours, through a 40-mesh screen; 92% extraction. Electric power is obtained from Northern Cal. Power Co. Company employs 140 men.

Production: previous to 1901, said to be \$85,000; 1901-1914 said to be \$3,000,000; yearly production, about \$360,000.

See U. S. G. S. Bull. No. 540, pp. 35, 37, 46, 57-60; Mines & Min. Res. of Shasta Co., State Mineral Report 1915, pp. 43-44.

HAZEL MINING & MILLING CO.

TEXAS

Officers: John V. Hughes, Dallas, Texas, pres.; G. G. Wright, v. p.; C. F. Freeman, Dallas, Tex., sec.; R. B. Stichter, treas. **Directors:** J. V. Hughes, T. J. Oliver, G. H. Cox, C. A. Culters, C. F. Freeman, Milton Parks and G. G. Wright.

Property: the Hazel Silver mine, in Diablo mountains, 15 miles N. E. of Van Horn, Culberson Co., Texas, shows a fissure vein that yields chalcocite ore with barite gangue. Shipping ore said to average 10% copper and 50 oz. silver per ton. **Development:** includes 700' shaft and extensive workings at various levels. Mine was worked for 10 years by H. G. Clifford of El Paso and A. C. Schriver of San Antonio, producing \$500,000, but was shut down in 1895. A dry concentrator was erected to treat the old dumps, said to contain about 100,000 tons of \$15 copper-silver ore, but was unsatisfactory and has been converted into a wet concentrator.

Reported in 1915 that the Sutton Steel & Steel Co. of Dallas had taken over the mine and would operate it.

HEAD LAKE GOLD-COPPER MINING CO.

WASHINGTON

Address: care George Geisler, pres., S. 1111 Augusta St., Spokane, Wash.; J. A. Sullivan, v. p.; A. M. Harris, v. p.; W. E. Allen, sec.-treas. **Property:** 22 claims, about 500 acres, in the Newport mining district, near Metaline, Pend Oreille Co., Wash. Company recently acquired the Comstock and Key Fraction group, containing silver and lead-bearing ore.

HEARNE GOLD & COPPER CO.

COLORADO

Idle. Office: Wheeling, W. Va. **Mine office:** Central City, Gilpin Co., Colo. W. H. Hearne, mgr.; Mathew Daniels, supt. **Inc.** 1907, in Colorado. **Cap.,** \$500,000. **Property:** the Anchor mine, in Willis gulch,

drained by the Newhouse tunnel, shows low-grade copper and lead ores and medium-grade silver ores. Electric power used; has air compressor, and a 50-ton 10-stamp mill and concentrating machinery.

HECLA (CONSOLIDATED) MINE. MONTANA

Glendale, Beaverhead Co., Mont. Mine worked by lessees until 1912, when it was taken over by the Longmaid Bros. of Helena, who installed electric power. **Property:** the Atlantis, Cleves and other mines, formerly owned by the Hecla Consolidated Mining Co., which for 20 years was a large producer of silver and lead, with considerable gold and copper, latter reaching 100,000 lbs. fine copper yearly. Property paid dividends of \$2,250,000 on an original investment of \$40,000, but was bought, 1906, at sheriff's sale, for \$28,000. About 65 men employed for a year or two, but the little ore found was low-grade and the mine was again closed down, and abandoned, after some \$300,000 had been spent.

HECLA CONSOLIDATED MINES CO. WYOMING

Idle. **Office:** 1624 Curtis St., Denver, Colo. **Mine office:** Hecla, Laramie Co., Wyo. **Officers:** Henry Schwartz, pres.; Wm. L. Wilson, v. p.; Lawrence Myers, sec.; Eli Miller, treas., and Henry Hirsch, directors. Inc. 1909, in Wyoming, as a merger of the Hecla Mining Co., Amalgamated Copper Mining & Extraction Co. and Kopper Krown Mining Co. **Cap.**, \$5,000,000; shares \$1 par.

Property: 610 acres, including the Hecla group, 13 claims, 2 patented, and a 35-acre townsite, in the Silver Crown district, 4 miles from Granite Canyon, on the Union Pacific railroad and 7 miles from the Cheyenne Northern line. The Hecla is claimed to show 16 fissure veins, of 8' average width, in schist and granite, of which 3, of 7' average claimed width, carry oxidized and sulphide ores, said to give average assays of 3.4% copper, 3 oz. silver and several dollars in gold per ton, besides nickel, platinum and uranium. **Development:** includes a 40' tunnel and 14 pits and shafts of 10 to 140' depth.

The Teddy Roosevelt-Good Hope group, formerly held by the Amalgamated Copper Mining & Extraction Co., comprises 10 claims in the Silver Crown district, 2 miles from the Union Pacific railway and 23 miles from Cheyenne, with about 700' of workings, claimed to show ore giving fair assays in copper.

The Kopper Krown group, about 2 miles S. W. of Hecla and 22 miles W. of Cheyenne, 7 claims, 140 acres and not 154 acres as claimed by the company, has 413' of workings, claimed to show 10,000 tons of sulphide ore blocked out for stoping.

The Hecla mill has 15 stamps, a 50-ton concentrating plant and a leaching plant. The Ohly process, installed in an attempt to save the rare metals, was not a success. Ore, mainly low in grade, is only in part adapted to concentration, and the mill requires overhauling and adaptation to the ore. With concentration by the Minerals Separation process, on the sulphide ores, property ought to be workable. The history and financial methods of this company and its predecessor are described in Vol. X. Idle, except for annual assessment work.

HECLA COPPER-SILVER MINING AND MILLING CO. WASHINGTON

Chewelah, Wash. **Officers:** J. C. Argall, pres.; Howard McPhee, v. p.; Virgil R. Hoar, sec.-treas.; Fred F. Foster, supt.; preceding, with Chas. Kliner, directors.

Property: 11 claims $3\frac{1}{2}$ miles N. E. of Chewelah and S. of the United Copper Co. holdings. Claims show 4 ledges, the main vein varying from 6 to 14' wide, traceable by cuts and pits for nearly a mile and averaging

5.4% copper, \$1 in gold and \$1.80 in silver. **Developed:** by a 75' tunnel and a 140' vertical shaft. **Equipment:** includes a 50-h. p. hoist and a 4-drill compressor. Company plans sinking the shaft to 500'.

HECLA-GRANITE MINING CO.

COLORADO

Idle. Mine near Turret, Chaffee Co., Colo. Company is an offshoot of the Stratton Gold & Copper Mining Co. that took over the Stratton group. Owns the Copperopolis group of 5 claims developed by 600' shaft and said to show an 8' vein of copper ore in shoots.

HECLA MINING CO.

IDAHO

Wallace, Idaho. **Officers:** Jas. F. McCarthy, pres.-treas. and gen. mgr. Wallace; Frank Upman, v. p., with Sarah E. Smith, Carl Landsee, F. J. Kipp, W. J. C. Wakefield and H. C. Lambach, directors. L. E. Hanley, sec., Wallace. Original Hecla Mining Co., inc. in Idaho in 1891, with cap., \$500,000 and shares \$1 par, owned the Hecla and Katie May claims. **Reincorporated** July, 1898, in Wash. **Cap.,** \$250,000; shares 25 cts. par; all issued and fully paid. Security Transfer and Registrar Co., New York, transfer agent; Metropolitan Trust Co., New York, registrar. Annual meeting in April. Listed on New York Curb and Spokane Stock Exchange.

Balance sheet, Dec. 31, 1915, shows: assets: \$1,067,361, which includes property and improvements, \$716,350; inventory, \$35,562; accounts receivable, \$1,530; ore in transit, \$114,272; cash, \$199,645. Liabilities include: accounts payable, \$52,501; reserves for depreciation, \$333,091; surplus, \$431,768.

Income statement for 1915 shows: net receipts from ore sales, \$1,028,991; interest and misc., \$5,495; total, \$1,034,486. Expenditures, \$388,340, which include: mining and development, \$259,177; ore sorting, \$21,620; haulage, mine to mill, \$11,168; milling, \$40,261; taxes and general \$56,112. Net income, \$646,146; depreciation reserves, \$84,395, leaving net profit of \$561,751.

Dividends: for 1915 amounted to \$565,000 or 56½ cts. per share. Total dividends paid to 1916, \$3,775,000. Dividends in 1916 total \$800,000 to July 20, at which date the 158th consecutive dividend was paid. Dividend rate, formerly 2 cts. per share per month, was decreased to 1 ct. in 1914, due to condition of the lead market, and increased, Dec., 1915, to 10 cts. per share; increased June, 1916, to 15c per share.

Property: 29 patented claims, 347 acres, near Burke, also mill site at Gem. **Ore:** chiefly silver-lead sulphides accompanied by sphalerite and pyrite, occurring in the Hecla lode; strike N. W.-S. E., with average dip 80° to N. E. General country rock is sericitic Burke quartzite. The lode is intimately associated with a lamprophyric dike, which has an average width of 2'. Ore averages 5' to 6' in width, occurs mainly in the quartzite on one or both sides of the dike, and, to a large extent, fills fissures. The pay shoot has an extreme length of 1,200'. For geology of Coeur D'Alene district, see U. S. G. S. Prof. Paper No. 62. Also paper by Oscar A. Hershey. Published by Mng. & Sci. Press.

Development: by tunnels and shafts; working shaft 1,600' deep with 20,000' drifts and crosscuts. Development work in 1915 amounted to 3,411'. Lowest level is at 1,600', where orebody has been drifted on for its full length. The 1,400' level had 535' work done in 1915, all in ore; the 1,200' level had 529' in ore which is apparently an extension of the old orebody; the 600' level, 344' work in waste, and 88' in ore, which discloses the same extension; the 270' level 270' in ore.

Ore reserves: estimated Jan. 1, 1916, at 1,110,000 tons, sufficient at present rate of production to last over 6 years.

Equipment: the property is one of the best equipped in the district with hoists, compressors, machine shops, and a 500-ton concentrator, the latter at Gem, has a flotation unit, using General Naval Stores oils. Electric haulage is being tried out on the 1,600' level; if successful there, it will be extended to other levels. Company employs 175 men. In June 1916, leased the Union mill from the Federal Mng. & Sm. Co., planning to increase production 60%.

Production:

	Ore & Cncts.		Lead Lbs.	Silver Ounces	Lbs.Pb. Oz.Ag. per T. per T.	Sell. Pr.	
	Shipped Tons					Pb.	Ag.
1915.....	26,214 (a)		24,917,867	692,444	951 26.4	4.866	50.4
1914.....	20,051		18,957,823	509,200	945 25.4	3.866	55.0
1913.....	19,937		18,832,534	507,236	945 25.4	4.364	50.5

(a) includes 15,199 tons dry concentrates and 11,015 tons crude ore; 112,646 tons ore were milled.

Costs per ton, 1915, were as follows:

	Perm.					Gross			
Mng.	Dev.	Sorting	Imp.	Misc.	Mill	Trans.	Rec.	Exp.	Profit
\$1.68	8.7c	14.7c	14.7c	38.3c	35.7c	9.9c	\$7.05	\$2.65	\$4.40

The Hecla mine, unsuccessful in its early years, has become one of the steady dividend payers of the district. The property is kept up to a high standard in condition and is most efficiently managed.

HEDLEY GOLD MINING CO.

BRITISH COLUMBIA

Offices: 42 Broadway, New York, and Hedley, B. C. **Officers:** I. L. Merrill, pres.; W. B. Dickson, v. p.; C. D. Fraser, treas.; preceding, with W. D. Thornton, C. A. Congdon, G. E. Tener, F. E. Searle, Marcus Daly, and W. E. Corey, directors. J. D. Clarke, sec. and assist. treas. Gomer P. Jones, gen. supt., Hedley, B. C.

Inc. Aug., 1909, in Delaware. Is successor of the Yale Mining Co. **Cap., \$1,500,000;** shares \$10 par; outstanding \$1,200,000. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting, second Wednesday in April, at 42 Broadway, New York. Listed on Boston Stock Exchange.

Comparative Statements of Income Account:

Year	Rec. at		Expen- ditures	Profits (a)	Dividends	Erngs. on	
	Mill					Surplus	Cap.Stk.
1915.....	\$796,591		\$421,846	\$374,745	\$300,000	\$74,745	\$3.12
1914.....	797,341		409,112	388,229	300,000	88,229	3.23
1913.....	802,330		397,075	405,255	360,000	45,255	3.38
1912.....	748,133		362,253	385,880	360,000	25,880	3.22
1911.....				318,152	300,000	18,152	2.65

(a) includes interest earned.

Comparative General Balance Sheet, Dec. 31:

Assets:			Liabilities			
Property Current		Total	Cap. Undivided		Total	
Acct.	Assets		Stock	Profits		
1915..	\$1,439,542	\$195,528	\$1,635,070	\$1,200,000	\$435,070	\$1,635,070
1914..	1,394,275	166,049	1,560,324	1,200,000	360,325	1,560,325

Dividends:

	Amt.	Rate %		Amt.	Rate %
1909.....	\$0.30	3	1913.....	\$3.00	30
1910.....	1.40	14	1914.....	2.50	25
1911.....	2.50	25	1915.....	2.50	25
1912.....	3.00	30	1916 to July 1, 1917	1.00	10

Property: the Nickel Plate and Sunnyside mines, 31 claims, crown-granted, and a mill site, 1,370 acres in all, on Nickel Plate Mountain, and in Similkameen Valley, Osoyoos mining division, Boundary district, Hedley, B. C. Also owns the Copper Flat property near Silver City, N. M.

Geology: the Hedley ore deposits are of contact metamorphic origin, and occur at contact of dikes and sheets of gabbro in altered limestones; they are irregular in outline, usually have a well-defined boundary on the side of the gabbro, and dip about 24°. Ore occurs in shoots. Nickel Plate shoot is 150' wide, 40' thick, and 1,500' long. Principal ore mineral is arsenopyrite, with which occurs chalcopyrite, pyrrhotite, sphalerite, pyrite, gold and sometimes tetradymite; the valuable content of the ore is gold alone. In the association of gold with arsenopyrite in deposits of this origin the Nickel Plate ore deposits are unique and have no known counterpart in North America.

All ore treated in 1914 and 1915 came from the Nickel Plate property. **Ore reserves:** estimated Jan. 1, 1916, at 423,500 tons, average assay \$10.39 per ton.

Development: 2 tunnels, 900' and 1,160' long and a 35° incline shaft, 900' deep. Greatest depth of workings, at 5,200' elevation, 670' below the outcrop. Shrinkage stoping is used; no timbering required. In 1915 ore opened up on the 700' level was found to be 25' wide, assaying \$12 to \$13 per ton. Below the 700' and separated from it by an andesite sheet, lies another orebody which is said to be as wide as the ore on the 600' and 700' levels, but with values averaging \$15 per ton. New work in 1915 totaled 935', in addition to 2,784' diamond drilling. Company plans to develop orebodies below the 600' level in 1916.

Ore is transported from the mines to the mill at Hedley by means of electric and gravity tramways; the electric tramway is 1 mile long, while the 45° gravity tramway is 10,000' long, with a 4,000' drop.

Equipment: includes an air hoist, two compressors, each of 2,000 cu. ft. capacity and driven by 440-h. p. motors; also a 200-ton 40-stamp mill equipped with 24 Frue vanners and 12 Deister tables. The system is being changed to an all cyanide plant.

Electric power supplied by company's hydro-electric plant on the Similkameen river. The dam, located on the river just below its confluence with Twenty-Mile Creek, is of the stoplog type; from it water is conveyed in a flume, 7'x9' inside dimensions, a distance of 15,000' to the forebay, which supplies 2,100-h. p. twin turbines through an 8' steel penstock. Powerhouse has a 1,250 k. v. a. alternating current generator. Work was started on the dam about Jan. 1, 1914, and the whole plant was finished and in operation Jan. 2, 1915. Total cost of plant, \$192,009, charged to capital account.

Recent production:

	Ore Tons	Ave. Assay	Gold Rec.	% Rec.
1915.....	74,265	\$11.65	\$796,592	.....
1914.....	78,494	10.80	797,340	94.09
1913.....	70,796	12.03	802,330	94.14
1912.....	70,455	11.19	748,133	....

Conditions in the lower levels of the mine have changed considerably during the last two years. While the orebodies are larger and stronger and maintain practically the same grade, the specific gravity has increased due to an increase in arsenopyrite, which adds to the cost per ton of ore milled. Concentrate tonnage rose from 3,831 tons in 1913 to 6,218 tons in 1915 and to offset this increase in costs the company is installing a cyanide plant. Is a good property and well managed.

HELENA MINING BUREAU, INC.**MONTANA**

Helena, Mont. **Officers:** S. A. Balliet, pres.-mgr.; M. H. Gerry, Jr., v. p.; preceding, with E. N. Brandegee, O. G. Beck, J. P. Bahnsen, C. E. Dalton, and Wm. Scallon, all of Helena, directors. L. M. Rheems, sec.-treas. W. F. Word, supt. **Inc.** May 7, 1914, in Montana. **Cap.**, \$100,000; shares \$5 par; 875 shares outstanding. Annual meeting second Monday in Jan. Operating expenses in 1915, \$15,000.

One of the objects of the Bureau is to develop properties to a certain stage and then endeavor to transfer them to some company that will continue the development. Since its organization several properties have been acquired in the Scratch Gravel and Unionville districts within a few miles of Helena. Among these are the Eastern Belle, Wayside, and Blue Bird in the Scratch Gravel district, and the Yellow Boy, White Boy, Panama, Lena, and Little Wonder in the Unionville district. The Eastern Belle has been transferred to Huffaker and Hill of Helena and small shipments of gold ore have been made. The Wayside and Bluebird have also been transferred.

The Bureau has recently put the Yellow Boy in shape for operation; a shaft had been sunk to the 100' level with a long drift on the vein and a winze to the 150' level. **Ore:** free milling gold, is treated in the stamp mill on the Little Wonder, $\frac{3}{4}$ of a mile distant. **Ore** has been cut in the bottom of the winze and if this proves of any importance the shaft will be sunk deeper.

Work of the Bureau deserves great praise and has done much to restore the once famous Scratch Gravel and Unionville districts to the attention of the mining world generally.

HELVETIA COPPER CO.**ARIZONA**

Idle. Office: 907 Metropolitan Life Bldg., Minneapolis, Minn. **Mine and works office:** Helvetia, Pima Co., Ariz. **Officers:** C. C. Prindle, pres.; Chas. W. Sexton, v. p.-sec.; preceding, with William A. Paine, Jas. H. Seager, John S. Pillsbury, Russel M. Bennett and John R. Van Derlip, directors. Robt. H. Gross, treas. **Inc.** March 3, 1899, in New Jersey, and reorganized Oct. 4, 1905, in Arizona. **Cap.**, \$5,000,000; shares \$25 par, in \$250,000 full-paid and \$4,750,000 assessable stock; fully issued. Levied 50-ct. assessments, payable July 20, 1908; April, 1909; February, 1910, and Feb. 15, 1911, the latter assessment rendering the stock \$15 paid. State Street Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, 1st Monday after 1st Tuesday in October.

Financial statement of Dec. 15, 1915, is as follows: Capital stock, \$3,100,000; expenditures to date for mining property, \$2,181,786; for development, \$95,450; for equipment, \$40,250; treasurer's account, \$30,727; unpaid assessments, \$35,388; interest on funds on deposit, subject to check, \$10,012; ore account, \$3,550; accounts receivable, \$50; general expense, \$26,404; taxes, \$1,068. There is no bonded indebtedness and all accounts are paid.

The company's holdings are at Helvetia, at the west foot of the Santa Rita mountains, 18 miles north of Vail, on the Southern Pacific, and El Paso & Southwestern railroad.

Property: 38 patented claims, also 8 patented mill sites and 960 acres of scrip land, giving total holdings of 1,673 acres, 30 miles S. E. of Tucson. The formations, resembling those of Bisbee, include Carboniferous and older limestones lying north of a great granite mass with porphyritic intrusions. The limestone has many iron outcrops underlain by orebodies occurring as replacements. These have an average strike of N. 35° W., with average dip of 45°, carrying ore of 2 to 4% copper.

There are 5 known orebodies called the Isle Royale, Old Dick, Exchange, Pilot and Heavy Weight, with development on 3.

The Copper World mine, to which operations were confined before closing down in 1912, was the principal producer of recent years, showing a vein of 15' estimated average width, traceable about 3,000', carrying oxidized ores above and sulphides below, with values, mainly in the latter, formerly estimated by company to average 5% copper, 0.5 oz. silver and 50 cts. gold per ton, which figures probably were too high. The Copper World mine has a 480' shaft sunk at an angle of 64°. A heavy flow of water on the 400' level hampered operations and necessitated bulkheading until the installation of a Prescott triplex pump, with capacity of 700 gals. per minute, working against a 500' head.

The mine as a whole has several miles of laterals, estimated to show about 400,000 tons of ore. **Equipment:** includes a 375-h. p. steam plant and a 50-h. p. gasoline hoist, good for depth of 600', a 9-drill Ingersoll-Sergeant air compressor and an electric light plant.

The cost of hauling this ore to the railroad proved too expensive to permit operating at a profit and the amount of ore developed does not warrant building a railway, so the mine is closed down.

Management reports Oct. 4, 1915, that an expenditure of over \$279,000 would be necessary to build a railroad from Helvetia to Vail, and put the company's properties in shape for mining. An assessment of \$2.50 per share would have to be levied to raise this amount and company considered such assessment inadvisable at that time.

For full description of properties and development, see Vol. XI, Copper Handbook.

H. E. M. MINING CO.

IDAHO

Consolidated with the Aurora-Sampson Mining Co. to form the Western Union Mining Co., which see.

HEMBRILLO COPPER MINING CO.

NEW MEXICO

Mine in Socorro Co., N. M. **Officers:** J. W. Eubanks, county surveyor, El Paso, Texas, pres.; W. M. Fly, Gonzalez, Texas, v. p.; H. C. Marks, sec.-treas.; John P. O'Connor, gen. mgr. Inc. 1904.

Property: 12 claims, in Hembrillo canyon, on the eastern side of the San Andreas mountains, 35 miles W. of Tularosa, with a wagon road thereto, said to carry 3 strong veins with N.-S. strike converging to the S. The central or main vein is but a few inches wide at the surface, but widens to 6' in the shaft. Vein lies between quartz-porphry and limestone and is said to have a nearly vertical dip. **Development:** by the Platte crosscut tunnel 1,000' long, in April, 1914, which has cost over \$20,000 and has cut the vein 500' below the outcrop. Before starting this tunnel company sank numerous pits showing copper ore, and a 150' vertical shaft in which the vein is seen to carry oxide and carbonate ores that average 12% copper and has a little chalcopryite in the lower workings. The heavy flow of water led to the abandonment of this shaft. A 10-ton shipment to El Paso smelter in 1914 said to have assayed 24% copper and 4.6 oz. silver per ton.

HEMLOCK SILVER-LEAD & MINING CO.

MONTANA

Saltese, Missoula Co., Mont. Walter J. Hughes, pres. Inc. 1907, in Montana. **Cap.**, \$150,000; shares 10 cts. par.

Property: 3 claims, on Packer Creek, 1½ miles from Saltese, is an old prospect, worked by tunnels. Present management sank a shaft 150', and in 1914 crosscut 220' to the lode, which is claimed to be 60' wide and to carry silver-lead ore.

Friction in the company is said to have delayed operations. At last

accounts, Feb., 1916, the mine was being worked and shipments were supposed to start when the roads became passable; another assessment was then in sight.

HEMPLE COPPER MINING CO.

ALASKA

Valdez, Alaska. **Mine office:** Landlock, Alaska. **Officers:** S. A. Hemple, pres., treas. and gen. mgr.; F. S. Sylvester, v. p.; S. I. Hemple, sec.; preceding, with Arthur Lang and R. P. Ferguson, directors; Frank Stone, supt. **Inc.** March, 1910, in Alaska. **Cap.**, \$1,000,000; shares \$1 par; non-assessable. Company is said to have expended considerably over \$25,000 on the property. Is controlled by Galena Bay Mining Co.

Property: 6 patented claims, 120 acres, with a 2-acre mill site, all timbered, near the Standard and Three Man mines, at Landlock bay. Shows greenstone, slate and quartzite, carrying 2 veins with 5 or 6 shoots, said to average 24' in width and to be traceable 2,000', carrying chalcopryrite giving average assays of 3 to 6% copper. Mine is opened by tunnels of 50', 300', 575' and 800', with about 2,000' of workings, estimated by management to show about 200,000 tons of ore blocked out for stoping, which estimate seems high. There is no power plant, but property has 6 buildings and gasoline engine.

HENLEY CONSOLIDATED COPPER MINES.

WYOMING

Henry Schwartz, 308 Masonic Temple, Denver, Colo., chief owner; H. W. Honacker, v. p. **Property:** 3 claims, 60 acres, 25 miles S. W. of Cheyenne, Laramie Co., Wyoming. Developed for 15 years past. Mine has 2 orebodies. Property reported sold to an English-French syndicate in 1913, for \$5,000,000, which report was evidently premature, to say the least.

HENRIETTA MINING & MILLING CO.

COLORADO

Company has suffered from a complication of bad luck and bad financial conditions and has been in a comatose condition for several years past. The former president, E. C. Drews, is said to be in the penitentiary, but whether for his connection with the company or not is not known. Company and its property, near Silverton, Colo, are described Vol. X, Copper Handbook.

HENRY ADNEY GOLD MINING CO.

COLORADO

A close corporation operating the Henry Adney mine on Rosebud Hill, Cripple Creek.

HERCULES MINING CO.

BRITISH COLUMBIA

Idle. Nearest P. O.: Jedway, Queen Charlotte island, B. C. Claims are near the Ikeda mine, on Moresby island. Apparently has little or no development.

HERCULES MINING CO.

IDAHO

Burke, Idaho. Company is not incorporated. Controlled by the Day Brothers and associates and information on the property is not made public.

Owns and operates the Hercules mine, a large silver-lead producer. The ore, containing galena, with high silver values, occurs in the lower beds of the Burke formation. The ore shoot has enlarged downward until, at a depth of over 2,000', it is said to be three times as long as it was in No. 2 tunnel. **Development:** by tunnels. The Humming Bird tunnel, 8,000' long, finished 1914, gives an additional depth of 800' on the vein.

The mine and mill were idle for three months in 1915, due to a deadlock resulting from a controversy over renewal of the smelting contract with Amer. Sm. & Ref. Co. As a result the Hercules acquired and remodeled the old Northport smelter, near the Canadian line in Washington, where ores and concentrates from the Hercules and Tamarack & Custer mines are now treated.

Production: \$1,868,761 net in 1914 gave the mine first place among the mines of the Northwest. In 1915 the mine ranked third in output, with net profits of \$1,096,019. The report shows: tons extracted, concentrates and crude ore, 49,441; gross value, \$3,090,175; cost extraction, \$950,852; cost transportation and reduction, \$986,219; cost betterments, \$57,084.

Reported in April, 1916, that the 500-ton mill was treating more than 1,000 tons daily; feed contains about 15% lead, 12 oz. silver and a varying amount of zinc. Most of the concentrate is comparatively low-grade, the object being to save as much iron as possible as flux for the Northport smelter. The flotation plant is reported to use General Naval Stores oils.

The mine is comparatively young and the orebodies opened up are sufficient to keep the property in the front rank of producers for many years.

HERMINA MINING CO.

ONTARIO

Office: 109 5th St., Calumet, Mich. **Mine office:** Massey, Ontario, Canada. **Officers:** Edw. J. Hall, pres.; Christ Schenk, v. p.; Lucas Hermann, sec.; W. B. Anderson, treas.; preceding, with Ole Olson, A. T. Laberge, W. O. Olson, J. S. Pickell and T. H. Pollack, directors.

Inc. June, 1903, in Ontario. Cap., \$2,500,000; shares \$12.50 par; \$8 paid and \$4.50 assessable. Total assessments to date, \$2.35 per share; 71,000 shares issued. Annual meeting, fourth Tuesday in June. Property: 1,040 acres near Massey, Ont., on which shafts were sunk and ore developed. In 1910 company extracted small quantities of copper, but has been idle since then.

HERMOSA COPPER CO.

NEW MEXICO

Office: 30 Church St., New York. **Mine office:** Hanover, Grant Co., N. M. **Officers:** John B. Keating, pres.; L. B. Judson, v. p.; M. F. Westover, sec.; Henry N. Darling, treas.; preceding, with A. W. Burchard, D. M. Riordan, directors. **Inc. July 20, 1905, in New Jersey. Cap., \$100,000; shares \$100 par. Corporation Trust Co., New York, registrar. Annual meeting, first Monday in June.**

The mines, discovered 1800, and opened 1880, were worked intermittently, owing to various Indian troubles and lack of funds, until taken over, 1904, by the present owner, which practically is the General Electric Co.

Property: 114 claims, patented, about 2,200 acres, in the Central or Hanover district, adjoining the Chino Copper Co., includes the Ivanhoe and Humboldt mines, also the Copper Queen, Treasure Vault, Wild Cat, Ninety, Tourmaline and other mines and attempts at mines. Country rocks are porphyry, granite, quartzite and limestone, showing various contact deposits between granite and limestone, with porphyry intrusions, ores occurring as lenticular bodies, in veins with a generally N. E.- S. W. strike and an average dip of 45°. Four different orebodies are developed, ranging from 15 to 20' in width, with a known depth of 410' and known length of 2,000'.

Development: by several shafts, 300 to 400' deep and all showing ore; the various mines have about 3 miles of workings, estimated to show 100,000 tons of ore, with 25,000 tons blocked out for stoping. The property has large bodies of low-grade concentrating ore carrying average value of 3% copper, 3 oz. silver, and slightly under \$1 gold per ton, with small quantities of lead near the surface and occasional traces of zinc, but not in sufficient quantities to materially hamper reduction.

Equipment: includes a 700-h. p. steam plant, with 7 hoists, good for 500 to 1,000' each, and 4 Sullivan air compressors of 26 drills aggregate capacity.

Buildings include machine shop, smithy, carpenter shop, framing mill, warehouse and sawmill, with a total of 20 buildings.

The 100-ton concentrator has a No. 14 Blake crusher, 2 sets of rolls, 1 Hartz jig, 5 Overstrom tables, 2 Wilfley tables, 7 screw sizers, 1 hydraulic sizer and 1 Huntington mill.

Considerable systematic development was done, 1904-07, based upon estimates of tonnage by eminent engineers, but results did not come up to expectations, for although some fairly large bodies of low-grade ore were found, they were not large enough to render the property profitable. Property closed down and in hands of a caretaker at last reports.

HERMOSILLO COPPER CO.

MEXICO

Office: 914 Columbus Savings & Trust Bldg., Columbus, Ohio. **Operating office:** Apto. 98, Hermosillo, Sonora, Mex. **Officers:** J. L. Zimmerman, pres.; C. P. West, v. p.; R. D. Wood, sec.-treas.; preceding, with A. J. Rusling, F. E. Resler, L. A. Clark, E. C. Plyley, Gilbert Holmes and Dr. H. W. Whitaker, directors. **Jas. Penman, gen. mgr. Inc. Feb. 13, 1909, in Mexico. Cap., \$1,500,000; shares \$1 par; nonassessable; issued, \$1,031,052. Authorized bond issue, \$200,000 of 7% convertible gold bonds; amount outstanding Dec., 1915, \$24,100.**

Company was a reorganization of the Verde Grande Copper Co., whose old shareholders were given new stock, share for share, by paying 25 cts. cash per share.

Property: about 1,300 acres, with 200 acres of mill and smelter sites, in the Hermosillo district, about 28 miles N. W. of Hermosillo, consists of 9 claims, reported by the management to carry porphyry and lime cut by granite. The Picacho and Verde Grande have contact deposits in limestone, near igneous intrusives, carrying oxidized ore giving assays of 6% copper, 8 oz. silver and \$1 gold per ton. La Cobriza group and La Verde have contact deposits between granite and quartzite, of 30 to 60' claimed width, traceable 7,000', carrying auriferous and argentiferous copper ore said to assay 5.5 to 20% copper, with gangue of talcose limestone. Company reports 7 orebodies under development of 10 to 100' width, averaging 5.44% copper, 8.66 oz. silver and 75 cts. gold per ton.

Development: 20 shafts and tunnels with over 7,000' of workings, reported to show over 200,000 tons of ore. **Equipment:** consists of a 100-ton Allis-Chalmers blast furnace, a 30-h. p. hoist, 6-drill compressor, etc. Smelter is 1½ miles from principal workings.

Owing to the Mexican revolution the work done for the past few years has been mainly churn drilling. Company expects to operate smelter and vigorously develop mine when peace is restored.

HESS MINING CO.

CALIFORNIA

I. W. Gibbons, supt. Property: at Alturas, Modoc Co., Calif., said to show gold-quartz ore. **Development:** 300' shaft. **Equipment:** 10-stamp mill, compressor and cyanide plant. Employs 15 men.

HIDALGO COPPER MINING & SMELTING CO.

MEXICO

Office: Avenida 16 de Septiembre No. 26, Mexico, D. F. **Mine and works office:** Zimapan, Hidalgo, Mex. **Officers:** Sydney Ludlow, pres.; Ricardo T. Sobey, v. p.; R. A. Mills, sec.; Hedley Ludlow, treas.; preceding, with George A. Camphuis and W. H. Armstrong, directors; Hedley Ludlow, gen. mgr.; Jas. H. Armstrong, supt.; Plenio Lopez, engr.; Halarion Diaz, chemist. **Inc. Aug. 14, 1907, in Arizona. Cap., \$2,000,000; shares \$10 par, in \$1,000,000 preferred and \$1,000,000 common stock. Annual meeting, third Monday in August.**

Property: 44 mines, 500 acres, with a 500-acre mill site, said to carry copper ores, with small amounts of lead ore. Lands show monzonite-

porphyry and limestone, with contact orebodies. Copper ores are estimated by the company to average 2.8% copper and 800 grams silver per ton. The mines have a great variety of ores, including copper oxides and carbonates, carbonate and sulphide ores of lead, argentite and chalcopryrite. **Development:** by shafts and tunnels, with a total of 3,000 meters of workings, estimated to show 50,000 tons of ore, with 20,000 tons blocked out for stoping.

Equipment: includes a small steam plant and 16 buildings. Company employs about 800 men at the mines and works.

The 50-ton smelter, at Zimapan, 5 miles from the mine, receives ore by pack-train. Copper production is 20% matte, sent to the Aguascalientes smelter. Lead smelter running, 1913, after many years' idleness, on ore from Nevada group of mines, averaging 25% lead and 900 grams silver. Company plans further development of Purisima, Camino and Concordia groups, and was installing oil engines and electric light, etc., at smelter. Probably closed down, owing to disturbed conditions in Mexico. No recent returns secured.

HIDDEN TREASURE CO.

SOUTH DAKOTA

Trojan, Lawrence Co., S. D. **Officers:** S. T. Cochran, pres.; J. N. Andrews, v. p.-sec.; Banks Stewart, treas. and gen. mgr.; above, with J. T. Bickle, Harry Thurston and Wm. Hill; directors at last accounts. **Property:** near Deadwood. **Ore:** carries copper-gold values. Has recently resumed shaft sinking after having crosscut E. and W. 100' on the 200' level. Property is a prospect.

HIDDEN TREASURE GROUP.

MONTANA

Address: W. J. Stephens, owner, Missoula, Mont. **Property:** near Clinton, Missoula Co., Mont., 9 patented claims in the Wallace district, said to show 5 veins with gray copper and bornite ores averaging 2 to 20% copper, \$2 to \$4 gold and 2 to 20 oz. silver per ton as sorted for shipments.

Development: mainly on Hidden Treasure and Cascade claims, includes 2 tunnels in a steep mountain side, uppermost 558' on vein claimed to be 50' wide. Ore cut 80' from portal and extends to face. Lower tunnel, 1,400' long, follows the east vein, said to be 50' wide. Crosscuts develop 1 other vein of 13' width and drifts have opened up some rich spots and several hundred feet of concentrating ore. Total work 3,600'. Shipments began 1899 and ceased in 1907 and property has had but little development since, though owner expects to reopen it in 1916.

HIGGINS & BIELENBERG MINE (H. & B.).

MONTANA

See B. & H. Mines & Mill.

HIGGINS LEASING CO.

ARIZONA

Inc. 1912, to prospect the Higgins property for silver-lead and copper ores. Lease has expired and property reverted to owner, Thos. Higgins, of Los Angeles, in 1916.

HIGH TOP MINING CORPORATION.

VIRGINIA

Walter Hall, supt., Elkton, Rockingham Co., Va. **Inc.** 1909 in Arizona. **Cap.**, \$10,000,000; shares \$10 par. Is a reconstruction of the High Top Copper Mining Co.

Property: about 1,000 acres in Greene Co., Virginia, 10 miles from Elkton, on the Norfolk & Western railway, said to show ore zone 600' wide carrying sulphide ores, claimed to give average assays of 6% copper, 10 oz. silver and \$15 gold per ton, which figures are entirely too high. **Development:** by shaft 130' deep, with a 30' crosscut said to show 8' of rock spotted with bornite and chalcocite, giving sample assays of 10% copper. There also is a 55' shaft and several shallow pits and open cuts, tracing the outcrop for the entire length of the property. A report formerly circulated by

the company states that there are 70,000,000 tons of commercial ore discovered, which is a statement worthy of Baron Munchausen. Property does show occasional spots and bunches of copper ore and a few tons of selected ore have been shipped, but the mineralized rock as a whole is altogether too lean to work at a profit. Company is believed to have no chance to succeed, its officers to be self-deceived and stock is considered valueless. The property has been visited by various geologists and described in official government reports and the guarded warning given therein should be heeded.

At the request of the financial house backing the company, this office sent an engineer to look over the property and see if above statements were incorrect. His examination confirms what has been said and throws serious doubt on the judgment, to say the least, of the retired army officer, who is acting as the company's advisor and engineer.

HIGHGRADE SILVER & COPPER MINING CO. WASHINGTON

T. F. Hertzell, pres.-mgr., Chewelah, Stevens Co., Wash.; L. E. Hertzell, v. p.; W. W. Dickson, sec.-treas. Inc. 1909 in Washington. Cap., 1,500,000 shares; assessable. **Property:** formerly known as the Enterprise, in the eastside mineral belt 3 miles from Chewelah, shows an ore deposit along a granite limestone contact. **Development:** includes a 125' shaft with some crosscutting exposing a short 6" streak of high-grade silver-copper ore and some galena with stephanite. Small shipments are said to have assayed 7.7% copper, 85 oz. silver and 20% lead.

Equipment: includes boiler, hoist, pump and 2 buildings.

Property taken over July, 1916, by Columbia Copper Co., which see.

HIGHLAND BOY GOLD & COPPER MINING CO. UTAH

Controlled by Utah Cons. Mining Co., and described under that title.

HIGHLAND COPPER CO., LTD. MONTANA

Office: 20 Riverside Ave., Spokane, Wash. **Officers:** R. C. McCaffery, pres.; J. A. Anderson, v. p.; Homer Wylde, sec.-treas., with N. J. Thomas and J. H. Marks, directors. Inc. 1909 in Washington. Cap., \$1,500,000; shares \$1 par; issued, 415,200.

Property: 5 claims, unpatented, 130 acres, in the Silver Star district of Madison county, Mont., shows granite and limestone, carrying 5 contact deposits, with some work on each, there being 9 pits and shafts, of 45' and 80'. Main vein, estimated by company at 10' in width, shows copper carbonates at surface, with chalcocite and chalcopyrite at depth, ore having given average assays of 6% copper, 2 to 5 oz. silver and \$19.78 gold per ton. **Equipment:** includes a 40-h. p. hoist, good for 1,000', and necessary mine buildings. Is a prospect.

Probably idle. No recent returns.

HIGHLAND SURPRISE CONSOLIDATED MINING CO. IDAHO

Kellogg, Idaho. Chas. Weigand, sec.-treas. **Officers:** W. W. Papesh, pres.; M. J. Sinclair, v. p.; preceding, with Geo. Lomielle, Wm. McDougall, C. W. Simmons, all of Kellogg, and Al. Page, Spokane, directors. P. F. Rogers, mgr., Beeler. Inc. 1912 in Idaho. Cap., \$1,200,000; shares \$1 par; assessable; 1,158,000 shares outstanding. Company is a consolidation of the Surprise Mining & Milling Co. and the Highland Chief Group. Annual meeting, 4th of April. Listed on Butte Exchange.

Annual report for fiscal year ending April 2, 1916, shows: net returns from shipments, \$27,214; total expenses, \$27,704; operating loss, \$490. Cash balance, April 3, 1915, \$1,341; sales of treasury stock during fiscal year, \$15,061; miscellaneous receipts, \$505; total year's income, \$44,121.

Property: 21 claims, 3 patented, 400 acres on Pine Creek, 15 miles by road S. of Kellogg. **Ore:** silver-lead-zinc sulphides in fissure veins in slate;

veins strike N. 60° E., dip 70°. **Ore:** occurs in shoots 3' to 14' wide. The pay shoot is said to be 7' wide and 1,500' long, with step faults to the S. about every 200'. Ore is said to average 5 oz. silver, 8% lead and 20% zinc per ton. Ore reserves not reported.

Development: by tunnels, longest 2,000' with 4,750' of underground workings; greatest depth of workings, 325'. **Equipment:** includes a 6-drill compressor, two 80-h. p. boilers, 75-h. p. engine and 150-ton mill. It was reported in March, 1916, that a flotation unit would be added to the mill. Concentrates said to assay 17 to 22 oz. silver, 58% lead, and 40% zinc. Electric power obtained from the Washington Water Power Co. Concentrates hauled to the railroad at Pine Creek siding. Company employs about 35 men.

Production: for fiscal year ending April 2, 1916, was 750 tons zinc concentrates, yielding \$31,361; 23 tons lead concentrates, containing 1,865 oz. silver, which returned \$5,401.

Company plans sinking a 3-compartment shaft to 500' depth in 1916.

HILARITY MINING CO.

IDAHO

W. H. Moffitt, sec., Wallace, Idaho. Jacob Lackman, pres., Nampa, Idaho. **Cap.**, \$1,000,000; shares \$1 par. A 6 months' option, dating from April 18, 1916, on majority of stock, has been taken by Spokane brokers. Listed on Butte Exchange.

Property: 7 claims in the Pine Creek district, covers about 1 mile along strike of vein said to be the extension of the Constitution Douglas. **Ore:** lead-zinc. Development under way in 2 tunnels. Property is a prospect.

HILL CITY MINING & DEVELOPMENT CO.

SOUTH DAKOTA

Hill City, Pennington Co., S. Dak. **Officers:** John Wise, pres. and supt.; with Wm. Stoner and Chas. Booth, directors; E. A. Schilliman, sec-treas. Inc. 1911 in S. D. **Cap.**, \$500,000; shares \$1 par; 300,000 shares issued. Annual meeting, March 9.

Property: 11 claims, 6 patented, 220 acres in Burnt Fork gulch, 3 miles north of Hill City. **Ore:** gold, in fissure vein, in schist; strike N. S., dip 80°. Said to have been proven for a distance of 2,000' along the strike by 100' shafts, and to have an average width of 16'. Management expects to produce \$5 milling ore.

Equipment: includes Lidgerwood double-drum hoist, Leyner compressor and a 10-stamp mill. Company plans to put in a new hoist and sink to 400' depth and later to build a cyanide plant.

HILLSIDE COPPER CO.

NEVADA

See Bristol Cons. Mines & Sm. Co.

HILLTOP MILLING & REDUCTION CO.

NEVADA

Hilltop, Lander Co., Nev. **Officers:** Frank LeBar, pres.; Chas. E. Beach, v. p.; E. Ross Carver, sec-treas. and mgr. Above are directors. Inc. in Nevada. **Cap.**, \$50,000; shares \$10 par; all outstanding. Annual meeting in January. Company operates a 75-ton 10-stamp cyanide plant. Gross earnings, 1914, \$21,721; operating expenses, \$15,133.

HILLTOP MINES (not Inc.).

ARIZONA

Principal owners: J. O. Fife, Kansas City; P. J. Kasper, Chicago; R. O. Fife, Trustee. Dos Cabezos, Cochise Co., Ariz.

Property: 50 unpatented claims, 1,000 acres, in California mining district, Chiricahua Mountains, Cochise Co., Ariz., said to show copper, lead, zinc, silver ore in quartz veins and contact deposits; strike N. W.-S. E., dip 60° S. W. Ten shoots reported opened up on 800' level, 2' to 10' wide and 30' to 110' long, said to show assays of 20 to 40% lead, 1 to 3% copper and 6 to 10 oz. silver.

Development: by 2 tunnels, one 1,100' long, the other 2,600' long; greatest depth of working 800'. Total underground workings, 5,000'. No ore blocked out and has been cut on one level only. No shipments made in 1915. **Equipment:** includes a 70-h. p. Snow-Diesel engine and an Ingersoll-Rand compressor, capacity 385 cu. ft. Management is planning to drive 2 more tunnels.

HINSDALE TUNNEL & REDUCTION CO. COLORADO

Is a reorganization made in 1907 of the Henson Creek Lead Mines Co. **Property:** at Lake City, Hinsdale Co., Colo., known as the Bonanza group, is said to carry complex lead and copper ores. Has water and electric power and a 50-ton concentrator. Letters neither answered nor returned.

HOBSON SILVER LEAD CO. BRITISH COLUMBIA

Address: Box 1123, Spokane, Wash., and Ymir, B. C. **Officers:** George T. Reynolds, pres.; W. L. McEachren, v. p.; W. B. Ward, Jr., sec.-treas.; C. H. Harvey, asst. sec. and treas.; preceding, with J. C. Buchanan, F. R. Monfort and W. A. Buchanan, directors.

Inc. 1911 in Wash. **Cap.**, \$1,500,000; shares \$1 par; outstanding 1,286,571. Stock transferred at company's office. Annual meeting in January. Operating expenses in 1915, \$30,977.

Property: Yankee Girl mine, 3 claims, patented, 126 acres, at Ymir, Nelson mining district, B. C., said to show gold, silver, lead, zinc ore in contact deposits between granite, slate and schist; strike N. E.-S. W.; dip 60°. One orebody is said to be 90' long, another 400' long. Ore is said to assay \$20 gold, 6.5 oz. silver and 5.5% lead per ton. The main vein, the Yankee Girl, has been drifted on 300' in No. 4 tunnel; it is said to be 5' to 7' wide and to average \$7.24 gold and 0.77 oz. silver per ton. Another vein, the Yukon, is of secondary importance to the Yankee Girl.

Development: 4 tunnels; No. 1, 1,600' long; No. 2, 2,100' long and 400' below the surface; No. 3, 400' long and 175' below No. 2; No. 4, 2,100' long and 600' below No. 2, is driven in the footwall and for the first 1,160' nearly parallels the vein. At No. 4 tunnel level the Yukon vein is estimated to lie 100' N. E. of the tunnel. Company claims to have 400,000 tons ore blocked out. Total underground workings, 6,000'.

Equipment: includes 2 air compressors and a 6,000' tramway. Total output to date, 24,900 tons.

Company plans completing the development of No. 4 tunnel to add a compressor, build a 300-h. p. hydro-electric plant and a 200-ton concentrator.

HOLDEN GOLD & COPPER MINING CO. WASHINGTON

Mine near Lucerne, Chelan Co., Wash. **Officers:** W. J. Nicholls, pres.; A. L. White, v. p., Old National Bank Bldg., Spokane, Wash.; C. A. Smith, sec.-treas.; Wm. Yolen Williams, gen. mgr., and B. H. Kizer, directors.

Property: 3 claims, 60 acres, on Railroad creek, near Lake Chelan, 87 miles N. of Wenatchee on the G. N. R. R., shows gneiss and schist cut by granite with a vein of 40' average and 185' claimed maximum width. **Development:** by 6 tunnels, Nos. 2 and 3 being connected by a blind shaft with about 2,000' of workings on 3 levels. There also are numerous open cuts. Mine shows ore said to assay from 7 to 10% copper, 2 oz. silver and \$5 to \$10 gold per ton. Idle, except for annual assessment work.

HOLDEN MINING & MILLING CO. NEVADA

Tuscarora, Nev. Edw. R. Holden, pres., 524 S. 4th St., Los Angeles, Cal. **Inc.** 1916 in Nev. to take over leases and bond on properties of Tuscarora Cons. M. Co. and the Nevada rights of the Holden patents for concentrating and reducing ores. **Cap.**, \$500,000; shares \$10 par.

HOLLINGER CONSOLIDATED GOLD MINES, LTD. ONTARIO

Offices: 85 Bay St., Toronto, and Timmons, Ont. In May, 1916, definite announcement was made of the consolidation of Hollinger Gold Mines, Ltd., Acme Gold Mines, Ltd., Millerton Gold Mines, Ltd., and Claim 13,147, owned by Canadian Mining & Finance Co., Ltd., under the name of Hollinger Cons. Mines, Ltd. The present Hollinger Gold Mines, Ltd., cap., 600,000 shares, \$5 par, was converted into Hollinger Cons. Gold Mines, Ltd., cap., 5,000,000 shares, \$5 par, of which 200,000 shares will remain in the treasury. Hollinger will receive 2,400,000 shares of the new stock, 4 new for 1 old; Acme Gold Mines, Ltd., cap., \$3,000,000, will receive 2,100,000 shares of the new stock; Millerton Gold Mines, Ltd., will receive 200,000 shares and Claim 13,147 will receive 100,000 shares. Dividend rate, 20c every 4 weeks, to continue the same; this will require \$240,000 per 4 weeks for dividends. These properties, aggregating about 440 acres, all adjoin and are controlled by the Canadian Mining & Finance Co., Ltd.

The Hollinger system of veins extends to the S. W. into the property of Millerton Gold Mines, Ltd., and to the N. E. into the property of Acme Gold Mines, Ltd. For the purpose of securing maximum economy in operation, and a minimum of capital expenditure for equipment, it was desirable that the operations of the 3 properties should be centralized.

Hollinger has been producing for 3½ years and up to Jan. 1, 1916, had mined and milled 728,172 tons, with a profit of \$6,078,924. Of this profit \$4,170,000 has been disbursed as dividends.

Acme has been producing upon a comparatively small scale for 10 months. Ore milled up to Jan. 1, 1916, amounted to 106,486 tons, which yielded \$1,036,087 in bullion. Millerton and Claim 13,147 have not reached a producing stage.

Assumed valuations of the ore in the different properties:

Acme Gold Mines, Ltd.....	\$14,327,455
Millerton Gold Mines, Ltd.....	1,250,000
Claim 13,147	200,000
Hollinger Gold Mines, Ltd.....	13,708,227

Hollinger Gold Mines, Ltd.

Officers: Noah A. Timmins, pres.; John McMartin, v. p.; D. A. Dunlap, sec.-treas.; with L. H. Timmins and John B. Holden, directors. Canadian Mining & Finance Co., Ltd., gen. mgrs.; P. A. Robbins, gen. mgr. Inc. June 28, 1910, in Ont. Transfer offices: Toronto General Trusts Corp., Toronto; Montreal Trust Co., Montreal. Registrars: Guardian Trust Co., Toronto; Montreal Safe Deposit Co. Annual meeting at call of directors. Listed Montreal and Toronto Stock Exchanges, and traded in on New York Curb.

Comparative General Balance Sheet, Dec. 31

Assets—	1915 (a)	1914	Liabilities—	1915	1914
Mining Prop..	\$2,500,000	\$2,500,000	Cap. Stock.....	\$3,000,000	\$3,000,000
Plant	807,705	(d) 640,000	Wages Unpaid..	49,558	53,025
Development..	203,786	199,862	Accounts Pay..	218,323	79,694
Deferred Devl.	219,024	123,688	Conting. Liabil. ....	.....	15,533
Real Estate...	2,950	2,950	Surplus	1,478,210	1,126,743
Current assets.	1,012,626	808,495			
			Total	\$4,746,091	\$4,274,995
Total	\$4,746,091	\$4,274,995			

(a) Less amounts written off. (d) After marking off \$165,621 for depreciation.

Income and Expenses, Years Ended Dec. 31

	Bullion Prod.	Other Income	Oper. Exp's	Gross Profits	Div'ds	Add. to Surplus	Capital Expend.
1915..	\$3,169,813	\$79,884	\$1,186,231	\$2,063,466	\$1,560,000	\$498,466 (a)	\$413,966
1914..	2,688,354	22,077	923,752	1,786,679	1,170,000	616,679	454,121

(a) Reduced, in addition to dividends, by donations, \$5,000.

Dividends: (since organization) 9% in 1912; 39% in 1913; 39% in 1914; 52% in 1915; total of \$4,170,000. Starting in Jan., 1915, dividend rate was made 4%, payable every four weeks.

Property: 4 claims, 160 acres, patented, in Tisdale Twp., Porcupine. The chief rocks of the entire area consist of basalt in the S. E. portion and the common greenstone of the Keewatin series in the N. W., while between these two areas, approximately 2,000' apart, lies an area of basalt schist and an area of greenstone schist, which have been intruded by a quartz-feldspar porphyry. The porphyry has not, except near its marginal contacts with the older rocks, proved of value as a source of gold, yet it is believed that its occurrence has had some definite influence upon the mineralization and concentration of gold values in the older rocks. It is within the area between the basalt and the greenstone that the gold bearing veins are found; 54 veins had been found on the Hollinger property up to 1915, and 12 had been reached by underground workings. Orebodies consist of quartz veins and country rock containing gold and pyrite. Veins are not fissures with well defined walls; the fissuring has been very irregular; a vein consisting largely of quartz in one place may consist of quartz veinlets and intervening schist a short distance away. In No. 1 shaft the veins are practically vertical.

Ore reserves estimated Dec. 31:

	Tons	Value	Estimated Gross Value
1915 (a).....	1,846,000	\$ 9.65	\$17,824,800
1915.....	1,600,800	10.02	16,031,600
1914.....	1,162,960	11.49	13,358,420
1913.....	845,300	13.71	11,604,800
1912.....	644,540	17.48	11,271,400
1911.....	462,000	22.14	10,230,000

(a) Reserves refigured for consolidation purposes.

Development: by shafts. No. 1 shaft, the main working shaft, has levels at 100', 200', 300', below this at 125' intervals to the 800' level; below this at 950' and 1,100' opened by a winze. Most of the work has been confined to the upper levels. New workings totaled 10,805' in 1915, in addition to 8,378' of diamond drilling; compared with 10,622' workings and 10,227' diamond drilling in 1914. The C. M. & F. Co., Ltd. (which see), is sinking a central shaft about 700' S. E. of No. 1 shaft. Electric haulage is used underground.

Mill: 100-stamps and cyanide plant, with daily capacity of 1,900 tons; this to be increased during the next year to 3,500 tons, which will permit treating a lower grade ore. The ore is easily treated; practice is to crush by stamp and to regrind in tube mills, preparatory to cyanide treatment.

Milling record for 1915 shows: supplies consumed per ton of ore: cyanide, 0.574 lbs.; lime, 1.896 lbs.; zinc, 0.467 lbs.; acid, 0.0032 lbs.; lead acetate, 0.0021 lbs. Tons of solution pptd. per ton of ore, 1.909; zinc added per ton of solution, 0.244 lbs.; average value of pregnant solution, \$5.074. Average tons per day 917, compared with 583 in 1914. Stamp duty tons per 24 hours of running time 14.72, compared with 13.30 in 1914.

Power: obtained from the central power plant built by the C. M. & F. Co.

Average number men employed in 1915, 735, compared with 546 in 1914.

Recent production and costs (costs are per ton of ore milled):

	Tons Milled	Aver. Value	Mng. Costs	Mllg. Costs	Assay Tailing	Values Recovered
1915 (a).....	334,750	\$10.11	\$2.18	\$0.999	\$0.40	\$3,169.813
1914.....	208,936	13.676	2.70	1.220	0.56	2,719,354

(a) In addition there was milled 106,486 tons Acme ore at a cost of \$1.09 per ton.

Operating costs are greatly affected by the war; the price of explosives in Feb., 1916, was sufficient to add 15c per ton to the mining costs; milling costs per ton were increased 7c, due to advanced price of zinc dust. It is expected that greater economies in operations will partly offset the increased cost.

Acme Gold Mines, Ltd., Ontario

Inc. in Ont. Cap., \$3,000,000; shares \$5 par. Before the consolidation was owned entirely by Canadian Mining & Finance Co., Ltd., and worked under one administration with the Hollinger and Millerton Gold Mining, Ltd. **Property:** a 40-acre claim adjoins that of the Hollinger Gold Mines, Ltd., on the E. and N. E. and covers the continuation of the Hollinger vein system.

Development: 4 shafts. No. 9, the main shaft, has 3 compartments, is 825' deep, with levels at 100', 200', 300', and below this at 125' intervals to the 800' level; No. 9 shaft is the only one operating at present; underground workings total 12,507'. No. 10 shaft is 388' deep, with levels at 140', 240' and 365'; underground workings, 925'. No. 11 shaft has 3 compartments, is 419' deep, with levels at 175', 275' and 400'; underground work, 90' of cross-cutting. No. 12 shaft has 3 compartments, is 179' deep, with a level at 159', underground workings 510'. Total development of 4 shafts up to Jan. 1, 1916, 14,032', exclusive of shaft footage.

Ore reserves: estimated for consolidation purposes, 1,776,360 tons, average value \$9.06 per ton; gross value \$16,100,180. Estimate does not include ore in 19 other veins, combined length 2,945', average width 5.40', average value \$11.89 per ton, upon which no work has been done other than sampling of their surface outcrops. Ore was assumed to continue in these veins to a depth of 100', giving an estimated tonnage of 133,480; gross value, \$1,592,500. Costs figured same as Hollinger, from \$3.25 to \$3.50 per ton.

Equipment: at No. 9 shaft includes two 100-h. p. double-drum electric hoists; one 1,500 cu. ft. electrically-driven compressor; one 700-k. w. transformer station; crusher, capacity 700 tons per day; and an aerial tram from mine to Hollinger mill. The other 3 shafts have 10x12 single-drum hoists. Total cost of plant to Jan., 1916, \$120,507.

Ore is treated at the Hollinger mill. In 1915, 106,486 tons were milled, compared with 2,910 tons in 1914. Milling costs in 1915, \$1.09.

Claim No. 13,147

Owned by Canadian Mining & Finance Co., Ltd., before the consolidation. Consists of 40 acres, adjoining Acme on the south and Hollinger on the east. Rock formation is basalt, a coarse amygdaloidal lava (Keewatin), and the only ore found to date upon the claim is that developed by Porcupine Vipond Mines, Ltd., at a point on the south boundary of Claim 13,147; here the Vipond has followed ore up to the boundary on the 100', 200' and 300' levels. On the N. E., the Schumacher Co. claims have developed a considerable tonnage of ore. Surface work on Claim 13,147 has shown several quartz veins, but none have shown payable values at the surface. A

shaft is being sunk, near the S. W. corner, to a depth of 400'. For consolidation purposes an arbitrary assumption was made of 130,000 tons ore, average value \$7 per ton; with an estimated profit of not over \$2 per ton, due to isolated position of claim and amount of development work required. Cost of plant and development to Jan. 1, 1916, \$14,787.

Millerton Gold Mines, Ltd., Ontario

Inc. in Ont. Cap., \$3,000,000; shares \$5 par. Before the consolidation was owned entirely by the Canadian Mining & Finance Co., Ltd., and worked under one administration with Acme and Hollinger.

Property: 3 claims, approximately 40 acres each, adjoining the Hollinger on the west. The north claim has over $\frac{2}{3}$ of its surface covered by Miller Lake.

Development: 3 shafts; No. 6, 394' deep, with levels at 55', 150', 250' and 379'; total underground workings, 1,311'. No. 7 shaft, 170' deep, has a level at 167'. No. 8 shaft is 45' deep. Underground work is insufficient to permit a dependable estimate of ore reserves. Sampling has shown an average value of \$7.08 per ton for the ore found. Allowing for persistence of ore for 50' from underground exposures, gives 115,490 tons, gross value \$818,120. For consolidation purposes an arbitrary assumption was made of 400,000 tons ore, average value \$6.50 per ton. Cost of production figured not to exceed \$3.50 per ton.

HOLLOWAY MINE.

VIRGINIA

Idle. Owned by Wm. M. Pannebaker estate, Virgilina, Va. **Property:** the old Holloway or Eustis mine, $3\frac{1}{2}$ miles S. of Virgilina, Halifax Co., Va., on a spur of the Southern railway. Has a 460' shaft, and produced ore from 75', 150', 200' and 300' levels. The vein is strong, persistent and 3 to 33' wide, owing to lenticular expansions. The ore is chalcocite in quartz, with epidote. Is described in detail by Weed in Bull. 455, U. S. Geol. Survey, p. 79. Produced 6,000 tons of 12% ore about 1902.

HOLMES MINING & MILLING CO.

WISCONSIN

Idle. Mellen, Ashland Co., Wis. **Officers:** John Holmes, pres.-mgr.; A. D. Barnes, v. p.; Thos. A. Humphries, sec.; F. P. Simmons, treas.; preceding, with Edw. Bekken, A. D. Wilson and A. D. Hill, directors. **Inc.** Jan. 9, 1902, in Wisconsin. **Cap., \$150,000; shares 25 cts. par.**

Property: 160 acres in the Penokee iron range, about 1 mile N. of Bad river, shows fissure veins in greenstone, diorite and slate with E.-W. strike and dip of 70°. Three orebodies are claimed of which one, said to be 40' wide and traceable one-half mile by a strong gossan, with slate foot-wall and diorite hanging, is reported to have chalcopyrite in a quartz gangue. Ores give assays up to 9 oz. silver and \$3 gold per ton. **Development:** by shafts of 150' and 188'. **Equipment:** includes a 16-h. p. hoist.

HOME COPPER CO.

ARIZONA

Morenci, Graham Co., Ariz. H. J. Degener, pres.; W. A. Leonard, v. p.; W. P. Gee, sec.-treas. **Inc.** April, 1901. **Property:** 35 claims, 700 acres, in 2 groups, also a mill site on Eagle river. Promoters were unable to inspire confidence and could not raise enough money to prospect the property sufficiently to prove if it has merit. Not a "wild cat" but a mistake. See Vol. XI, Copper Handbook.

HOME RUN COPPER CO.

NEVADA

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. Mine in Bristol mining district near Pioche, Nev. **Officers:** M. C. Godbe, pres.; E. S. Woodward, v. p.; H. F. Earle, sec.-treas.; preceding, with A. H. Godbe and Henry Sadler, directors. W. H. Pitts, supt. **Inc.** 1912. **Cap., \$100,000; shares 10 cts. par.**

Property: 8 claims, 3 fractions, 180 acres, 9 miles from railroad, adjoins the Gypsy mine and is said to carry same fissures. Claims show fissures in limestone expanding into replacement deposits and caves carrying rich copper ores with gold and silver values. Development in 1916 on the 65' level said to have opened up a 5' vein of copper ore.

Company also owns Bristol mine.

Development: by 225' shaft with levels at 65', 90' and 150' opening up caves, showing 1,500 tons of ore containing 8.25% copper and 40 to 200 oz. silver.

Equipment: includes gasoline engine, hoist, compressor and necessary buildings.

HOME RUN COPPER MINING CO.

WYOMING

Office: Rooms 17-18, Postoffice Bldg., Colorado Springs, Colo. Mine near Rudefeha, Carbon Co., Wyo. **Officers:** A. L. Bohrer, pres.; J. F. Humphrey, v. p.; Adolph Fehringer, treas.; Wm. C. Robinson, sec., at last accounts. **Cap.**, \$1,500,000; shares \$1 par. **Property:** 180 acres, partly patented, known as the Copper Bell group, near the Ferris-Haggarty mine, having a 350' tunnel showing a vein of 30" to 9' width assaying up to 12% copper, with gold and silver values. Idle.

HOMELODE MINING & MILLING CO.

SOUTH DAKOTA

Silver City, Pennington Co., S. Dak. L. A. Richards, gen. mgr.; L. L. Farnam, supt. Property shows several quartz veins, 1' to 2' wide, containing gold, silver, antimony, lead and zinc ore. Two veins have been opened up; one by a 200' adit connecting with a shaft, sunk on the vein, at the 100' level; a 50' winze shows the ore to be continuous to that depth. In these workings vein varies from 12" to 18" and is 150' in length; values are mainly in gold and antimony. The second vein parallels the first, is ¼ mile E., said to be 24" wide and to contain more zinc than No. 1. Two shafts, 370' apart, 66' and 103' deep, respectively, have been sunk on the vein.

Equipment: includes 100-h. p. boiler and an amalgamating mill, equipped with Dodge crusher, slow-speed Lane mill, and Deister table. Company employs 35 men. Plans to sink No. 2 shaft, 77' deep, an additional 100'.

HOMESTAKE MINING CO.

SOUTH DAKOTA

Main office: 354 Pine St., San Francisco, Calif. **Eastern office:** 15 Broad St., New York. **Mine office:** Lead, South Dakota. **Officers:** Edward H. Clark, pres.; Frank G. Drum, v. p.; Fred Clark, sec.; Louis P. Haggin, treas.; preceding, with Harry L. Tevis, Thos. Turner and Richard A. Clark, directors. Richard Blackstone, supt. C. W. Merrill and Allen J. Clark, cons. metallurgists.

Inc. Nov. 5, 1877, in Calif. **Cap.**, \$21,840,000, increased March 25, 1913, to \$25,116,000 by payment of 15% stock dividend; shares \$100 par. Columbia Trust Co., New York, transfer agent. Union Trust Co., New York, registrar. Annual meeting, third Tuesday in March in San Francisco. Listed on New York Stock Exchange since 1879.

Comparative General Balance Sheet, Jan. 1st

Assets—	1916	1915	Liabilities—	1916	1915
Mines, plants, etc.	\$25,116,000	\$25,116,000	Cap. stock....	\$25,116,000	\$25,116,000
Bal. in bank...	1,199,833	1,086,530	Outst. d'fts...	486,640	483,336
Bal. with Supt.	22,979	18,661	Uncl. div'ds...	5,126	5,128
Bull. in transit.	302,097	280,869	Accts. pay....	210	.....
			Profit & loss..	1,032,933	897,596
Total	\$26,640,909	\$26,502,060	Total	\$26,640,909	\$26,502,060

Summary of Income Statements

Dr.	Receipts	Other Income,	Balance	Total
	Mng. Oper.	Shops, Etc.	Brought Forward	
1915.....	\$6,448,024	\$ 77,758	\$ 897,596	\$7,423,378
1914.....	6,160,160	148,562	1,428,248	7,736,970
1913.....	6,186,652	132,716	1,455,958	7,775,326
Cr.	Oper. Expenses (a)	Dividends	Balance Dec. 31	Total
1915.....	\$4,180,238	\$2,210,208	\$1,032,932	\$7,423,378
1914.....	4,629,166	2,210,208	897,596	7,736,970
1913.....	4,200,853	2,146,225	1,428,248	7,775,326

(a) Including salaries, legal, general, etc.; bills payable; taxes (b); prop. purchased; interest.

(b) Taxes are high; in 1914, amounting to 16c per ton of ore milled, and in 1915, 15c.

Dividends: have been paid monthly almost continuously since Jan., 1879; were suspended in May, 1907, as result of a fire in the mines, and resumed Jan. 25, 1908; continued to Dec., 1909, inclusive, when they were suspended owing to labor troubles at the mines; resumed in March, 1910. Present rate is 65c per share per month. Dividends paid to Jan. 1, 1916, \$35,525,481. Dividends paid in recent years:

	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915
Cap. stk. (per share)	\$8.00	\$2.00	\$6.25	\$5.50	\$5.00	\$8.00	\$6.00	\$8.80(a)	\$7.81	\$7.81
(a) Also 15% paid in stock, March 25, 1913.										

The first claims acquired by the company were the Grant and Old Abe, located by J. B. Pearson, Dec. 11, 1875. In the Fall of 1876, representatives of Haggin and Hearst bought these claims, and the Homestake Mining Co. was incorporated. In July, 1878, the first and only assessment was levied, \$1 per share; it furnished the \$200,000 required to build the 80-stamp Homestake mill. In 1899, company acquired the Highland Mining Co., an adjoining property of about 73 acres; also the Black Hills Canal & Water Co., owning 40 miles of ditches, flumes and pipe lines, with reservoirs, improvements and water rights covering the water supply of Deadwood and Lead districts.

Property: 468 claims, about 3,723 acres in the White Wood mining district, Lawrence Co. The towns of Lead and Deadwood and the settlements of Blacktail, Terraville and Central City have grown up around the mines and mills.

Ore: gold bearing, lies in a mineralized zone of nearly vertical Algonkian slates and crystalline schists, having a general strike, N. 35° W., and dipping slightly toward the east, into which enormous masses of rhyolite have been intruded. The ore bearing zone is approximately ½ mile wide and several miles long. Only the northern end of the zone has been extensively developed; such work lying mostly between the gulches, Gold Run, Deadwood and Blacktail. The deposits are not fissure veins, but impregnations that appear to have taken place along two converging lines of crushing; they follow roughly the direction of schistosity and show a general pitch southward; where several unite, the aggregate thickness is over 500' and many stopes are carried across that width of ore. The larger lenses are on the west side of the zone and are flanked on the east by a series of smaller parallel lenses, some of which join the larger at depth. Near the surface the orebodies follow the rhyolite porphyries, but at depth diverge from them and become in part associated with phonolite. The ore varies considerably in composition in different portions of the deposit, but that of the deeper levels, the unoxidized ore, usually contains either chlorite or ferruginous hornblende (cummingtonite), with quartz, carbonates of lime,

magnesia, iron, arsenopyrite, pyrite and pyrrhotite. Ferrous minerals predominated and this has been an important factor in determining the metallurgical treatment. In the upper oxidized parts of the deposits the ore is dark red, but deeper, in the sulphide zone, is greenish blue to blue black. The sulphides vary in amount from 3 to 5%, and even as high as 10% or more of the ore. In the sulphide zone the distribution of gold is uniform and averages \$4 to \$4.50 per ton. Over 60% of the ore is free milling. Secondary enrichment has not resulted in the formation of any particularly rich zones.

Development: 6 shafts; 4 in the footwall, one in the hanging, and one in the lode; depths Jan. 1, 1916:

Ellison	B. & M.	Golden Prospect	Golden Star	Old Brig	Gldn. Gate
1,920' (a)	1,700'	1,100'	1,400'	800'	800'

(a) Lowest level is at 1,850'. In Feb., 1916, sinking to the 2,000' level was started.

The 1,850' and 2,000' levels of the Ellison shaft will eventually be connected with the B. & M. shaft, through which outlet the bulk of the ore will be hoisted to surface. The B. & M. shaft will be equipped with skips, which will dump into No. 8 Gates crushers, and their product carried by a belt conveyor system to smaller gyratories. Total cost of sinking at the Ellison shaft is said to have averaged \$60.64 per ft. There are in all about 130 miles of workings. Underground work in 1914 amounted to 17,809' of drifting; in 1915, 17,114' of drifting and 1,001' of raising. The measured ore reserves are large and sufficient to supply the reduction plants for many years.

The metallurgical equipment at the Homestake is one of the most modern and efficient in the country.

Mills: At the South Side—3 stamp mills (660 stamps) with 36,356 sq. ft. of amalgam plates; 1 regrinding plant, with independent cone system, and 540 sq. ft. of amalgam plates; 4 batteries of cones for classification; 3 clarifying tank houses; 1 sand plant. The mills are the Amicus, Golden Star, Homestake and Pocahontas. In 1915 the Pocahontas mill was completely rebuilt. The Amicus mill is being rebuilt.

At the North Side—2 stamp mills (360 stamps), the Monroe mill and Mineral Point mill; 2 tank houses; 2 cone houses; 1 sand plant. Ore supplied to these mills is usually drawn from the upper levels of the mine, and is at least partly oxidized.

At Deadwood—1 slime plant, treating the combined slime from south and north sides. The stamps weigh 900 lbs., drop 10", making 88 drops per minute. Increased mill capacity is to be secured by a combination of heavier stamps and secondary crushing; the new stamps will weigh 1,000 lbs.; this, it is estimated, will give 10% additional stamp duty, while secondary crushing will allow another 8% increase in capacity. The Homestake order of drop is 1-3-5-2-4 or 1-4-2-5-3. A 25-h. p. back-gear motor drives each 10 stamps. Ratio of water to ore is large, at the Lead mills being 10 or 12 tons of water to one of ore. A minimum of about 50,000 tons of water per day is used, most of which comes from Spearfish Creek and its tributaries, being conveyed over 20 miles in ditches and vitrified clay pipe.

Inside amalgamation is practiced, quicksilver being fed to the mortar. Chuck-blocks are cleaned in rotation, at intervals of about 2 weeks; outside plates, except those of the fourth row, are cleaned and dressed daily. Fourth row plates are dressed at 2-day intervals. Amalgam is restored three times each month. Oil-fired retorts are used, the resulting bullion being melted in coke-fired furnaces. Loss of quicksilver in retorting is almost nil.

Cost of stamp milling per ton of ore: stamping, \$0.242; amalgamating,

normal charges, \$0.024. Power at \$30 per h. p. year; quicksilver at 50c per lb.; castings, 2¼c per lb.; mill labor, \$2.97 per 8-hr. shift.

Regrinding is done in tube mills. In cyaniding the usual methods are closely conformed to. Slime plant costs in 1914 were \$0.184 per ton of slime; unit consumptions per ton of slime treated: sodium cyanide, 0.16 lb.; zinc dust, 0.12 lb.; lime, 3.84 lbs.; hydrochloric acid, 0.39 lb.; costing 0.93c per ton treated; power, 1.15 kw.-hr. A recovery is made of about 94% of the values in the ore: 72% by amalgamation and 22% by cyanidation.

Power and equipment: company has hydro-electric plants at Spearfish and Englewood. New power equipment in 1915 includes a steam-driven electric generating station at Lead, maximum capacity, 4,000 k.v.a.; this, in conjunction with the hydro-electric plants, will furnish sufficient power for all purposes except the hoists, which will continue to be operated by steam. A completely equipped central boiler plant of six 600-h. p. boilers was completed in 1915. The B. & M. shaft was equipped in 1915 with a compound condensing hoist, designed to handle two 6-ton skips from a maximum depth of 4,000'. The company operates its own machine shops, carpenter shops and foundry.

The Homestake Mining Co. has long been known for the fine way in which it has looked after the welfare of its 2,350 employees. In 1914, it completed a recreation building, containing a theatre with seating capacity of 1,000, library, swimming pool, gymnasium, bowling alleys, billiard and amusement rooms.

Production: to Jan. 1, 1916, \$140,610,382. Recent production has been:

	Tons milled	Recovered per ton	Total cost per ton
1915.....	1,573,822	\$4.0848	\$2.6561
1914.....	1,587,774	3.8797	2.9155
1913.....	1,540,961	4.0148	2.7258

In 1915 Homestake produced tungsten ore from the Golden Summit claim, which netted \$19,237. A 20-ton concentrating plant is being built to handle the low-grade ore. It will consist of 5-stamps and concentrating tables.

HOMESTAKE T. & C. CO.

UTAH

Idle. Is a subsidiary of the Great Divide Mines Co. and controlled by John B. Taylor, 678 E. So. Temple St., Salt Lake City, v. p.; Walter A. Cook, sec.-treas. Inc. 1906, in Utah. Cap., \$100,000; shares \$5 par; assessable; fully issued. Is a close corporation, with only 5 stockholders.

Property: 30 claims, in Pine Canyon, West Mountain section, Tooele county, with water rights, tunnel rights and franchise for a deep tunnel, from Pine Canyon into the Bingham district, also several hundred acres of bench lands, and an 800-acre smelter site, 4 miles from the International smelter. Claims show veins with lead and copper ores.

HOMESTEAD-IRON DYKE MINES CO., INC.

OREGON

Halstead Lindsley, gen. mgr., Room 1508, No. 60 Broadway, New York; E. F. Galligan, supt. Operates property of Iron Dyke Copper Co., which see.

HONDO MINING & MILLING CO.

COLORADO

Cripple Creek, Teller Co., Colo. R. G. Mullen, pres.-gen. mgr. Inc. in 1914. **Property:** adjoins that of the Golden Cycle on Battle Mountain and includes the old Keystone property, developed by the Sitting Bull shaft, down 250' at the time property was acquired. Also owns 3 claims in the Tenderfoot Hill section. Little work had been done on the Battle Mountain property for 20 years. Present management sank the shaft to the 500' level, and is said to have opened up low-grade ore from the 3rd to 5th levels. At last accounts a crosscut on the 5th level was being

driven to strike the 3 veins cut on the 4th level. Some shipments have been made, but results are not available. Authentic information on the property is meagre.

HONEST ENDEAVOR MINING CO.

NEVADA

Property closed down. Letters returned from Yerington, Lyon Co., Nev. **Officers:** B. W. Wooding, pres.; Elmer Hoff, v. p.; C. S. Wood, sec.; F. D. Goodale, treas.-gen. mgr., at last accounts. **Inc.** 1907, in Arizona. **Cap.**, \$2,500,000; shares \$1 par.

Property: 11 claims in Buckskin district, west of and across the valley from Ludwig, the railroad terminus, and 3½ miles from Buckskin, in the Yerington district. **Development:** by 300' shaft and drifts said to open up 2 veins, showing 2' of sulphide ore with commercial values. **Equipment:** includes hoist, compressor, etc.

HOOSAC TUNNEL & MINING CO.

COLORADO

At last accounts an attempt was being made to reorganize under name of New Life Tunnel & Mining Co. Company has been in hands of receivers for a number of years. **Property:** is on Belleview Mt., at junction of Fall River and Clear Creek, near Idaho Springs, Clear Creek Co., Colo.

HOP CANYON MINING & SMELTING CO.

NEW MEXICO

Office: 154 West Randolph St., Chicago. **Mine address:** Magdalena, Socorro Co., N. M. **Officers:** Alpheus McCallum, pres.; Elias G. Raffety, sec.-treas.; Oscuro, N. M.; above with Alexander McCallum and J. A. Pement, directors. J. A. McCallum, supt. **Inc.** April, 1906, in N. Mex. **Cap.**, \$1,000,000; shares \$100 par, nonassessable; 8,852 shares outstanding.

Property: 11 claims, 220 acres, 3 miles from Santa Fe R. R., in the Magdalena mining district, shows a shear zone in rhyolite running N. 25° W., with steep dip N. E. Surface shows thin seams of oxidized ore, developed by 1,550' crosscut tunnel and shafts. Total amount of work is about 4,000'. A test shipment made to El Paso in 1915, contained 7.02% copper and 12.9 oz. silver. Company said to be clear of indebtedness and expects to ship ore in 1916. Government report states conditions do not warrant the expectation of finding important bodies of ore.

HOPE MINES DEVELOPMENT CO.

CALIFORNIA

Offices: Boston Bldg., Salt Lake City, and Sonora, Tuolumne Co., Calif. **Officers:** T. W. Whiteley, pres.; Henry Sadler, v. p.; C. W. Johnson, treas.; F. O. Horn, sec. Geo. Weston, mgr.

In Feb., 1916, it was reported the company's production for the past year had been sufficient to pay a debt of \$20,000, a dividend of \$4,500, and put \$15,000 in the treasury.

Property: an old one, is on the Bonanza lead, ½-mile E. of Sonora, and is said to show free milling gold ore. Vein strikes N. 85° E. with dip of 23° W. and 2' average width. Has mica schist footwall and porphyry hanging. **Development:** by tunnels, present work being done 300' below the old workings; main tunnel is in several hundred feet.

Equipment: includes a 25-h. p. gasoline engine and a 5-stamp mill. Eight men are employed.

HORN SILVER MINING CO.

UTAH

Office: 27 Cedar St., New York. **Operating office:** McCornick Bldg., Salt Lake City, Utah. **Mine office:** Frisco, Beaver Co., Utah. **Officers:** Jacob Needle, pres. and treas.; Alexander B. Simonds, v. p.; Edward F. Emmet, sec.; preceding, with Harvey N. Wadham, E. B. Critchlow, A. B. Simonds, W. R. Britton, Chas. Brenneman, Wm. J. Barrette and H. S. Young, directors; Benjamin B. Lawrence, cons. engr.; Wm. H. Hendrickson, mgr.

Inc. 1879, in Utah. **Cap.**, \$10,000,000; shares \$25 par. Has paid dividends of \$5,642,000, last having been paid in 1907. Net profit for year ending Jan., 1914, was \$13,179.

Property: 19 claims, 9 patented. The mine is extensively developed, has been a large producer of zinc, lead, silver and gold, and has yielded some copper as a byproduct. The old bonanza mine carried good values to depth of about 800', showing silver ores on the footwall, with copper ore on the hanging. Main shaft is 1,600' deep, but stoping is mainly above the 900' level. **Development:** for 1914, comprised 579'. Main shaft was retimbered from 900' level to the 1,000' level. **Equipment:** includes a 30-stamp mill.

Production shipped, under a 2-year contract ending 1911, to the American Smelting & Refining Co., shipments, 1909, said to have averaged about 20% lead and 20 oz. silver per ton. Zinc ore, carrying up to 10% lead and 5 oz. silver, is shipped to Colorado and Kansas zinc plants. Production was suspended, 1907, for the first time in 20 years, because of temporary inability to market ore.

Production: 25,183 tons, with total receipts from ore shipments of \$149,380, in 1913; 24,121 tons, with receipts of \$201,163 in 1914.

The mine was a bonanza silver producer for many years, but has seen its best days and since 1906 has done but little better than make expenses, though it seems probable that some small further profits will be secured from production.

HORNITOS GOLD MINING CO.

CALIFORNIA

Offices: 127 Montgomery St., San Francisco, and Hornitos, Mariposa Co., Calif. H. W. Morris, pres. In May, 1913, company took over and in 1915 began operating the Ruth Pierce gold mine, consisting of 2 claims, located 4 miles from Hornitos. Mine had been idle for some time. Vein averages 3' in width; developed by a 550' shaft, part vertical and part incline, with about 2,500' underground workings.

Equipment: includes a hoist, driven by 105-h. p. motor, 4-drill compressor, and a 10-stamp mill.

HORSE MOUNTAIN COPPER CO.

CALIFORNIA

Eureka, Humboldt Co., Calif. David Wilson, pres.; George Wilson, mgr., Eureka, Cal.; D. W. Stapp, supt. **Inc.** Nov., 1910. **Cap.**, \$1,000,000. **Property:** 70 claims, unpatented, in vicinity of the Humboldt Copper Co., with which this corporation apparently is connected in ownership and management.

Property: Ruby Copper mine on Horse mountain, in the Hoopa range, Horse River district, on the watershed between Redwood creek and Trinity river, in T. 6 N., R. 1 E. For miles copper occurs along a serpentine-gabbro contact; claims show native copper in a vein 30' thick having 2' of high-grade ore.

Development: by 6 tunnels, No. 6 of 900', another of 450', 3,000' in all. **Equipment:** includes engines, boilers, 35 buildings and a \$12,000, 50-ton concentrator with Huntington mill, installed in 1912. Concentrates sacked and shipped by pack train to Korbelt, on Arcata and Mad River railroad, thence by steamer from Eureka to the Tacoma smelter. Small shipment made in 1914. Concentrates average 20% copper and \$4 gold per ton. Twenty-six men employed.

HORST-POWELL COPPER MINING CO.

IDAHO

Address: P. O. Box 2221, Spokane, Wash. A. J. Devlin, mgr. and lessee. **Property:** 7 claims and a 5-acre mill site, well timbered, on the Little North Fork river. **Development:** by 3 tunnels, 300', 600' and 200' long, and 2 shafts, 50' and 100'. Vein is of 15' estimated surface width,

opened up for 800' and proved to depth of 400' with slate footwall and quartzite hanging wall, carrying copper ore averaging 2-6%. **Equipment:** includes steam and gasoline power, with a hoist and necessary mine buildings. Mill being installed 1916. Property is connected with Idaho No. R. R. at Murray by 5-mile wagon road. Estimated 15,000 tons of copper ore on the dumps. Thirty men employed.

HOSEY MINE.

Patagonia, Santa Cruz Co., Ariz. **Property:** in Wrightson mining district, Santa Rita mountains, 12 miles west of Patagonia. Claims show fissure veins carrying high-grade chalcopryrite and glance ore developed to a depth of 200'. Shipments of several carloads have been made. Shaft now caved in, but property favorably reported upon by John Daniells, of Calumet, Mich. Reported under lease to August Varick in 1915.

HOTCREEK SYNDICATE TRUST.

Idle. Property at Hotcreek, via Tonopah, Nye Co., Nev. Victor Barndt, trustee; John Lawton Butler, sec. Is not incorporated. **Property:** 32 claims, unpatented, in Rattlesnake canyon, shows limestone and andesite, carrying replacements in limestone near porphyry contacts, and fault planes; orebodies reported by company to be 2 to 25' in width and traceable from 400' to more than 2,000'. **Development:** by about 1,000' of workings, showing copper ores said to average 2 to 3% copper, 5 to 10 oz. silver and \$1 gold per ton. Ore at water level is disseminated chalcopryrite, of concentrating grade.

HOUGHTON-ALASKA EXPLORATION CO.

Office: Houghton, Mich. **Mine office:** McCarthy creek, Copper River district, Alaska. **Officers:** J. H. Rice, pres.; Deen L. Robinson, sec.-treas.; Ocha Potter, mgr; preceding, with Dr. L. L. Hubbard and F. G. Coggin, directors. Inc. 1905, in Michigan. **Cap.,** \$500,000.

Property: 12 claims, 180 acres, patented; also 160 acres patented placer lands, held for town site and general purposes. Lands adjoin the Bonanza group of the Kennecott Corp., on the N. E., and are on the McCarthy Creek slope of the divide, the Bonanza group being on the Kennecott slope. About 1,000 h. p. is available from McCarthy creek, for a hydro-electric installation.

The Bonanza fault, traceable 7,000', consists of a 6" to 12' fissure filled with brecciated limestone, with mineralization in places up to 100' width, on the fault and along the stratification planes of intersecting veins. The Bonanza fault has a series of fissures cutting the main fault, with mineralization along both, at and near the points of intersection, but where other fissures intersect the cross fissures, only the Bonanza fault is mineralized. Ore is exclusively chalcocite, except at surface, where sometimes broken down to carbonates, and the ore is pockety.

Development: scanty, management apparently awaiting development of its neighbors.

HOUGHTON COPPER CO.

Office: 199 Washington St., Boston, Mass. **Mine office:** Houghton, Houghton Co., Mich. **Officers:** Chas. J. Paine, Jr., pres.; Geo. P. Gardner, v. p.; A. E. Coe, sec.-treas.; preceding, with W. Cameron Forbes, Jas. P. Edwards and Fredk. W. Nichols, directors. Rex R. Seeber, supt.

Inc. Jan., 1910, in Michigan. **Cap.,** \$2,500,000; shares \$25 par; assessable; 1,675,000 issued; \$8 paid. Is controlled by St. Mary's Mineral Land Co., through ownership of 37,228 shares of the 67,000 shares outstanding. Old Colony Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent.

Annual report for year ended Dec. 31, 1915, shows: total receipts,

\$82,761, of which \$71,524 was from assessments, as compared with receipts of \$20,917, with \$5,652 from assessments in 1914. Expenditures for 1915 amounted to \$60,888. Balance of assets was \$24,763, compared with \$7,650 balance of liabilities, Dec. 31, 1914.

Property: 23 acres of surface rights, with mineral rights to 160 acres owned in fee, being the N. W. $\frac{1}{4}$ of Sec. 14, T. 54 N., R. 34 W., lying E. of the Isle Royale mine and adjoining the Superior mine. Diamond drilling was begun March, 1910, in the horizon of the Baltic-Superior bed, showing 2 cupriferosus amygdaloidal beds, the Superior and East lodes, 17' and 20' wide respectively, with dip of 51°, separated by about 83' of trap and conglomerate, the lower bed overlying another conglomerate at a distance of about 150', these strata corresponding exactly with the Baltic formation. Maximum operating depth is figured at 2,800'.

Development: by 620' shaft, sunk about 60' in the footwall, and a winze sunk 400' below the 620' level, disclosing rich copper rock in the Superior lode. The ground penetrated by the shaft is soft and badly broken, necessitating close timbering and occasional concreting; the shaft has been lined with a concrete collar for depth of 300'. Work in 1914 included 1,383' of drifts on the 620' level on the Superior lode; 200' winze below 820' level and 741' drifting from bottom in high-class rock. In 1915 the winze was sunk to the 12th level and a crosscut run to the West lode. In June, 1916, this crosscut, reported in 72', has so far failed to meet copper of commercial grade or quantity.

Equipment: includes a small power plant, and a 16-drill Nordberg electric air compressor. There are necessary buildings, including an office, changing house and warehouse, all of wood.

Due to the outbreak of the European war the mine was closed down from Sept., 1914, to July, 1915. During the summer the 8,140 ton rock pile was sent to the Winona mill, in addition to which 6,517 tons were shipped from underground work. Shipments now being made principally of rock coming from the 6th and 10th levels, amount to about 90 tons per day; recovery reported to be slightly better than 13 lbs. copper per ton.

Production:

	Tons Rock milled	Lbs. Min. prod.	Lbs. Min. p. t.	Lbs. Ref. Copper	Lbs. Cu. p. t. Rock
1915.....	14,656.92	258,900	19.5	156,766	10.69

Sale price for the year was 22.2 cts. per pound.

The property, though small, for the Lake Superior district, is considered promising and management good. Company employs about 35 men.

HOWE SOUND CO.

BRITISH COLUMBIA

Office: 747 Fifth Ave., New York. **Mine office,** Britannia Beach, in the Vancouver district, B. C. **Officers:** Grant B. Schley, pres.; J. W. D. Moodie, v. p.-gen. mgr.; Kenneth B. Schley, sec.-treas.; preceding, with Dennis Sullivan, E. J. Berwind, Louis S. Noble, M. Gavin, W. J. Walworth, G. B. Schley, Jr., and Chas. G. Raynor, directors; Jas. E. Manter, clerk. Inc. Aug. 22, 1903, in Maine. Cap., \$3,000,000; shares \$1 par; issued, \$1,984,150. Listed on New York Curb. Bonds, \$1,000,000, convertible into stock at par. Bankers Trust Co., New York, transfer agent. Annual meeting, third Monday in March.

Balance sheet of Dec. 31, 1915, shows assets: \$2,599,883, which includes: share investments, \$1,402,800; accounts receivable, \$1,186,966; cash, \$10,117. Liabilities include: bills payable, \$500,000; profit and loss, \$115,733. There was authorized in Dec., 1915, an issue of \$5,380,000 20-year, 6%, Gold bonds (5% Sinking Fund). This bond issue is to pay for 53,800 shares out of a total outstanding capitalization of 60,000 shares, of the

El Potosi Mining Co., which see. As owner of the Britannia M. & S. Co. its stock is a desirable investment and ranks high.

The company is a securities-holding corporation, controlling the Britannia Mining & Smelting Co., Ltd., which took over the properties of the Britannia Copper Syndicate, Ltd., and the Britannia Land Co., Ltd., which latter two companies were dissolved in 1915.

HOWELL MINING CO.

UTAH

Office: 218 So. Main St., Salt Lake City, Utah. Ezra Thompson, pres.; J. C. Lynch, v. p.; Lynn H. Thompson, sec.-treas.; with J. M. Howell and David Neff, directors. **Inc.** in 1910. **Cap.**, \$600,000; shares \$1 par; 500,000 shares outstanding. Listed on Salt Lake Exchange.

Property: an old mine, formerly known as the Baby McKee, 8 claims, 4 patented, 140 acres, in the Alta-Cottonwood district, Salt Lake Co., about 25 miles S. E. of Salt Lake City, adjoins the Cardiff property on the east. Reported that it will eventually be merged with Cardiff. Claims cover strike of Howell vein, said to be traceable on property for over a mile, with strike N. E.-S. W. and 4' width. Country rock is quartzite and limestone.

Ore: silver, copper, lead, zinc and antimony, said to average \$20 to \$50 per ton. **Development:** 150' of shafts, 1,790' of tunnels, 90' of raises, 40' of crosscuts. Shipments were made prior to 1910, but amount not known. Management plans adding a compressor, continuing upper tunnel to the contact, and driving the lower tunnel farther along the Howell fissure.

HUBBARD-ELLIOTT COPPER CO.

ALASKA

Offices: 319 So. La Salle St., Chicago, Ill. **Home office:** 411 New York Bk., Seattle, Wash. **Mine office:** Elliott Creek, Chitina district, Alaska. **Officers:** Jerome G. Steever, pres.; H. P. Elliott, 1st v. p.; Thomas S. Hopkins, 2nd v. p.; A. J. Elliott, sec.; John T. Evans, treas.; Carl Hauser, mine supt.; Earl C. Stroup, mech. engr. **Inc.** Jan., 1911, in Washington. **Cap.**, \$3,500,000; shares \$1 par; 1,500,000 shares issued in exchange, share for share, for stock in the old Hubbard-Elliott Copper Mines Development Co., of Alaska; 2,000,000 shares treasury stock.

Property: 35 patented claims, 4 mill sites with U. S. government titles and 84 unpatented claims, over 2,400 acres, also 300 acres of timber, covering over 6 miles in Elliott Creek valley. Elliott creek is an affluent of the Kotsina river, about 15 miles above junction of the Kotsina with the Copper river.

Geology: copper ore occurs in fissure veins and associated replacement orebodies in greenstone with limestone beds above it. The prominent outcrops are practically all on the north side of Elliott creek, near the contact, which runs N. 75° W. and dips 80° N. All outcrops are in the greenstone underlying the limestone beds except on the Leland and Lawton claims which are in a well-defined porphyry dike. Above the limestone is found a heavy capping of conglomerates.

The principal ore minerals are bornite, glance and chalcopyrite. The total absence of surface oxidation due to glacial action is notable and sulphides occur in a calcitic matrix in the veins and with a greenstone matrix.

Development: mainly by the Albert Johnston tunnel, now 1,000' long, in the gulch 500' below the old tunnel which crosscuts the outcrop for 48' all in ore ranging from 4 to 22% copper. The outcrop averages 40' wide and is exposed for 350' in length. The new tunnel will be 390' below it and it is hoped that this work will develop sufficient tonnage to warrant the building of a branch of the Copper River and Northwestern railroad from Elliott Junction to the property, a distance of 15¼ miles.

Equipment: includes compressor, drills, etc. Hydro-electric power plant and concentrating mill installed in 1914.

HUDSON BAY MINES, LTD.

ONTARIO

New Liskeard, Ont. **Officers:** Geo. Taylor, pres.; A. A. McKelvie, v. p., with Thos. McCamus, D. M. Ferguson, J. J. Grills, S. S. Ritchie and C. L. Sherrill, directors. F. L. Hutchinson, sec.-treas.

Inc: July 16, 1909, in Ontario, to acquire from the Temiscaming & Hudson Bay Mining Co., silver properties at Cobalt; it is the operating company of the latter. **Cap.**, \$3,500,000; shares \$1 par, outstanding Sept. 1, 1915, \$3,200,050. Controls Dome Lake Mining & Milling Co., Ltd., through ownership of 460,900 shares.

Balance sheet for year ending Aug. 31, 1915, shows assets \$3,262,202, which includes: mining claims, at Cobalt, \$2,953,228; at Gowanda, \$44,900; claims in Teck & Lebel Twp., \$15,159; plant, concentrator and equipment, \$41,320; accounts receivable, \$4,863; Dome Lake M. & M. Co., \$80,600; 460,900 shares Dome Lake M. & M. Co., Ltd., \$100,877; 2,943 shares of Mines Water Supply Co., Ltd., \$2,943; cash, \$16,667. Liabilities show: accounts payable, \$1,273; Temiscaming & Hudson Bay Mining Co., Ltd., \$37,975; wages due, \$118; capital stock, \$3,200,050; surplus, \$22,785. **Dividends:** to 1916, \$778,909; last dividend, 2½%, was paid Aug. 31, 1913.

Property: 9 claims, 340 acres, at Cobalt. Work during 1915 was on property of Dome Lake M. & M. Co., which see. No work was done on the other properties, except assessment work at Gowanda.

HUDSON BAY ZINC CO., LTD.

BRITISH COLUMBIA

Office: Salmo, B. C. J. L. Bruce, gen. mgr.; J. K. Neill, mine supt. **Inc.** April, 1916, in B. C. **Cap.**, \$5,000,000; shares \$5 par. Incorporators were M. W. Bacon, Old National Bank Bldg., Spokane, Wash.; W. E. Cullen, Jr., and associates, who are reported to have secured a 3-year lease and bond, dating from Sept. 1, 1915, on the property described below. An 18 months' option on the property was acquired by the Butte & Superior Mng. Co. (Hayden Stone & Co.) for approximately \$1,200,000, in May, 1916.

The Canadian Cons. at one time held a lease and bond on this property for \$500,000, and shipped 3,200 tons of lead carbonate ore containing a small amount of zinc from near the surface. The option was relinquished, due to increase of zinc with depth.

Property: 14 claims, 600 acres, 8 miles S. E. of Salmo, and 25 miles S. of Nelson on the Great Northern Ry. **Ore:** zinc, contains lead values in varying amounts, but no silver. Orebodies occur as replacement deposits along bedding planes in shattered limestone. Orebody cut, but not displaced by diabase dike. Vein is on N. E. slope of mountain, 1,500' above Sheep creek; runs N. 28° W. and dips 85° S. W. It is stripped and stoped for 1,000'.

Development: in Nov., 1915, consisted of a 600' crosscut tunnel, No. 2 tunnel, 200' below the outcrop, said to cut a mineralized zone 300' wide with many veins carrying low-grade zinc carbonates, and one or two of shipping grade. Veins strike N. 28° W., dip 85° S. W. The main vein is 33' in width and averages 10% in zinc, with 4' of 30% zinc ore. For 840' of stope, the vein averaged 9% zinc, 3.93% lead, 18% iron, 2.29% lime. In November it had been drifted on 1,000' north and south with no decrease in size or value. A 100' winze from this tunnel level showed 30' of vein matter and a 10' orebody, 4' of which was shipping grade. A lower tunnel, now in several hundred feet, is being driven 1,700' to put the vein 830' below the outcrop. **Ore reserves:** estimated in November, 1915, at 225,000 tons in sight, 10% of shipping grade.

Equipment: includes a small water-power plant working under a 300 head to operate the compressor plant. An aerial tram is being built from the mine to the foot of the hill, where a mill will be erected in Summer of 1916. The railroad will be continued from Salmo to the mill location.

Production: all from development work during the past few months, has been about 1,000 tons monthly of carbonate ore. The present management is pushing development work, completing the lower tunnel and adding to the equipment. Production will be increased as soon as possible. Present indications are that the property will become one of the largest and most profitable producers of the province.

HUGO GOLD & COPPER MINING CO.

MONTANA

Saltese, Missoula Co., Mont. **Officers:** Richard W. Seideman, pres.; A. G. Kearns, v. p.; A. G. Seideman, sec.-treas., with A. B. Atwater and Peter Weber, directors. **Inc.** 1907, in Idaho. **Cap.**, \$1,000,000; shares 10 cts. par; assessable; 770,000 issued.

Property: 3 claims, carrying the extensions of the Boston-Colby vein system, next E. of the New York & Brooklyn mine, and ½-mile E. of Saltese. Claims carry 2 parallel veins, 300' apart, 1 about 15' wide, said to show copper carbonates, bornite and chalcopyrite, giving assays, from selected specimens of 2 to 57% copper. The second vein, proven by trenching, is said to be about 12' wide, carrying a 3' paystreak of ore assaying 12% copper, 6 oz. silver and \$8 gold per ton. Developed by 2 drift tunnels, 1,350' long, that follow the vein. An overshot water wheel, taking water, under a 12' head, from the St. Regis river, runs a 4-drill air compressor. Only assessment work done in 1915. Is a prospect.

HULBERT MINING CO.

MICHIGAN

Idle. Albert S. Bigelow, pres., 199 Washington St., Boston, Mass. W. A. S. Chrimes, sec.-treas.; Fred W. Nichols, agt., Houghton, Mich. **Inc.** about 1865, in Michigan. **Cap.**, \$1,000,000; shares \$25 par; all issued.

Owens 1,640 acres of mineral land, in Houghton and Keweenaw counties, Michigan, undeveloped; part of the surface rights have been sold, but mineral rights reserved. Property valued at \$21,862. Gross receipts for 1912 were \$403. No mining done since organization.

HULL COPPER CO.

ARIZONA

Jerome, Yavapai Co., Ariz. Hon. Geo. W. Hull, pres.-gen. mgr.; Will L. Clark, v. p.; S. F. Dennison, sec. **Officers** are the directors. **Inc.** 1906, in Arizona. **Cap.**, \$10,000,000; shares \$1 par, fully issued; nonassessable.

Property: 21 claims, partly fractional, patented, 249 acres, shows syenite, diorite and slate, a continuation of the formation of the United Verde adjoining, reported by company to show 21 orebodies, carrying some oxidized ores, but mainly sulphides, as developed. The "1888" shaft, of 475' depth, has produced a small amount of ore, but not at a profit.

Development: the Hull property and that of the Cleopatra Copper Co. have been developed by a 5,200' adit driven from Deception gulch, through Cleopatra ground into the Hull property. A winze has been started on the lode at 5,000' from the portal.

The Dillon tunnel extends completely around two sides of the United Verde ground. There are many drifts branching out from the tunnel and these usually follow a fracture plane in the rock showing 1 or 2' of fractured country rock, which usually shows pyrite and may be slightly copper stained. These drifts twist and turn in a manner showing lack of system and finally branch out like a tree, each branch following a fracture plane, some of which show 2 or 3" of copper ore, and some are not even copper-stained. These fracture planes are described as being "leaders" from the big orebodies below, and because the country rock contains a small amount

of pyrite disseminated through it, these ragged workings were stated to block out low-grade concentrating ore.

On the Silent claim a drift from the tunnel exposed an irregular body of excellent chalcopyrite from which 2 shipments were made, the ore assaying 8½% copper. The stope is about 60' long, in places is 12' wide and of irregular height. A 160' raise shows it to branch into 2 seams of 2' and 3' wide. An inaccessible winze was said to show 13' of ore, but inasmuch as shipments had ceased, this seems questionable. Beyond this orebody the tunnel turns the southwest corner of the United Verde property and follows along its western boundary to the "1888" shaft. For part of this distance the tunnel follows a lens of quartz devoid of copper. Aside from the 1 lens of chalcopyrite mentioned the showing in the tunnel is exceedingly discouraging. The mine has upward of 2 miles of openings, but the manager states that these old workings are not deep enough to develop the extension of the main orebodies of the United Verde.

Equipment: includes a 94-h. p. steam plant and a gasoline engine, with 2 hoists, one being a steam hoist, installed 1909, at the "1888" shaft. There also is a small air compressor.

HUMBOLDT CONSOLIDATED MINES CO. ARIZONA

Humboldt, Yavapai Co., Ariz. **Officers:** Benj. Rybon, v. p. and acting gen. mgr.; Dr. B. S. Bowen, treas. and gen. mgr.; John Newman, supt. **Property:** near McCabe, developed by 2,200' of tunnels. Ore occurs in fissure veins. Sample assays returned 400 oz. silver per ton. Equipped with gasoline hoist. Tunnel being driven to 1300' vertical depth to cut main vein.

Company reported to have acquired stock and property of La Tosca Mining Co.

HUMBOLDT COPPER CO. MICHIGAN

Idle. Copper Falls, Keweenaw Co., Mich. Thos. Hoatson, pres.; C. A. Wright, sec., Calumet, Mich. Inc. 1863, in Mich. Cap., \$1,000,000; shares \$25 par. Amount paid in, \$100,000 in real estate, and \$240,986 cash. Annual report of Dec. 31, 1915, shows \$2,281 cash on hand. Is controlled through ownership of 5/6 of the outstanding stock by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March.

Property: Secs. 16 and 21, the former fractional, T. 58 N., R. 31 W., all on the mineral belt, about midway between the Arnold and Phoenix mines, lying north of the greenstone, with the Eagle River and Natick mines to the south. The mine, opened 1853, though never a producer, has a single shaft about 300' deep, sunk on the ashbed, which shows the same characteristics as at the Arnold, carrying occasional bunches of rich ground.

In May, 1914, diamond drill holes numbered 12-13 and 15 were bored through a portion of the hanging wall and across the lode. Holes 12 and 13 intersected the copper bearing part of the lode at 489 feet and 364 feet respectively from surface. Hole number 15 cut this same formation at 713 feet from surface, and disclosed vein matter of good width with good values in both the upper and lower portions of the amygdaloidal flow in each of the holes. **Equipment:** includes an engine house, compressor building, smithy, warehouse and 4 dwellings.

No work was done in 1915.

HUMBOLDT COPPER MINING CO. CALIFORNIA

Eureka, Humboldt Co., Cal. T. L. Loofbourrow, pres.; Kenneth Newett, Jr., sec. Apparently this corporation is a twin of the Horse Mountain Copper Co. **Property:** 8 claims, unpatented, well watered, adjoining the Horse mountain, in Secs. 28 and 29, T. 6 N., R. 4 E., and Secs. 32

and 33, T. 6 N., R. 4 E., said to show strong veins with a good showing of copper ore, including chalcocite and cuprite. **Development:** by 750' of drifts, 210' raise and 20' winze. **Equipment:** consists of 3 surface buildings. Only assessment work being done.

HUMBOLDT MINES CO.**COLORADO**

Telluride, Colo. **Officers:** Bulkeley Wells, pres. and gen. mgr., Telluride; F. N. Watriss, v. p.; Thos. J. Regan, sec.-treas., 120 Broadway, New York; preceding, with C. N. Bell and E. B. Adams, directors. C. N. Bell, supt. Inc. 1915, in Colorado. **Cap.**, \$500,000; shares \$100 par; outstanding, \$382,000.

Property: 25 patented claims, 180 acres, in Mt. Sneffels mining district, Ouray county. **Ore:** gold, silver, lead and iron, in a 2' quartz fissure vein in andesite with N. W.-S. E. strike and dip of 76°.

Development: 680' vertical Humboldt shaft with 7 levels and the mile-long Sheridan tunnel connecting with lowest level of the Humboldt shaft. Greatest depth of workings, 840'. **Equipment:** includes a 50-h. p. electric hoist, Ingersoll-Rand compressor and a tramway. Power is electric.

Production: started Jan. 1, 1916. Ore is milled by Smuggler Union Mng. Co. Production and costs are not given out. When company acquired property it was reported that the mine would be put on 150-ton daily output basis.

HUMBOLDT ORE CO.**ARIZONA**

Controlled by Consolidated Arizona Smelting Co.

HUMBOLDT TRINITY GOLD MINING & MILLING CO. NEVADA

Office: Lovelock, Humboldt Co., Nev. E. L. Connell, mgr. Not incorporated. **Property:** 10 claims, 200 acres, 12 miles N. of Lovelock, said to show gold-silver ore in quartz vein, 18" to 2' wide. The ore above water level at 100' depth is said to assay \$18 to \$25 per ton, with higher values below.

Development: 108' Humboldt incline shaft with drifts on 90' and 55' levels, 80' and 90' long, respectively. Claims \$10,000 in ore is blocked out. **Equipment:** includes an 11-ton Huntington mill, and a 15-h. p. gasoline engine. "Production varies on account of lack of water; if mill runs steady, about \$3,000 per month." Nevada is a dry state.

HUMBOLDT MINING CO.**UTAH**

Merged with Uncle Sam Consolidated Mining Co.

HURON GOLD CO.**ARIZONA**

Idle. **Office:** Jerome, Ariz. **Mine office:** Huron, Yavapai Co., Ariz. Geo. W. Hull, pres.-treas. and gen. mgr.; H. E. Wilcox, sec. **Inc.** in Ariz. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 5 claims, 80 acres, known as the Swindler mine, in the Big Bug district, developed by 125' shaft and 680' tunnel, with 1,500' of workings. Claims said to show veins from 4-10' wide, carrying ore reported to assay 2.5 to 11% copper and \$5 to \$20 gold per ton. Is said to have 800 tons of ore on the dump. Inactive since 1903, except for annual assessment work.

HURONIAN BELT CO., LTD.**ONTARIO**

Office: 310 Dominion Express Bldg., Montreal, Canada. **Officers:** J. M. Bell, managing director; F. H. Hamilton, chairman; with E. Turk, E. T. McCarthy, Scott Lings, H. B. Hooper, directors.

Inc. March, 1914, in Ontario. **Cap.**, £200,000. Company acquired, in 1914, all the interests of the Huronian Belt Syndicate, Ltd.; controls the North Thompson Gold Mine, Ltd. Also has claims in Northern Ontario and near Great Slave Lake.

HURRY-UP MINING CO.**MISSOURI**

Webb City, Jasper Co., Mo. **Property:** in the North Webb City

sheet-ground district, said to show lead-zinc ore occurring at depth of 200'. A 300-ton mill on the property, operating almost continuously for 10 years, is to be dismantled and replaced with one of 400 tons capacity in 10 hours. Company soon expects to begin hoisting ore from the Florence shaft, 1,000' N. E. of the mill.

HUSSEY-HOWE MINING CO.**MICHIGAN**

Address: care C. A. Senecal, Lake Linden, Mich. **Officers:** Wm. H. Rea, pres., with Geo. W. Guthrie, Geo. W. Howe, C. G. Hussey, F. B. Nimick and G. H. Childs, all of Pittsburg, directors. **Inc.** 1911, in Michigan. **Cap.**, 100,000 shares; \$25 par; 54,000 shares issued, fully paid, 45,000 going to owners for property, 9,000 sold for development.

Property: 320 acres, bounded by Indiana and Bohemia ground, includes N. E. $\frac{1}{4}$ Sec. 22 and N. W. $\frac{1}{4}$ Sec. 23, T. 51, R. 37 W., in Ontonagon county. Property shows outcrop of the Eastern sandstone and 100' west of it an amygdaloid vein supposedly the Baltic lode of 2 veins. It shows copper carbonates and oxides over a width of over 100' resembling the Baltic outcrop at Champion, 25 miles N. E. As the dip is 60 to 65°, the property contains a valuable area for working.

HYDAH (HAIDAH) COPPER CO.**ALASKA**

Mine near Kasaan P. O., Prince of Wales Island, Alaska. Company inactive since 1912, and letters undelivered at the Alaskan and Seattle offices. See Vol. XI, Copper Handbook.

HYPOTHEEK MINING & MILLING CO.**IDAHO**

Otto A. Olsen, sec., Wallace, Idaho. **Mine address:** Kingston, Shoshone Co., Idaho. **Officers:** J. H. Kern, pres.-gen. mgr.; S. L. Shonts, cons. engr.; Fred L. Beigin, mgr.; preceding, with W. W. Davidson, J. H. Kirk and S. A. Covert, directors. Stock is assessable. Issue of \$200,000, 7% 12-year bonds authorized in 1914 to furnish necessary funds for development and equipment.

Property: 9 claims, located, 1886, by Octave Guay, shows 3 veins, 2 of 10 to 20' estimated width, the third vein, known as the Great Western, of 8 to 25' width, having a 12 to 18" paystreak carrying native copper and cuprite, assaying up to 16% copper, balance of vein carrying low-grade ore, estimated to carry 2% copper, with small gold and silver values, with quartz gangue..

Development: by 1,000' tunnel and 3-compartment shaft to the 1,100' level. The 523' level (750' below surface) opened up a fine shoot of commercial lead ore in 1912. The 900' level also shows an ore shoot 6' thick and 400' long, from which small shipments were made in 1915. This is the deepest mining work in the Prichard slates of the Coeur d'Alene sedimentary series, a formation hitherto considered unpromising. The finding of chalcocite at this mine below 1,000' of Burke quartzite completely contradicts all former views. In Feb., 1916, a crosscut on the 1,100' level opened up a vein of solid galena ore from 18"-2' wide.

The mine is electrically equipped and has a 100-ton concentrator with Chilean mill, Wilfley table, Frue vanners, etc. Property examined and reported upon by Jas A. McEachran, 1911.

A 3-mile aerial tram was installed to convey ore from the mine to the railway. The new 125-ton mill was reported ready for operations in June, 1916. **Production:** 1913, about 200 tons of first-class ore a month. Recent production not available.

IBAPAH GOLD MINING CO.**UTAH**

Property: the Queen of Sheba mine, in the south end of the Deep

Creek country, Beaver Co., Utah, an old gold mine credited with a production of \$80,000. Mine shows vein 5-18' wide. Pay ore occurs in shoot assaying from \$10-\$13 per ton. **Development:** by a 1,187' main tunnel, several short tunnels and a 376' raise. **Equipment:** includes a small mill.

Worked under a 3-year lease from 1914 by C. E. Johnson.

IBEX GOLD MINING CO.

UTAH

Joy, Juab Co., Utah. A Knight Investment Co. property, under lease and bond to Detroit Copper Co. and described thereunder.

IBEX MINING CO.

COLORADO

Office: 929 Equitable Bldg., Denver. **Mine office:** Leadville, Colo.

Officers: A. V. Hunter, pres.-treas.; John A. Ewing, v. p.; Chas. Caven-der, sec.; J. F. Campion, mgr., with W. W. Davis, Wm. Byrd Page and J. J. Brown, directors. Geo. Becker, supt. Inc. March, 1891, in Colorado. **Cap.**, \$100,000; shares \$1 par; nonassessable; all issued. Annual meeting 1st Monday in June. Company is operated as a close corporation.

Property: 10 claims, patented, 52 acres, on Breece Hill, Lake county, includes the Little Jonny claim, which has produced about \$25,000,000 worth of ore. Ore occurs in blanket deposits carrying silver, lead, copper and zinc values. Bodies of contact metamorphic ore encountered at depth were low-grade and not valuable. Vein structure is very complicated, owing to faulting.

Development: by 4 vertical shafts to depth of 1,250'. On the 900' level an oreshoot, opened for 2,000', is reported to be 70' wide and 55' high and to run from 0.80 to 1.30 oz. gold per ton. **Equipment:** includes 18 machine drills, breaking about 350 tons of ore per day. Mine is worked by lessees.

IBEX MINING CO.

IDAHO

Mullan, Shoshone Co., Idaho. Controlled by the Amalgamated Stock Holding Co., of Wallace, Idaho. Inc. April 15, 1911, in Idaho. Company still in existence, but comatose. Owns 4 claims adjoining Idaho, Boulder Creek and Bitter Root mines, three-fourths of a mile S. of Mullan and 300' from N. P. R. R. Property shows 4' iron vein adjacent to a diabase dike. Developed by 2 tunnels, the lower starting from Coeur d'Alene river to cut vein at 700' below outcrop.

ICE PLANT MINING CO.

MISSOURI

Carthage, Mo. Inc. in Missouri. **Cap.**, \$50,000. Has a lease on 40 acres of mineral land belonging to the Guinn Investment Co., in Sec. 7, T. 28, R. 32, Jasper Co., Mo. **Property:** developed by 3 shafts to depth of 180'. **Equipment:** includes 300-ton concentrating plant, a 200-gal. per min. pump, 8 drills, hoist, crusher, compressor, boiler and steam power.

IDA MONTANA MINING CO.

MONTANA

Company dead. Property at Butte, Mont., bought at sheriff's sale, 1915, by J. W. Black, Houghton, Mich. Fully described Vol. XI.

IDAHO ANTIMONY MINING CO.

IDAHO

H. L. Williams, Seattle, Wash., managing director. Channing Prichard, supt. **Property:** in Yellow Pine mining district, near Cascade, Idaho county, shows an orebody of stibnite, 18-30" wide, developed by 4 tunnels. Two carload shipments, 1915-16, are reported to have yielded 47% antimony.

IDAHO BRIDE MINING & MILLING CO.

COLORADO

Officers: E. D. Payne, sec. and gen. mgr., 227 Temple Court Bldg., Denver, Colo. H. A. Miller, pres.; R. A. Kramer, v. p.; A. A. Ancoin and H. Angerman, directors. **Cap.**, \$100,000; shares \$1 par, fully paid, nonassessable.

Property: about 150 acres near Idaho Springs. Company organized

to take a lease on the Bride vein, worked through the Idaho tunnel, and supposedly has lease and bond on the Seaton mine, opened at depth by 300' drift in the Newhouse, or Argo, tunnel, 800' lower than the Idaho. Company took over Foxhall property, 1914.

Ore: mostly galena with silver-gold content, from 1,300' level said to have run \$9 to \$20 per ton.

Equipment: includes a concentrator. Recovery on \$4.65 ore is given as \$4.08, or 88%. Net smelter returns to Jan. 1, 1916, advertised as \$25,000.

Management states that upward of \$500,000 has been expended in development work. Advertising literature for the purpose of raising money to pay balance on mill and extend main tunnel, is not favorably regarded.

IDAHO CONTINENTAL CO.

IDAHO

Officers: A. Klockman, pres. and gen. mgr., 711 Paulsen Bldg., Spokane, Wash.; J. B. Whitehill, v. p.; R. Schacht, sec.-treas.; preceding, with E. M. Robinson, Wm. Wraith, directors. Inc. 1909, in Wash. **Cap.**, \$1,500,000; shares \$1 par, outstanding 1,325,000 shares. John D. Ryan, through the International Smelting & Refining Co., advanced \$325,000 for the development of the property on condition that it be given a 10-year contract to treat the company's ores, should name 3 directors and a manager and receive an option on 150,000 shares at 50 cts. a share.

Property: 20 patented claims, 26 miles from Port Hill, Bonner Co., Idaho, N. of head of Priest Lake, said to show a strong vein in quartzite and slate with a succession of ore shoots, 8' to 20' wide, carrying galena and a little copper ore. These ore shoots have been opened to a depth of 600' and on that level exceed 1,000' in length. Is an important new lead producer. A 300-ton concentrator was erected and was operating during June and July, 1915, producing over 2,000 tons of concentrates, when destroyed by fire. Rebuilt 1916. **Output:** 30 to 40 tons concentrates daily after April 1, 1916.

IDAHO COPPER MINING CO., LTD.

IDAHO

Office: Wallace, Idaho. **Mine office:** Mullan, Shoshone Co., Idaho. **Officers:** John H. Nordquist, pres.; A. N. Stroud, v. p.; Geo. F. Stoney, sec.; A. H. Featherstone, treas.; W. H. Herrick, gen. mgr. **Property:** 6 claims, 3 patented, on the Continental divide, between Idaho and Montana, near the head of Willow creek, in the Hunter district, west of the Reindeer Copper & Gold M. & M. Co., Ltd. Claims carry about 4,500' of the strike of the extension of the Reindeer vein, and are developed through the 3,000' Reindeer crosscut tunnel. Requests for information ignored.

IDAHO EXPLORATION CO

IDAHO

Property: a group of patented claims in Kelly Gulch, W. of Hailey, Blaine county, Idaho, showing lead-silver ore at surface. A rich strike made in 1915, said to have disclosed an orebody several feet wide, assaying 110 oz. silver and 70% lead per ton. Under development in 1916.

IDAHO GIANT MINING CO.

IDAHO

Cap., \$100,000; shares 10 cts. par. **Property:** the Idaho Giant mine, adjoins the Carbonate Hill above Mullan, Shoshone Co., Idaho. **Development:** mainly by tunnels, shows lead-silver ore in veins. The mine has been bonded to Thos. Brennan, manager of the Hunter Mine, for 5 years, starting April 1, 1915, with first payment of \$10,000 to be made at the end of 3 years.

IDAHO GOLD COIN COMPANY.

IDAHO

Controlled by the Salger Seed Co., La Crosse, Wis. S. W. Ford, supt., Landore, Idaho. **Property:** in the Black Lake section of the Seven

Devils district, Adams county, carries gold ore assaying from \$12-\$16 per ton. Company has expended \$250,000 in 12 years development work. A 50-ton cyanide plant at the mine treats the output.

IDAHO AND LOS ANGELES M. & M. CO.

IDAHO

Wallace, Idaho. **Property:** 6 lode claims, in process of patenting, in Beaver and Placer Center mining districts, Shoshone county, said to show a well defined vein containing lead-silver-zinc and copper ore. Developed by 250' tunnel which is being extended in search of a continuous orebody.

IDAHO MINING, REDUCTION & TRANS. CO.

COLORADO

Wm. E. Renshaw, mgr., Idaho Springs, Clear Creek Co., Colo. **Property:** the Silver Age, Gem and Freightons Friend mines (formerly the Gem. Cons. Mines Co.), showing veins with gold-copper ores:

Development: by several shafts and extensive tunnel workings. Is now operated by lessees. **Equipment:** includes electric-driven compressor and hoist, and a 200-ton concentrator with 20 stamps.

IDAHO MINING & SMELTING CO.

IDAHO

Is the successor, 1912, of Clayton Mining & Smelting Co., reorganized, 1913, as the Red Bird Smelting Co., which see.

IDAHO-MONTANA AMALGAMATED MINING CO.

IDAHO

Owns the Idaho-Montana mine, near Kalka station, on the Great Northern R. R., 7 miles E. of Bonner's Ferry, Bonner Co., Idaho. Developed by a 400' incline shaft which discloses a 2 to 4' vein in diorite, containing lead and silver values associated with iron sulphide, expected to develop copper with depth. Has 50-ton concentrator and is reported to have made a shipment of lead ore in 1914. Considered promising.

IDAHO MONTANA MINING CO., LTD.

IDAHO-MONTANA

Office: J. H. Wixom, sec., Box 32, Wallace, Idaho. **Officers:** Walter H. Hanson, pres.; E. H. McConnell, v. p.; Harry Harris, treas.; preceding, with F. P. Miller, directors.

Inc. Aug. 18, 1905, in Idaho. **Cap.**, 1,000,000 shares; 10 cts. par; assessable; 386,349 shares outstanding. Annual meeting 1st Saturday in Sept.

Property: 10 claims, unpatented, 200 acres in Shoshone Co., Idaho, and Sanders Co., Mont., showing lead-copper-silver ore in quartz veins. Developed by 1,200' tunnel to depth of 540'. Mine has no equipment and is not yet producing.

IDAHO NEVADA EXPLORATION CO., LTD.

IDAHO

Wallace, Idaho. **Officers:** Dr. L. E. Hanson, pres.; P. J. Limacher, v. p.-gen. mgr.; E. R. Turk, sec.-treas., with A. B. Livingston, Jos. Peila and Jos. Ghierrardi, directors. W. B. Lively, mgr.; S. L. Shonts, cons. engr. **Inc.** 1914, in Idaho. **Cap.**, 1,500,000 shares; shares given to those agreeing to pay an assessment of 1 mill per share every 2 months.

Property: 3 lode claims, the Castle Rock, Smart Alec and Arlington, and a mill site, formerly owned by the Castle Rock Mining Co., about 3 miles S. E. of Wallace on Placer Creek. Ore occurs as chalcopyrite in a 4' vein in quartzite formation.

Developed to depth of 200', from whence a crosscut is being driven to intercept the main vein. **Equipment:** includes compressor and hoist. A carload shipment to Tacoma smelter in 1915 said to have assayed .04 oz. gold, 10.89% copper, 10.5% silica, 35.7% iron. Surface equipment and buildings destroyed by snowslide, Jan., 1916.

IDAHO NORTHERN MINERAL CO.

IDAHO

Office: Room 1508, No. 30 Second Ave., Spokane, Wash. **Mine office:** Murray, Idaho. **Officers:** F. Swanson, pres.; Vina Burton, sec.

treas., with A. Engquist and J. A. Sangren, directors. Inc. in Washington. **Cap.**, \$1,500,000; shares \$1 par.

Property: 18 unpatented claims, in the Summit mining district, 5 miles from Murray, shows copper, lead, silver and gold ore in 2 well defined veins. Developed to depth of 400' by 1,500' tunnel. Property still in development stage.

IDAHO-SEATTLE MINING CO.

IDAHO

Office: 1604 Hoge Bldg., Seattle, Wash. **Mine office:** Tendoy, Idaho.

Officers: F. R. Van Tuye pres.; L. E. Eyman, v. p.; R. V. T. Horsha, sec.-treas.; with F. A. Linford and L. R. Margetts, directors. Walter M. Stephen, supt. Inc. Oct. 13th, 1915, in Mont. **Cap.**, \$1,000,000; shares \$1 par; 100,000 issued. Annual meeting 2nd Monday in January. Gross earnings in 1915 were \$15,000 from dump ore sales.

Property: 3 claims, 2 patented, 60 acres, known as the Copper Queen mine, in Agency creek, 8 miles from Tendoy, Lemhi county, held under bond and lease. Claims show bornite, chalcopyrite, copper glance and quartz in fissure veins dipping at from 45-70°. Ore occurs in shoots 20"-16', reported to average 10% copper, ½ oz. gold, 1 oz. silver per ton. Developed by 1,600' of underground workings to depth of 300'. Ore is mined by overhead stoping.

Equipment:- includes small concentrator. Management concentrated and shipped low-grade dump ore in 1915. Plans extensive development and installing drills, hoist and pump in 1916.

IDAHO SM. & REF. CO.

IDAHO

Dead. Mortgage foreclosed and title now in name of Union Trust & Savings Bank as trustee for bondholders. When expenses incurred by trustee are paid, property will be turned over to a new company to be known as the Ponderay Mng. & Sm. Co. and bondholders will take their respective pro rata.

IDAHO TUNGSTEN CO.

IDAHO

Had a 7-year lease on the Ima Cons. M. & M. Co. (which see) property near Ima, Patterson Creek, Lemhi Co., Idaho. Said to have shipped 12 tons of 60% tungsten concentrates, 1915.

IDEAL COPPER CO.

NEVADA

Office: 634 Bridge St., Grand Rapids, Mich. **Mine office:** Luning, Nevada. **Officers:** S. J. Hufford, pres.; H. D. Keefer, v. p.; Henry Riechel, sec.-treas., with Henry Smith, J. I. Keller, directors. Inc. Jan. 12th, 1915, in Nev. **Cap.**, \$600,000; shares \$1 par; 4,000 shares issued. Annual meeting, 2nd Tuesday in January.

Property: 16 claims, in 2 groups, unpatented, 360 acres, about 4 miles from Luning, formerly owned by the Wagner Azurite C. Co., and listed Vol. XI. The Atwood group, which is the principal property, shows a contact zone of about 600' width, traceable 2,000', between an altered granite footwall and limestone hanging, with N. W.-S. E. strike and dip of 50° N. The outcrop carries silver and gold-copper ores with a quartz gangue. **Development:** 2 tunnels, 1, 700' and 350' long, with a total of 2,185' of workings.

The Nevada-Wisconsin group shows several dikes of 50 to 100' width of which one is said to show 2 to 11% copper sulphide ore. Developed by shaft.

Equipment: includes 40-h. p. steam plant with 15-h. p. hoist, 3-drill straight-line air compressor, 100-ton leaching plant and 10-stamp mill. Owing to excess of lime in the ore, the leaching plant proved a failure and was closed down. During 1915 only assessment work was done, but

management plans extensive development at depth. Property considered promising.

IDORA MINING CO., LTD.

IDAHO

Office: Jamieson Blk., Spokane, Wash. **Mine office:** Wallace, Idaho. **Officers:** J. C. Broad, pres.; J. B. Carson, v. p.; C. E. Malette, sec.-treas. and mgr., with C. J. Orland and A. Landen, directors. E. L. Latta, supt.

Inc. May, 1915, in Idaho. **Cap.**, \$150,000; shares 10 cts. par; 1,200,000 shares issued, assessable; ½ ct. levied in 1915. Annual meeting 1st Monday in April. Company had \$26,000 debts in August, 1915, which have since been partly paid off. Property formerly held by the Idora Hill Mining Co., was purchased for \$100,000.

Property: 9 claims, 1 patented, in Beaver district, Shoshone county, show lead-silver-zinc ore in 3½' quartz vein. Formation is Prichard slate. Average assays reported to run 50% lead, 25 oz. silver, 8% zinc.

Development: by 8,000' of underground workings to depth of 600', including a 5,000' tunnel. **Equipment:** consists of electric power, compressor, 150-ton concentrating mill and a tramway. Mill operated under 3-year lease by Gus Ehrenberg. A new Janney flotation unit being installed, 1916. Shipped from 80 to 100 tons of ore a month, in 1915, to East Helena smelter over the O. W. R. & N. Co. Employs 6 men.

IGNACIO RODRIGUEZ RAMOS, S. A.; COMPANIA MINERA

MEXICO

Property "confiscated" by Gen. Villa, 1915, and operated by Sr. F. R. Quijano, Chihuahua City, Chih., Mexico. Shipments 1915 to Granby Mining & Smelting Co., St. Louis, held up by Villistas, and smelter agent unjustly jailed. No direct information received.

Property: 129 hectares, covering the mineral zone of the Sierra Almoloya. The geological conditions greatly resemble the Santa Eulalia camp. Ore occurs in limestone, in lenses, one having a width of 70' and length of 140', ore said to average 5% copper, 25% lead, 6% zinc, 15 oz. silver and \$8 gold per ton. Values are mainly in silver-lead ores, though chalcopyrite occurs as a byproduct.

The mine is extensively developed to a depth of 300 meters, by an 800' shaft and 2 main tunnels, with much rich ore in sight.

Equipment: includes steam and electric power, with steam hoist and air compressor. A 3-stamp experimental mill is connected with the mine by a 4,000' incline tram.

IKEDA MINES, LTD.

BRITISH COLUMBIA

Ikeda Bay, Queen Charlotte Islands, B. C. S. J. Castleman, gen. mgr.; Andrew G. Larson, cons. engr. and supt. **Inc.** Sept., 1910, in British Columbia. **Cap.**, \$850,000; shares \$1 par.

Property: the former holdings of the Aways-Ikeda Co., Ltd., taken over for \$200,000, include 42 claims, 2,100 acres in several groups on Ikeda bay, at the southern end of Moresby island, 3 miles from Jedway, and connected therewith by government rail and telephone. Steamer connection is had with Vancouver, 450 miles distant.

The Lily group, 8 claims, 400 acres, crown patented in 1912, on the southwestern side of Ikeda bay, discovered May, 1898, by Arichika Ikeda, and developed by him until taken over by the present company, Sept., 1910. The group shows limestone and slate cut by dikes of greenstone and diorite, having well defined flat fissures at right angles to and between the main fissures, which are practically vertical, the others being approximately horizontal and of great number. Ore occurs in a series of veins of 2 to 8' width, the largest orebodies lying along the horizontal main fissure. The vein principally developed is of 5 to 30' width, proven for

1,000' in length and about 300' in depth. The ore shoot, up to 20' in width, carries lenses of chalcopyrite, averaging, as mined, about 2.5% copper, with a gangue of silicious country rock and occasional stringers of quartzite and limestone. The ore mined by the former owners averaged about 4% copper, 2.2 oz. silver and \$2.25 gold per ton.

The Lily mine has 4 tunnels connected by winzes. No. 3 tunnel, 940' long, has about 5' of chalcopyrite of good average tenor and ends in a 40x50' chamber from which considerable ore has been stoped, the ore in the chamber apparently being not the same as that followed in the tunnel, lying about 45' to the N. and found by crosscutting.

Production: to end of 1910 was about 12,000 tons of ore. Property idle in 1912, save for assessment work on unpatented claims, but was reported as shipping 50 tons of ore monthly to the Granby smelter at Anyox in 1915.

ILLINOIS COPPER & SILVER MINING CO. WASHINGTON

Idle. Letters to Pittsfield, Ill., neither answered nor returned. Mine at Keller, Ferry Co., Wash. J. C. Davis, pres. and gen. mgr.; J. D. Nighbert, v. p.; A. Hamilton, supt.; B. H. Swan, sec.; J. D. Hess, treas., at last accounts. Inc. in Washington. Cap., \$2,000,000; shares \$1 par, nonassessable, in \$1,000,000 preferred and \$1,000,000 common stock. Owns 9 claims, in the San Poil district. The Columbia group of 4 claims, 3½ miles from Keller, shows auriferous and argentiferous copper ores. The Oregon group has 300' of workings, developing a vein claimed to be 72' wide, showing low-grade ore. Not favorably regarded.

IMA CONSOLIDATED MINING & MILLING CO. IDAHO

Warran Zeigler, supt. Inc. 1900 in Idaho. Property: 21 patented claims near Ima, on Patterson creek, 21 miles S. W. of Landore, Ida. Tungsten was discovered on this property in 1903, but was not mined until 1911.

Ore: mainly hubnerite with some wolframite, occurs in white quartz fissure veins, 1-10' thick in a formation of pre-Cambrian sedimentaries, closely resembling silicious schist. The quartz gangue shows lead, zinc and iron sulphides.

Development: aggregates about 2,500' of tunnels and drifts. **Equipment:** includes a 50-ton concentrator with flotation unit. Property was worked under a 7 years' lease by the Idaho Tungsten Mining Company. Shipped about 12 tons of 60% tungsten concentrates in 1915. Reported under lease to L. A. Jeffs and E. W. Johnson, 1916.

IMLAY MINING CO. NEVADA

Letters to 204 Herald Bldg., Salt Lake City, Utah, neither answered nor returned. Mine near Imlay, Humboldt Co., Nev. Geo. W. Morgan, pres.; Hon. O. W. Powers, v. p.; R. E. Siddoway, sec., at last accounts. Inc. April 19, 1907, in Utah, as successor of Morrison Mining Co. Cap., \$500,000; shares \$1 par; assessable; fully issued.

Property: 26 claims, unpatented, with 2 mill sites and a town site, 7 miles from Imlay. Mine has a vertical shaft, with about 4,000' of workings, developing ore said to assay up to 8.8% copper, 7.6% lead, and 0.18 to 66.5 oz. silver per ton, with gold values.

Equipment: includes three 60-h. p. boilers, a hoist, air compressor, 50-ton mill and electric plant, office and shops. Company was preparing to resume operations in 1914, but failure to answer letters indicates a fear of publicity.

IMPERIAL CONSOLIDATED MINING CO. COLORADO

Office: 725 Colorado Bldg., Denver, Colo. Mine office: Georgetown, Clear Creek Co., Colo. Edw. J. Wilcox, pres. and mgr.; Henry Butler, supt. Inc. as a reconstruction of the Waldorf Cons. Mining Co.

Property: 600 acres, patented, including the Tobin mine, in the East Argentine district, shows a strong fissure vein with 3' pay streak of gold-bearing copper ore. **Development:** includes the Tobin and Wilcox tunnels, with 7 miles of workings. A 3' vein of high-grade copper was intersected, April, 1915, at depth of 500'. **Equipment:** includes a 125-ton mill at the portal of the Wilcox tunnel. After an idleness of several years, operations were resumed in 1915.

A 42-ton trial shipment said to have averaged 10% copper, 8% lead, 1.53 oz. gold and 66 oz. silver per ton. Main development work being carried on by lessees in 1916 on the Commonwealth vein.

IMPERIAL COPPER CO.

ARIZONA

Dead. G. W. Dietz, sec., Tucson, Ariz. In 1903 company bought the old Silver Bell mines and built the Arizona Southern railway line from the Southern Pacific R. R. to the mine; it erected a smelter at Sasco, through its subsidiary, the Southern Arizona Smelting Co., and built a concentrator and fine plant at the mine. Mining was stopped in 1913 by the loss of a 450' shaft by fire and the inability of the mine to furnish 700 or 800 tons of ore of high enough grade to pay with copper below 12½¢ a lb. Had the parent corporation, the Development Co. of America, been able to supply the funds, which it claims were promised by the Southern Pacific R. R., the Imperial could probably have tided over this period.

In 1911 trustee for bondholders of the company began foreclosure proceedings, resulting in the sale in 1915 of the property, including the stock control of the railroad and of the smelting company. Immediately thereafter the American S. & R. Co. secured a bond and churn-drilled the tract to check assay plans of former management, and in March, 1915, property was taken over and lease taken at \$2,000 per month on the Sasco smelter.

The Silver Bell mines cover 85 claims, 1,700 acres, in a small mountain range called the Silver Bell. The range has a monzonite porphyry core capped by Paleozoic limestone and quartzite, eroded and faulted, with ore-bodies in the baked and altered limestone as irregular lenses along shear planes in this contact zone. The porphyry is itself altered and impregnated with copper sulphides. Oxidation extends downward 100-150'. The underlying sulphide ore carries chalcopyrite and some bornite. This is the largest developed mine south of the Southern Pacific R. R., being but 35 miles south of Tucson.

For geology see Bull. 285, U. S. Geol. Survey, 1906, pp. 102-3. Also Min. Res. 1907, p. 175; 1908, pp. 204 and 305; 1909, pp. 167 and 251. Fully described in Vol. XI, Copper Handbook.

IMPERIAL COPPER CO.

SOUTH DAKOTA

Durbin Groupe, pres.; John O'Brien, supt. Property in Custer Peak district, developed by 175' shaft, reaching permanent water level. Cross-cutting will be done to open up the 30' ledge. **Equipment:** steam hoist, pump and mill of several hundred tons capacity. Mine reported to show good values in copper in upper workings.

IMPERIAL COPPER & GOLD MINING CO.

WYOMING

Office: 423 Caswell Block, Milwaukee, Wis. Jacob Best, sec.-treas. **Property:** 6 claims, 113 acres, patented, near the Penn Wyoming mine, on Upper Cow creek, 12 miles west of Encampment, said to show 2 veins, 1 of 26 to 32' estimated width, being a schist dike. Mine has about 500' of tunnels, developing ore giving assays of 6 to 14% copper, with small gold and silver values. Secretary reports all taxes paid, 1915. Idle in 1915-16.

IMPERIAL MINING CO.

IDAHO

Mine office: Burke, Shoshone Co., Idaho. **Officers:** John H. Nordquist, pres.-gen. mgr.; J. N. Thennes, v. p.; H. G. Brown, sec.; with P. J. Jearon,

E. Day, directors. Inc. 1906. Cap., \$1,000,000, increased 1908 to \$1,500,000; shares \$1 par. Assessment of 1½ mills per share levied 1913 and 5 mills per share in 1915.

Property: 6 claims and 3 fractions, 180 acres, adjoins the Copper King, on the west, near Burke. Developed by 5,000' of tunnels and crosscuts. After being closed down for 2 years, property was reopened in 1915. Over \$15,000 worth of development work was done, including diamond drilling and raising, to prospect the orebody found in the upper or 4,000' tunnel, which was not encountered below. Contract for a new 400' tunnel was given in 1916. Equipment with 3-drill electrically driven compressor.

IMPERIAL MINING CO.

OREGON

C. L. Arzeno, mgr., 8 East 5th St., Covington, Ky.; Otto Simons, supt. Property: the Imperial mine at Cable Cove, 10 miles from Sumpter, the nearest railroad station. Ore occurs in fissure veins in granodiorite. The Imperial, or main vein is ¾' wide and has been extensively developed. **Equipment:** includes a small mill. Has been a small and irregular producer.

INCLINE MINING CO.

MISSOURI

Controlled by Tom Walker & Co., Webb City, Mo. Has a lease on part of the lands belonging to the Center Creek Mining Co., in Sec. 17, T. 28, R. 32, between Webb City and Carterville. Developed by 5 shafts to depth of 150', showing lead and zinc ore. **Equipment:** includes 2 concentrators of 500 tons capacity, pump, boiler and steam power.

INDEPENDENCE MINE.

IDAHO

Harry J. Allen, mgr. and owner. Mine near Ketchum, Blaine county, shows a well-defined lead-silver vein, from which shipments in 1915 averaged 45% lead, 95 oz. silver and 0.2 oz. gold per ton. Operations hampered owing to apex litigation and lack of water supply for the mill.

INDEPENDENCE GOLD & COPPER MINING CO.

MONTANA

Deer Lodge, Powell Co., Mont. Officers: I. S. Eldred, pres. and gen. mgr.; Peter Pauley, v. p.; E. Scharnikow, sec.; W. F. Gullette, treas.; preceding officers, A. D. Hoss and W. C. Spottswood, directors. **Inc. 1907 in Montana. Cap., \$900,000; shares \$1 par. Assessments to date 10 mills per share.**

Lands: 120 acres in the Oro Fino district, 12 miles S. of Deer Lodge and 5 miles S. of 2 railways, include the old Independence mine located 1870, which is a patented tract of 102x2,200'. **Development:** includes shafts and tunnels, one 425' long, 1915, showing a vein of 4 to 5' width, carrying copper ore said to have averaged as produced about \$12 per ton in combined values, and to be capable of concentration 4 into 1, giving concentrates with excess of iron. Closed down Sept., 1908, for lack of funds.

In June, 1914, a lease and bond for \$75,000 was given to T. C. Neumann with two years' option and royalty of 10% net on smelter returns. A 3' vein carrying gold, silver and traces of copper was encountered, 1915.

INDEPENDENCE GOLD MINING CO.

ALASKA

Seward, Alaska. Property: 5 claims and a mill site, in process of patent, in Fishhook Creek Valley, on the east slope of Granite Mountain, Willow Creek mining district. Mine located in 1907, and formerly owned and operated by the Alaska Gold Quartz Mining Co., shows 2 veins. The Granite Mtn., or main vein, from 2"-4" thick, occurs in quartz diorite, showing native gold, pyrite and chalcocopyrite; strike N. 14°, 20° W., with average dip 20° S. W. Developed by opencuts, stopes and several tunnels, longest 386'. The Independence, or upper vein, 620' vertically above and running parallel to the Granite Mtn., has strike N. 12° W. with average dip of 42° W., averages 12" thick and is only slightly developed.

Equipment: includes small stamp mill and concentrator, 2 aerial trams

connecting mine and mill. Production in the past has been mainly from the Granite Mtn. workings. Operated in a small way, 1915.

INDEPENDENCE LEAD MINES CO.

IDAHO

Officers: Maurice W. Bacon, pres., Old National Bank Bldg., Spokane, Wash.; John H. Wourms, v. p.; W. E. Cullen, Jr., sec.; with R. A. Carnochan and C. Van Ordstrand, directors. **Inc.** Nov., 1914, in Idaho, as a reorganization of the Independence Gettysburg Mining Co. **Cap.**, \$1,500,000; shares \$1 par; 1,300,000 shares issued. Stock listed on the Spokane Exchange.

Property: 8 patented claims and a ½ interest in the Key Lode claim, in the Coeur d'Alene district, 1 mile from Mullan, on the No. P. R. R. Claims adjoin the Gold Hunter M. Co. holdings to the E. and the You-Like and Morning veins of the Federal M. & S. on the W. Mine shows 3 veins believed to be the extension of the Morning-Evening, You-Like & Midnight orebodies, which have been profitably worked to depth of 2,800' on adjoining properties.

Development: mainly by 4 crosscut tunnels, 200', 400' and 1,800' long. The longest, or No. 4 tunnel, 370' vertically below No. 3, early in 1916 intercepted the You-Like vein, showing 8' of ore assaying 4 oz. silver, 3% lead with some iron sulphide. This tunnel is being continued north to reach the Morning vein. Employs 15 men.

INDEPENDENCE MINING CO.

WYOMING

Idle. Office: 55 High St., Oshkosh, Wis. **Officers:** E. E. Meeleus, pres.; Henry L. Larsen, v. p.; H. O. Granberg, sec.-treas. and gen. mgr. **Inc.** June 28, 1904, in Wyo. **Cap.**, \$1,000,000, shares \$1 par, as successor of Leighton-Gentry Mining Co.

Property: 6 claims, patented, 120 acres, 2 miles north of Dillon in the Battle Lake district, shows eruptive metamorphic country rocks, carrying an 11' contact vein between quartzite and diorite. **Development:** by 200' incline shaft and 250' tunnel, showing occasional stringers of 3 to 12" width, carrying a little chalcopryrite assaying 12% copper, with small quantities of nickel and cobalt and traces of silver and gold. Has steam power, a hoist and several small mine buildings.

INDEPENDENT COPPER MINING & MILLING CO.

IDAHO

Officers: John H. Nordquist, pres.; J. N. Thennes, v. p., gen. mgr. and agt., Wallace, Idaho; Otto A. Olsson, sec.-treas.; preceding, with James A. Beau, Aug. Mott, Chas. McKinnis, Forest Clark and Henry Bilberg, directors. **Inc.** 1907 in Idaho. **Cap.**, \$1,250,000; shares \$1 par; issued \$950,000; assessment to date 1½ cts. per share. First meeting in 7 years held June, 1914.

Property: 3 claims, the Bullpen, San Quentin and Independent Fraction, in the Snowstorm copper belt, 3½ miles N. E. of Mullan in the Hunter mining district. Claims show quartzite cut by 4' fissure vein running N. 72° W., 80° S., the vein underground said to be 10' wide and to carry scattered bunches of 2% copper ore.

Development: includes 800' crosscut tunnel, with 300' or more of drifts at a depth of 300' below the outcrop. Development to date, 1,300' shows ore in various places, but not in commercial amount. Property inactive since 1908, but reopened 1913. **Equipment:** includes 100-h. p. electric motor, etc. Is a prospect.

INDIAN MOUND MINING CO.

WISCONSIN

Quincy, Ill. Mine office: Benton, Wis. L. N. Dana, supt. **Property:** the Monroe mine, near Benton, Lafayette Co., Wis., is a regular shipper of galena and sphalerite concentrates.

INDIAN QUEEN CONSOLIDATED MINING CO.

UTAH

Idle. Address: care Jesse Knight, pres., Provo, Utah. Mine near New-

house, Beaver Co., Utah. Inc. 1907 in Utah. **Cap.**, \$150,000; shares 10 cts. par.; fully issued. Shares are listed on the Salt Lake Stock Exchange.

Property: 25 claims, partly patented, near the King David mine, about 2 miles E. of Newhouse, taken over from the old Indian Queen and Leland companies. **Development:** by a shaft and a 4,700' tunnel planned to be driven 6,000'. **Equipment:** includes electric power, with a hoist and air compressor. Closed down July, 1910, and worked by lessees since then with small production of picked ore.

INDIAN QUEEN MINING & SMELTING CO. MONTANA

Idle. Office: 22 West Park St., Butte, Mont. Mine near Apex, Beaverhead Co., Mont. **Officers:** Thos. F. Stephens, pres., treas. and gen. mgr.; Wm. Robertson, v. p.; Thos. W. Ellis, sec.; A. H. Stephens and T. J. Ellis, directors. **Inc.** July, 1904, in Montana. **Cap.**, \$450,000; shares \$1.50 par; nonassessable; issued, \$228,000.

Lands: 2 claims, 40 acres, and a 3-acre mill site, in the Utopia district, known as the Indian Queen mine. Owned jointly by this company and the Anaconda Copper Mining Co. The property shows granite, quartzite and dolomite, having 2 contact deposits between granite and limestone, of 8 to 10' average width, carrying malachite, azurite and chalcocite, estimated by management to average 8% copper, 10 to 12 oz. silver and \$1 to \$4 gold per ton. Mine was opened 1867, and has been worked intermittently by lessees. **Development:** by shafts of 150' and 220', and 820' tunnel, with about 1,600' of workings.

INDIAN SPRINGS MINING CO. NEVADA

Address: 223 Mohawk Block, Spokane, Wash. Mine at Lida, Esmeralda Co., Nev. **Officers:** A. B. Railton, pres.; H. T. DeMerritt, v. p.; Fred N. Davis, sec.; Thos. R. L. Harris, treas.; Ross C. Craddock, supt., at last accounts. **Inc.** Feb., 1911, in Washington. **Cap.**, \$1,500,000; shares \$1 par; assessments, 3 mills to April, 1913. Company is a reorganization of the Indian Springs Copper Mining Co., with new directorate.

Company owns 8 claims, 100 acres mineral land in Lida valley, or Tule Canyon district, 30 miles S. W. of Goldfield, Nev. Ground shows veins and replacements in massive gray limestone. Vein runs E.-W., has vertical dip and is said to be 70' wide, traceable for 1,000'. **Development:** by 100' shaft and 200' tunnel. Has steam power.

INDIANA & LAST CHANCE GROUP. CALIFORNIA

Owned by Messrs. Roan and Putney. **Property:** 4 claims in Sec. 29, T. 33 N., R. 5 W., ½ mile N. of Copley, Shasta county, shows oxide ores at surface and heavy sulphides at depth. Only slightly developed by tunnels and drifts, and is an unimportant producer.

INDIANA MINING CO. MICHIGAN

Office: 60 Congress St., Boston, Mass. Mine office: Dee Bldg., Houghton, Mich. **Officers:** R. M. Edwards, pres. and gen. mgr.; Sidney J. Jennings, v. p.; Henry Tolman, treas.; preceding officers, Carlos W. Van Law and C. A. Hight, directors; Albert L. Wyman, sec.; Thomas Bennett, supt. **Inc.** Aug. 11, 1909, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; issued \$2,000,000; paid in \$11.50. State Street Trust Co., Boston, transfer office. Federal Trust Co., Boston, registrar. Annual meeting 3rd Thursday in April. Company gave 60,000 shares to owners of lands for its property and offered 36,000 shares, Aug., 1909, for public subscription. Receipts, 1915, were \$80,555, of which \$80,000 was assessments. Expenditures, 1915, totaled \$36,448, accounts showing balance of assets at end of year of \$14,574, as compared with a deficit of \$29,532 in 1914.

Property: 1,200 acres bought 1909 from the Indiana Copper Co., the tract lying N. E. of the Lake and N. of the North Lake, in Secs. 21, 27 and

28, T. 50 N., R. 37 W. The property was worked on a small scale previous to the burning of the mill, 1864, but the old openings are inaccessible and no work has been done thereon by the present company. The lands are heavily timbered and can supply all mining timber for a considerable time. Ample water is available from the Fire Steel river. Transportation is furnished by a spur of the Copper Range railway, and the Mineral Range line is within a short distance.

The lands are traversed by the Evergreen belt of copper-bearing amygdaloidal beds and by a number of unidentified cupriferous beds lying between the Evergreen belt and the eastern sandstone. The southeastern part of the tract is in the hypothetical horizon of the Lake amygdaloidal bed. The Indiana is covered with a heavy overburden of sand, hampering drilling operations. The ground has been tested by extensive diamond-drill borings.

No. 2 drill hole disclosed phenomenally rich copper rock from a bed immediately under a 400' conglomerate. The nature of this ore is a subject of dispute, it having been called sandstone, conglomerate and felsite, but there is little question that it is an altered felsite; the rock consists essentially of quartz and light colored mica, with secondary infiltrations of calcite and small irregular grains of disseminated native copper. The even size of the quartz grains, with their interlocking texture, indicates an igneous origin. There are indications that the 40' of rich felsite rock and a second zone of about 25' width, are parts of a single bed of approximately 265' width, the second zone of 25' being near the center of the wide bed. No. 5 hole and No. 9 hole both cut felsite carrying heavy copper, apparently a continuation of the same orebody.

Ground was broken, Jan., 1911, near No. 2, the discovery hole, for a vertical shaft, the overburden at this point being about 110'. The shaft is cylindrical, of 17' outside diameter, lined with steel and concrete, with inner dimensions of 8x12', and is 1,415' deep. Development work was confined to the 600' level, but no commercial rock was found. A total of 1,152' of cross-cutting was done at \$11.13 per ft., 1914. In 1915 search was started on this level to find No. 2 drill hole, but to date it has not been found. It was this hole that disclosed rich copper rock at 1,450'. Shaft has been unwatered and drifting is under way on the 1,150' and 1,400' levels, June, 1916.

Equipment: includes a steam hoist good for 2,500' depth, compressor and necessary mine buildings.

INGALLS LEASING CO.

COLORADO

Operates the Ingalls Mine on Quartz hill, Gilpin county, showing gold-silver-copper ore in veins. Developed to depth of 240' by shaft and cross-cuts. Shipments in 1915 to Globe smelter reported to have yielded from 1.23-5.20 oz. gold, 7-27 oz. silver and from 1-5% copper per ton.

INGUARAN; COMPAGNIE D'

MEXICO

Office: 56 Rue de Provence, Paris, France. Mine office: Inguarán, Ario, Michoacán, Mex. Ch. Laforgue, gen. mgr.; Maurice Armand de Lille, agt.; J. L. Philips, supt. **Inc.** Jan. 15, 1898, in France. **Cap.**, 12,000,000 francs, shares 500 francs par. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud; a considerable portion of the company's stock is owned by the Compagnie du Boleo. Property is said to have cost 1,500,000 pesos, and company reported to have expended about \$8,000,000 thereon, which is undoubtedly overestimated.

Property: 185 hectares, and a mineral zone of 5,000 additional hectares, in the Tacambaro district 70 miles north of the Balsas river, Michoacán, lying on the plateau of the volcano Jorullo, 1,500' above the plains. **Geology:**

the Inguarán mountain is traversed by a dike 2,000 to 3,000' wide, of fine-grained pink granite, or granodiorite sprinkled with grains of copper glance and copper pyrite. This dike is traceable several miles across country. The granite rock is sprinkled with specks of chalcocite and chalcopyrite forming a disseminated, or so-called porphyry deposit whose payable ores occur in belts or bands in the dike. Proven depth of the ore is about 300 meters, at which point it apparently cuts off.

Development: by a 2,500' tunnel and 2 main shafts, deepest 350', with levels opened at 80' intervals. Both ore and country rock are exceedingly firm, little timbering being required. Estimates of size and value of the orebodies vary greatly, but the best authorities estimate an average of 3.25% copper, with 2,000,000 to 3,000,000 metric tons of ore blocked out. The ore is not well adapted to wet concentration as the metallic sulphides are firmly interlocked with the granitic minerals, but it is admirably adapted to treatment by froth flotation of the Minerals Separation Co., and apparently could be put about 8 or 10 into 1.

The Inguarán was the particular bugaboo of the copper situation at the end of the nineteenth century, the exigencies of the trade demanding that there always be some mine, just about to begin production, that can make several hundred million pounds of copper yearly at a merely nominal cost. The Inguarán has a large body of low-grade ore, but it is not equal in quantity or quality to that of several of our other "porphyry" coppers.

The property has been idle some years and cannot become a serious producer until rail connections are secured; judging from the very leisurely progress of the past decade it will become a large producer about the time that Gabriel blows his horn.

INLAND COPPER CO.

ARIZONA

Idle. Letters to 1017 Commerce Bldg., Kansas City, Mo., and to the mine at Planet, Yuma Co., Ariz., unanswered. L. E. Corbin, pres.; A. W. Bork, v. p.; S. D. Dodson, sec.-treas. Inc. in Arizona. **Cap.**, \$5,000,000; shares \$1 par; nonassessable. **Property:** 40 claims, including 2 groups of about 15 claims each, in the Bill Williams range, near the Bill Williams Fork river, with a mill site, smelter site and water rights. The mine has 2 tunnels, and a 2-compartment shaft equipped with an 18-h. p. gasoline hoist. Company advertised for copper ores, presumably to show its stockholders, since it had no reduction plant of its own. Is not regarded favorably.

INSPIRATION CONSOLIDATED COPPER CO.

ARIZONA

Office: 42 Broadway, New York. Mine at Miami, Ariz. **Officers:** William B. Thompson, pres.; William D. Thornton, v. p.; Joseph W. Allen, sec.-treas.; Evan J. Dudley, asst. sec.; W. S. Harper, asst. treas.; Charles E. Mills, gen. mgr.; Wm. B. Thompson, Wm. D. Thornton, Jos. W. Allen, John F. Alvord, Thomas F. Cole, Edmund C. Converse, William E. Corey, Charles A. Corliss, Philip L. Foster, L. D. Ricketts, Eugene Meyer, Jr., William G. Rockefeller, John D. Ryan, Charles H. Sabin and Albert H. Wiggin, directors. D. A. Welch, purch. agt. Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agts. Bankers' Trust Co., New York, and National Shawmut Bank, Boston, registrars.

Inc. Dec. 18, 1911, in Maine. **Cap.**, \$30,000,000; shares \$20 par; issued and outstanding Dec. 31, 1915, 920,975 shares. **Bonds:** \$6,000,000, 10-year, convertible 6%, due March 1, 1922, convertible into stock at \$25 per share, of which there was outstanding June 1, 1916, \$304,000; \$4,500,000 5-year convertible debenture 6%, due July 1, 1919, convertible into stock at \$25 per share, of which there was outstanding June 1, 1916, \$21,300; these were called for payment, July 1.

Comparative General Balance Sheet: year ending Dec. 31:

Assets—					
	Prop. & Equip.	Supplies	Copper on Hand	Other Current	Total
1915:...	\$25,293,529	\$622,276	\$1,115,960	\$ 411,281	\$27,443,046
1914....	22,166,764	439,880	.....	2,641,219	25,247,863
Liabilities—					
	Capital Stock	Bonds	Current	Surplus	Total
1915.....	\$18,419,500	\$ 6,544,500	\$1,878,983	\$600,062	\$27,443,046
1914.....	14,459,160	10,500,000	288,703	.....	25,247,863

Profit and loss account for 6 months ending Dec. 31, 1915, shows: sales of copper, \$1,138,878; total expenses, \$1,640,214; copper in process and on hand, \$1,101,399; balance forward, profit, \$600,062. Estimated operating profits for first half of 1916, \$8,750,000. **Dividends:** an initial quarterly dividend of \$1.25 per share was paid May 1, 1916, followed by a \$2 dividend, payable July 31.

Company took over properties owned by the Inspiration Copper Co. and the Live Oak Development Co., paying for same in stock. In May, 1912, the mill and camp site of the Black Warrior copper mine was purchased from the Warrior Copper Co. for \$175,000. Early in 1914 the property of the New Keystone Copper Co., lying between the Inspiration and Live Oak groups, 219 acres, was purchased for \$795,940, payable in 39,797 shares of stock at \$20 per share, 9 shares of New Keystone for 1 share Inspiration.

The consolidated property holdings of the company are as follows: mining lands, 1,881 acres; mill site and tailing lands, 615 acres; ranches, water lands, etc., 1,032 acres; total, 3,528 acres, located 8 to 10 miles W. of Globe, Ariz.

Geology: property carries about 1½ miles of the strike of a mineralized belt by Pinal schist, much crushed, altered and silicified by contact action, due to the intrusion of the great mass of granite forming the hills to the S. W., the shattering having allowed the free circulation of secondarily enriching solutions. The oxidized zone shows carbonates, occasionally of commercial tenor, as in the Clipper tunnel, but ore occurs mainly in secondary form as disseminated chalcocite, forming an enriched zone of commercial ore of 50 to 575' in thickness, estimated by the management to average 180', with an average of 90 to 100' of overburden, underlain by a primary zone of cupriferous pyrite below commercial tenor. About 40% of the values occur in small fissures and veinlets and along the jointing planes and planes of schistosity, copper being mainly in the form of flakes and grains of chalcocite, the balance of about 60% of ore values being disseminated through the gangue of friable Pinal schist, with some quartz. The mineralization also extends into the granite-porphry contact, about 10 to 15% of the ore developed in the Colorado orebody being in granite. The cupriferous schist is faulted, just east of the Woodson orebody, by the Bulldog fault zone, of about 300' width.

The Live Oak group of 14 claims, 200 acres, is about 1½ miles W. of Miami, at the western end of the Miami ore belt and separated from the Inspiration group by the New Keystone group. The geological conditions are similar to those of the Miami belt generally, save that much of the surface is covered by leached white granite, showing brilliant, green-stained outcrops of far more attractive appearance than any other part of the belt. This granite is underlain by schists carrying the ore, but part of the orebody is in granite.

The mine was originally opened on a flat dipping vein, 5 to 12' thick, carrying high-grade chrysocolla ore, from which shipments running 17 and

18% were made for several years. Much of this material is quartzose and valuable as a gemstone. The vein ended at water level in a mass of low-grade chalcocite ore similar to that of the Miami mine. Orebody was developed by tunnel work and drilling by the Live Oak Development Co. by over 50 drill holes with 20,000' of drilling and 5,000' of underground work. This work blocked out a body of disseminated ore 1,400' long, 75 to 200' deep beneath a capping of oxidized material averaging 435' thick. The orebody as developed averaged 114' thick and contained 15,000,000 tons of 2.11% copper ore.

The New Keystone Group has about 60 acres underlain by Pinal schist, covered in part by a sheet of granite porphyry, 25' to 200' thick. A strong fissure vein crossing the property was mined by the old Keystone Copper Co., the vein being 12' thick with a paystreak averaging 15", from which shipments of 19 to 22% copper and 2 to 5 oz. silver per ton were made for some years. Mine yielded, according to report, about \$1,000,000. The New Keystone Copper Co. explored and opened up a deposit of disseminated glance ore similar to that of the Miami mine.

Development: by the new company consisted in blocking out this orebody by underground workings and churn drilling. The Keystone shaft is 330' deep and at the time the company was absorbed by the Inspiration Cons. Copper Co., had a total of 14,886' of workings. Churn drilling along 200' squares was discontinued June, 1912, after company had put down a number of holes with an aggregate of 21,947' of work. Development blocked out 2,516,000 tons of ore, which sampling showed to have an average of 2.25% copper.

Development under the present company has been of a dual nature, including both extensive underground openings, and churn-drill borings along the same general system as followed in the development of the Ray and Chino mines. Underground work in 1915 amounted to 109,546'; total workings, Dec. 31, 1915, approximately 64 miles, in addition to 29½ miles churn drilling.

The Inspiration orebody will be worked by 2 main tramming levels at 326' and 450' in depth, respectively. The Live Oak orebody will be accessible through the Live Oak shafts, but all ore will be hauled through the main haulage tunnel, 6,600' long, connecting with the bottom level of the Inspiration shafts.

Ore is mined by the so-called Ohio system, locally termed the "Finger Raise" system, undercutting and caving in blocks of about 70' vertical dimension; the broken and caved ore is drawn off through a system of inclined raises delivering to the haulage-ways below; these raises have a sufficient number of branches immediately below the caved area to reduce the interval between the heads of the raises that tap the caved ore to a minimum of about 8'. The ore is carried in trains of 5-ton cars by air locomotives to the working shafts, where it is delivered to one set of double concrete bins underground holding 3,700 tons and hoisted to surface through 2 shafts, delivering to a bin of 2,000 tons capacity located between the shafts. Skip loading and hoisting is automatically controlled. Ore extraction will be entirely confined to these 2 cement and steel-lined shafts, 585' deep and 107' apart, in Webster gulch, on the north side of the mountain, while men and supplies will be lowered and water pumped at the Incline, or Supply shaft on the opposite, or Miami side of the mountain. The 2 shafts will be operated from the same hoist house, but will be entirely independent units, capable of handling 1,000 tons per hour. The total lift is 630'. The ore will be hoisted in skips, passed through crushers and put in 25,000-ton storage bins. From these bins it will be carried over the company's 1.6-mile

railroad, with 3% grade, to the new mill at the old Black Warrior town-site. Mining costs are estimated at 85 cts. a ton.

Ore reserves: Jan. 1, 1916, consisted of 97,143,000 tons of 1.63% copper ore made up of the following: (a) sulphide ore, 46,252,000 tons, 2.01% copper; (b) low sulphide material, 28,698,000 tons, 1.26% copper; (c) oxidized material, 17,460,300 tons, 1.31% copper; (d) mixed carbonate and sulphide material, 4,732,700 tons, 1.31% copper.

The new mill, designed by H. K. Burch, consists of 18 sections, each one with rated capacity of 800 tons per day, making a total of 14,400 tons per day, exclusive of the 600-ton experimental mill, which is in a separate building; 2 more sections, already provided for in the mill, are being added. This will increase the mill capacity to 16,000 tons per day and provide sufficient milling capacity to maintain full copper production in case it is decided to drop the grade, thus assuring a minimum output of 10,000,000 lbs. copper per month from a greater tonnage of ore, but without increasing the cost per lb. of copper.

The scheme of treatment, stated in general terms, is as follows: at the mine—crushing ore to 4", maximum size in gyratory crushers, crushing this ore to 1½" maximum size by Symons disc crushers. At the mill—crushing product from the Symons disc crushers in Marcy ball mills to pass 48-mesh screen, treatment of this product in flotation machines with separation of flotation tailing into sand and slime. Sand is treated on concentration tables and the slime retreated in flotation machines. Concentrates are dewatered in the filter plant.

While plans were for a 7,500-ton mill to cover 8 acres, adoption of the flotation process has permitted doubling originally planned capacity within space of 3 acres. As a result of this compactness, elimination of elaborate classification, and some stage crushing, the costs of the combined oil flotation and water concentration will not exceed 35c per ton. Mill is equipped with Mineral Separation and Callow flotation machines, also one designed by Dr. Gahl, who is in charge of the mill. Coal tar is the chief component in the frothing mixture. The first unit of the mill went into operation June 29, 1915, the 18th in Feb., 1916. The first ore was caved underground and actual mining started July 25, 1915.

From the time the ore is dumped from the chutes into the mine cars no manual labor is required, all operations being entirely mechanical.

The company owns its own railroad of 4½ miles standard-gauge track, connecting the mine with the mill and the mill with the smelter of the International Smelting Co.'s Miami plant, where concentrates are smelted.

The mine and mill are connected with both the U. S. Reclamation hydroelectric plant at Roosevelt and with the company's own steam plant, consisting of three 6,000-k. w. turbo generator units.

Production: for last six months of 1915—

1915	Tons Milled	Cu. %	Rec. (%)	Ratio Conc.	% Cu. In Conc.	Cost per Ton				Net Prod. Lbs. Cu.	Cost per lb. Cta.
						Mng	Conc.	Mktg. & Roy. etc.	Total		
	778,851	1.702	79.95	24.6:1	32.67	\$0.631	\$0.487	\$0.764	\$1.988	20,067,310	8,136

(a) Recovery on sulphide ore, 88.56%. Yield in refined copper was 26.4 lbs. per ton of ore.

(b) Includes a charge of 20c calculated to cover average amount of development work per ton ore.

(c) Includes coarse crushing, 2.9c; ore hauling, 2.0c, and concentrate hauling, 0.2c.

(d) Gross production, 20,445,670 lbs.; for first 5 months 1916, 43,348,925 lbs.

Ore that averaged 1.702% copper had .226% in oxide combination; apparently about 24% of this was saved. In all probability a 4,000-ton plant will be required to treat the oxide ores in the same proportion to the developed tonnage as the sulphides.

The monthly output in 1916 has increased rapidly from 5,500,000 lbs.

copper in Jan. to 10,400,000 lbs. in May, practically maximum capacity, and the rate originally planned, 120,000,000 lbs. per year. This production will, when sustained, be surpassed in this country only by Anaconda, Utah and Kennecott. The first dividend followed within six weeks after the completion of the mill. Inspiration's record is an enviable one and both property and management are regarded as exceptionally good.

INSPIRATION EXTENSION COPPER CO.

ARIZONA

Officers: William Evans, pres., 433 Broome St., New York. Anton Trojanovich, gen. mgr., Miami, Ariz.; John Kasser, v. p.; Fred Augustin, sec.-treas.; preceding officers and Geo. Kingdon, directors; J. A. Thomas, mine supt. and engr. Inc. Feb. 11, 1913, in Delaware. **Cap.**, \$1,000,000, increased to \$1,500,000 in 1915; shares \$5 par; \$80,000 issued. Annual meeting, Feb. 11. Company's holdings are under bond and lease to the Castle Dome Dev. Co., 7 Wall St., New York.

Property: 9 claims, 145 acres, patented, in the Miami district, surrounded by claims of the Inspiration Consolidated Copper Co., and underlain by schist, locally altered, that is said to show a large deposit of low-grade copper ore that will average 3%. Also 29 locations, about 500 acres, on Porphyry Mountain in the Globe mining district, on which the Castle Dome Dev. Co. is driving a tunnel, looking for low grade "porphyry" ore.

Development: by a shaft that has passed through schist into granite.

Equipment: includes a 35-h. p. gasoline hoist good for 500', with various buildings.

INSPIRATION NEEDLES COPPER CO.

ARIZONA

Offices: 116 Nassau St., New York, and Globe, Ariz. **Officers:** D. R. Williamson, pres.; Frank Beston, v. p.; F. W. Hamm, asst. sec.; A. D. Williamson, treas.; with Geo. J. Stoneman, directors; John S. Cook, sec. Inc. Jan. 4, 1912, in Ariz. **Cap.**, \$2,000,000; outstanding, \$1,300,000; shares \$1 par. Security Transfer & Registrar Co., New York, transfer agent and registrar. Listed on New York Curb. Annual meeting first Monday in February. Statement of June 29 gives: property, \$1,275,000; mining expense, \$5,000; cash, \$20,000.

Property: 500 acres, 3 miles from Miami, Ariz., adjoins Southwestern Miami on the W., lies 1 to 2 miles S. W. of Inspiration Cons. property. Surface shows Gila conglomerate, Pinal schist and Schultze granite formation. **Development:** the result of assessment work, consists of a number of shafts, none over 100' in depth, and tunnels, none over 200' in length.

August, 1916, two churn-drills operating at holes No. 1, 395' deep, and No. 2, 300' deep, had cut oxidized ore carrying 1% to 2.6% copper, proving that the ground is on the ore zone of the district.

Churn drilling began June 18, 1916. Expect to have 7 drills in operation. Examined by J. H. Dockweiler (Crocker Bldg., San Francisco, Calif.) in June, 1916.

INTERCOLONIAL COPPER CO.

NEW BRUNSWICK

Idle. Office: 32 Tyler Bldg., Pawtucket, R. I. Mine office: Dorchester, Westmoreland Co., N. B. Darius L. Goff, pres.; T. J. Edwards, sec. Inc. 1899 in Arizona. **Cap.** decreased, 1906, to \$2,000,000, shares \$5 par, in preferred and common shares, latter with restricted voting privileges.

Property: 250 acres freehold and 1,100 acres held by leasehold from the Crown, show a blanket vein carrying carbonate and sulphide ores, claimed to average 3 to 4% copper. Has shafts of 40', 75' and 150', also a 1,500' drainage tunnel, with about 8,000' of underground workings.

Works include a 200-ton concentrator, leaching plant and electrolytic refinery. The electrolytic plant has 550 lead cathodes and 550 lead anodes, 22x33" each, giving a plating surface of 5,000 sq. ft., for the deposition of

electrolytic copper. Plant also includes tanks for precipitation of metal on scrap iron. Reduction plant proved unsatisfactory after making about 50 tons fine copper. Letters neither answered nor returned. Unfavorably regarded.

INTERMOUNTAIN COPPER MINING CO.

MONTANA

Wallace, Ida. Mine office: Iron Mountain, Mont. **Officers:** Oscar Nordquist, pres.-mgr.; Edw. Evans, v. p.; H. M. Childs, treas.; with E. V. Lambert and G. W. Griffith, directors.; A. L. Nicholson, sec. **Inc. 1915** in Mont. to take over the holdings of the Amador Copper and Gold M. & M. Co. **Cap.**, \$2,000,000; shares \$1 par; assessable; 1,500,000 outstanding.

Property: 6 patented and 15 unpatented claims on Cedar Creek, 10 miles S. of Iron Mountain, Mont., shows a small shoot of fair grade copper-gold ore with calcite gangue, in black slate. Ore occurs irregularly and in small bunches.

Development: 700' vertical, 3-compartment shaft, with levels at 200', 460' and 700' and long drifts on each level. There are also 4 tunnels of 187', 512', 632' and 662'.

Equipment: includes a 2-mile flume and pipe line, delivering water under a 310' head, and steam power, with 2 hoists, compressor, pumps, saw-mill, and about 15 mine buildings. A 100-ton concentrator was constructed in 1915. Equipment is ahead of company's needs and property is not yet far enough developed to be a self-sustaining mine. Idle in 1915 but resumption of operations planned for 1916.

INTERNATIONAL COPPER & GOLD CO.

Letters returned, 1915, marked "Out of business," from 1207 Fort Dearborn Bldg., Chicago, Ill. See Vol. XI, Copper Handbook.

INTERNATIONAL COPPER & MINING CO.

ARIZONA

Office: 57 W. 109th St., Chicago, Ill. **Mine office:** Mayer, Ariz. **Officers:** Roy A. Hillstrom, pres.-treas.; John Slak, v. p., sec. and mgr. **Inc. Feb. 1, 1916**, in Ariz. **Cap.**, \$1,500,000; shares \$1 par. Annual meeting Feb. 15th.

Property: 12 patented claims, 200 acres, in Black Canyon mining district, Yavapai county, shows fissure veins in lime-porphyr-schist formation. The main orebody has N. S. strike and dips 10° from vertical. Average assays reported to run 6% copper, \$5 gold, \$3 silver per ton. **Development:** by incline shaft and 3 short tunnels.

Equipment: includes 25-h. p. gasoline hoist and 10x10' Ingersoll compressor. Management plans sinking to 500' depth and crosscutting every 100'.

INTERNATIONAL COPPER ORE CORPORATION.

MEXICO

Office: 424 Scarritt Bldg., Kansas City, Mo. A. M. Conard, pres., Nogales, Ariz., at last accounts; his record is enough to discourage any ordinary investor. **Mine office:** Noria, Sonora, Mex. Is the Mexican operating corporation of the Sonora Copper Smelting Co.

INTERNATIONAL GOLD & COPPER MINING CO.

MEXICO

Idle. **Mine office:** Guaynopa, Chihuahua, Mex. J. C. Peterson, pres. Company took over lands formerly held by International Cons. Smelting & Mining Co., known as the Utah mine, in Guaynopa canyon. Claimed by former owners to have a 90' vein, with an 8 to 12" pay streak carrying high-grade chalcopryrite, assaying 5 to 8% copper, with good silver values. Mine has several short tunnels. Idle on account of revolution, but regarded unfavorably for other reasons. No recent returns secured.

INTERNATIONAL LEAD REFINING CO.

INDIANA

East Chicago, Ind. Is a subsidiary of the International Smelting Co., and described thereunder.

INTERNATIONAL & INTERCONTINENTAL**MNG. & REF. CO.****UTAH AND NEVADA**

Office: 60 Wall St., New York City. **Officers:** Raoul Madero, pres.; Wm. W. Wilson, v. p.; D. T. Gately, sec.-treas.; with C. C. Graham, A. W. Middleton, Antonio G. Garializo and Wm. H. Hull, directors; Edward M. Bement, treas.

Inc. Feb. 26, 1916. in Del. **Cap.,** \$3,000,000; shares \$5 par; outstanding, 537,500 shares; 62,500 reserved for conversion of bonds. Stocks transferred at company's office. Metropolitan Trust Co., New York, registrar. Listed on New York Curb.

Bonds: \$125,000 ten-year, 8% convertible debenture coupon, dated March 1, 1916, due March 1, 1926. Int. payable quarterly, March, June, Sept. and Dec. 1. Company is a holding company, the Uvada Copper Co. being the operating company.

Balance sheet of March 24, 1916, shows assets of \$3,124,671, which includes: accounts receivable, due from Cons. Calif.-Nev. Co. stockholders and claims against Cons. Calif.-Nev. Co., \$29,082; contract rights, \$1,617,835 (under contract International is entitled to receive 304,757 shares out of 600,000 shares outstanding of the Uvada Copper Co. stock); investment in capital stock of the Cons. Calif.-Nev. Co., \$1,476,215; cash, \$723; organization expense, \$816. Liabilities include: contract liability, \$84,545; notes payable, \$6,560; debenture bond cfts., issued and reserved, \$33,566.

Reported in March, 1916, that "Negotiations are now pending with Francesco Madero for the purchase by this corporation of certain mining properties belonging to the former in Mexico."

INTERNATIONAL METALS SELLING CO.**UNITED STATES**

Is a subsidiary of the U. S. Smelting, Refining & Mining Co. and managed by Vogelstein & Co., 42 Broadway, New York.

INTERNATIONAL MINES DEVELOPMENT CO.**MEXICO**

Main office: 523 Los Angeles Investment Bldg., Los Angeles, Calif. **Eastern office:** Room 1506, 20 Broad St., New York. **Officers:** Max Muller, pres.; P. Schabarum, v. p.; Frank Turner, sec.-treas.; above, with August Freese, Geo. Grunig, H. J. Wendler, Jas. M. Satterfield, directors. **Cap.,** \$3,000,000; shares \$1 par; \$2,000,000 issued. U. S. Corporation Co., New York, registrar and transfer agent. Stock listed on New York Curb.

Property: the Santa Rita, Santa Gertrudis, Santa Ana and El Carmen mines, in Sonora, Mexico, about 200 miles from Bisbee, Ariz. Company also reported to have a 5-year option on the Ash Peak mine near Clifton, Arizona. The Mexican properties have been small silver-gold producers in the past, but have not been developed and owing to revolutionary conditions will probably remain undeveloped for some time to come. A George Graham Rice promotion.

INTERNATIONAL MINING CO.**ARIZONA**

Owns a group of claims about 2 miles from Ray, Pinal county, showing a 15" streak of chalcopryite, claimed to run \$78 per ton in copper and silver.

INTERNATIONAL MINING CO.**MONTANA**

Bozeman, Gallatin Co., Mont. **Officers:** J. W. Wilcox, pres.; S. J. V. B. Henderson, v. p. and treas.; Samuel F. Walker, sec. and gen. mgr.; preceding officers, Harvey M. Farriss and A. Badgley, directors, all of Bozeman, Mont. **Inc. Oct. 2, 1902,** in Montana. **Cap.,** \$600,000; shares \$100 par, fully paid and nonassessable.

Property: 12 claims, 240 acres, well timbered, in Springhill mining district, Gallatin county, Mont., said to show gneiss, quartzite and shale.

fissure and contact veins, opened by 380 to 1,800' tunnels and 5 shafts of 80 to 800', showing sulphide ores.

Company developing an ore shoot, at last accounts, said to carry 26% lead, 8 oz. silver and \$8 to \$67 gold per ton. The Lone Star group adjoining the International is practically under the same ownership. Letters neither answered nor returned, so it is safe to say company's affairs are not prosperous.

INTERNATIONAL NICKEL CO. UNITED STATES & CANADA

General office: Constable Hook, Bayonne, N. J. **Executive office:** 43 Exchange Place, New York. **Officers:** Ambrose Monell, pres.; R. M. Thompson, chairman of board; E. F. Wood, 1st v. p.; J. R. De Lamar, 2nd v. p.; J. L. Ashley, sec.-treas.; W. N. Cromwell, A. Jaretzki, D. Coulson, W. E. Corey, S. H. P. Pell, E. C. Converse, Wm. T. Graham, W. A. Bostwick, W. H. Brownson and S. Prosser, directors.

Inc. Sept., 1912, succeeding International Nickel Co. and Colonial Nickel Co., the former absorbing the Canadian Copper Co., which owns the great nickel-copper mines and smelters of Sudbury, Canada.

Cap., \$8,912,600, 6% non-cumulative preferred stock, \$100 par, and \$41,834,600 common stock, \$25 par.

Stock is listed on the New York Stock Exchange. Bankers Trust Co., New York, transfer agent. New York Trust Co., New York, registrar.

Comparative Statements of Income Account and Balance Sheets years ending March 31:

	Total Income	General Expenses	Taxes	Depreciation	Mineral Ex- haustion	Bond S. F.	Interest on Bonds
1916	\$14,340,968	\$870,860 (a)	.....	\$1,721,828 (b)	.....	.....	.....
1915	7,280,760	449,819	\$68,055	730,000	\$885,815	.....	.....
1914	6,568,787	376,665	81,147	641,915	687,395	.....	.....
1913	6,929,107	477,862	64,445	558,449	498,472	\$89,458	\$225,115
1912	5,088,966	217,778	4,775	497,520	139,782	201,500	445,650

(a) Includes taxes; (b) includes mineral exhaustion.

Year	Balance for Dividends	Preferred Dividends	Common Dividends	Balance To P. & L.
1916	\$11,748,279	\$584,756 (6)	\$9,431,808	\$1,781,720
1915	5,598,071	534,756 (6)	4,758,987 (12½)	809,778
1914	4,792,665	534,756 (6)	3,808,150 (10)	454,759
1913	5,020,305	534,755 (6)	3,491,049 (18½)	994,501
1912	8,581,960	584,729 (6)	2,148,412 (13)	903,709

ASSETS.

	Dec. 31, 1915	Mar. 31, 1915	Mar. 31, 1914	Mar. 31, 1913
Properties	\$44,016,061	\$44,016,061	\$44,552,025	\$44,085,044
Advances to subd. } Mncpl Bonds & Sund. Sec }	1,119,645	3,157	1,668	3,999
Inventories at cost	3,397,739	3,100,681	4,289,021	3,364,969
Accts. rec.	.....	1,416,092	1,615,405	1,485,949
Bills rec.	.....	11,071	10,050	.....
Interest rec.	2,025,950	89,270	18,022	28,273
Sundry advances.	.....	58,529	34,272	9,355
Call Loans (secured)	1,015,000	1,000,000	.....	.....
Chgs. of Dep.	2,030,000	950,000	.....	.....
Cash	4,457,398	4,542,538	3,243,672	4,442,663
Deferred Charges	.....	.....	89,234	255,033
Total	\$57,758,671	\$55,195,300	\$53,941,207	\$54,140,707

LIABILITIES.

Pfd. Stock (6% Non-Cum.)	\$ 8,912,600	\$ 8,912,600	\$ 8,912,600	\$ 8,912,600
Common Stock	41,234,600	38,031,500	38,031,500	38,031,500
Accts. Pay., Pay Rolls	.....	637,219	642,984	753,299
Taxes Accrued	1,046,082	89,582	92,767	102,652
Dividends unclaimed	.....	7,989	5,662	5,069
Pfd. Divds.	133,689	133,689	133,689	133,689
Com. Divds. Payable June 1	.....	1,901,575	950,787	1,140,945
Acc. and Ins. Funds	187,087	105,501	164,979	189,603
Surplus	5,644,083	5,315,625	5,000,247	4,921,409
Total	\$57,758,671	\$55,195,300	\$53,941,207	\$54,140,707

The net quick assets, or excess of current assets over current liabilities, amounted to \$11,745,766 on December 31, 1915, as compared with \$8,347,827 on March 31, 1915, \$7,384,563 on March 31, 1914, and \$7,195,608 on March 31, 1913.

Dividends-Earnings: regular dividends of 6% have been paid upon preferred stock since 1906, and varying rates have been paid on common since 1909. Stockholders received 10½% in 1913, 10% in 1914, 10% stock and 17½% cash in 1915; in 1916, 8%, paid June 1. Present rate is 20% per annum, payable quarterly, M. J. S. and D. 1. Since the expansion in 1912, the International Nickel Co.'s earnings have averaged about 12% yearly for its common shares. Actual percentages are 11.79% for year ending March 31, 1913; 11.2% in 1914, 13.32% in 1915. Allowing for 6% preferred dividends, this would be equivalent to about 27% on stock outstanding. The large increase in earnings does not seem to be entirely due to war conditions.

The copper-nickel properties consist of mines with an estimated developed reserve of 20,000,000 tons, smelting plants at Copper Cliff, Canada, handling 3,500 tons daily, separating and refining plants at Constable Hook and Camden, N. J. Company also absorbed the Orford Co., Anglo-American Iron Co., Vermillion Mining Co., American Nickel Works, Nickel Corporation of Great Britain, and the Société Minière Calédonienne.

Production: company is said to control the world's production of nickel, which is 60,000,000 to 70,000,000 lbs. per year, selling usually at 40 to 50 cts. per lb. It also produces about 35,000,000 lbs. copper annually, and 1915-16 profits from this source are larger than normal though the price of nickel has remained practically stationary. War requirements for nickel have been less of a factor than generally supposed, the big expansion having taken place in developing new uses for the metal. Company has adopted policy of increasing earnings through development of new uses for the product. When the war is over International Nickel ought to retain most, if not all of its present large earning power. Is planning erection of another refining plant in Canada.

Company's mines are described under Canadian Copper Co.

INTERNATIONAL SMELTING CO.

Office: 42 Broadway, New York. **Officers:** Cornelius F. Kelly, pres.; Wm. D. Thornton, 1st v. p.; Dennis Sheedy, 2nd v. p.; Albert H. Melin, treas.; with Chas. H. Sabin, Benj. B. Thayer, and John D. Ryan, directors. David B. Hennessy, sec. J. B. Whitehill, ore purchasing agent. Inc. in Montana. **Cap.,** \$15,000,000. Stock entirely owned by Anaconda Copper Mining Co. Company is a reorganization of the International Sm. & Ref. Co.

Company operates smelters at Tooele, Utah and Miami, Ariz., the Raritarn Copper Works at Perth Amboy, N. J., and the smelter of the International Lead Refining Co., at East Chicago, Ind.

MIAMI SMELTER

The Miami smelting plant, Miami, Ariz., C. E. Mills, gen. mgr.; L. R. Wallace, supt, built primarily to smelt the concentrates produced by the mills of the Inspiration Cons. Copper Co. and the Miami Copper Co., is equipped to handle custom ores. The plant is situated about a mile E. of Miami and 6 miles W. of Globe, on the Inspiration Co.'s Industrial Ry., connecting with the Arizona Eastern R. R. at Miami.

The smelter is essentially a reverberatory plant, which on account of the high copper content of the concentrates treated has been built to minimize losses in the handling of material from one department to another, and the prevention of dust losses, as far as possible.

Material from both Miami and Inspiration mills is largely flotation concentrate hauled to the smelting plant in 60-ton steel cars especially designed to handle sticky fine material of this nature.

Bins: concentrates are first bedded in three 3,000-ton V-bottom bins with the necessary limerock, pyrite, first-class ore and secondaries to give a proper smelting mixture. First-class ore goes to receiving bins with capacity of 1,350 tons.

Crushing and Sampling Plant: 22'x40', 5-stories high, contains: 1 18"x30" Blake crusher; 1 set 54"x16" rolls; 3 sets 42"x16" rolls; 1 16" Snyder sampler; 3 27" Snyder samplers; 2 24"x8" rolls.

Steel storage bins of 1,500 tons capacity are provided for the storage of crushed ore and fluxing material.

Roaster and Dryer Plant: 67'x97 and 93' high, contains 5 Wedge roasting furnaces, 22'6" in diam., each having 5 regular hearths and a dryer hearth. Oil burners operating in combustion chambers supply the heat for drying. No roasting is permitted, as the sulphur content of the concentrates is so low that it is necessary to add pyrite to keep matte down to a proper grade.

Each furnace is fed from a 190-ton storage bin directly over it. The gases pass directly to a header flue, and then into Cottrell treaters located above the charge floor. The Cottrell treaters in this plant practically prevent the loss of any flue dust.

Reverberatory Plant: the reverberatory building, 134'x176', contains 3 reverberatory furnaces with hearth areas of 21'x120'. The furnaces are oil fired and discharge their gases through Stirling boilers, according to the usual practice. There are seven 712-h. p. waste heat Stirling boilers.

Converter Plant: is 58'x380'x49' to the top of crane rail. Two 40-ton, maget switch controlled electric traveling cranes are provided.

The plant contains 5 converter stands of 12' electrically operated Great Falls type converters; 2 straight line casting machines with 56"x16'6" tilting furnaces, 1 skullbreaker, etc. Silica bins filled by belt conveyors discharge into weighing hoppers, which measure out a pre-determined charge, delivering it directly into the mouth of the converter through pivoted spout.

The gases from the converters are passed through Cottrell treaters, before being discharged into the chimney, which give a high recovery of the precious metal values contained in the gases.

Power Plant: at the smelting works is operated by the Inspiration Co., the smelting plant selling its steam to, and purchasing its power from the Inspiration company. The power plant buildings are of steel and reinforced concrete construction throughout. The main units consist of three 6,000-k. w. Turbo-Generators and 3 cross compound, 15,000 cu. ft. blowing engines, switchboard, etc. Modern auxiliary apparatus is provided for condensing, automatically measuring steam and feed water, recording temperatures, pressures, etc. The boiler house contains six 712-h. p. oil fired Stirling boilers equipped with superheater and economizer.

The plant operates at very high economy.

Shops, Offices, Etc.: a steel shop building, equipped with traveling crane, is divided into four departments, viz., machine, blacksmith, boiler, electrical and carpenter shops, all well equipped with modern tools.

The warehouse building and general office and laboratory buildings are of reinforced concrete throughout and there are 8 reinforced concrete cottages at the smelting plant for its staff. Water for the plant is obtained from the Inspiration Co.'s water main.

On account of the high copper contents of the concentrates which the plant receives, it has a production capacity of 16,000,000 lbs. of copper per month, with spare reverberatory furnace and converter stand.

The plant commenced operations May 21, 1915; in remainder of year treated 70,304 tons concentrates and 17,104 tons purchased ores. **Production:** 51,769,669 lbs. fine copper; 70,000 oz. silver, and 822 oz. gold.

TOOELE SMELTER

Tooele Smelter: Wm. Wraith, gen. mgr., Kearns Blk., Salt Lake City, Utah. The smelter is $6\frac{1}{2}$ miles from Tooele Junction on the main line of the San Pedro, Los Angeles & Salt Lake railroad, where connection is made with the Tooele Valley railroad, and plants and yards cover one-half square mile.

Crushing and sampling 5-story building, 2 complete sections using the Brunton **system** of sampling, contains 8 Blake type crushers, 9 to 12"x15 to 24" in size and 8 rolls, 12 to 15" wide and 26", 42" and 48" diameter. Each sampling section contains 4 Brunton sample cutters. In the copper plant ore is crushed to $\frac{3}{8}$ ", conveyed from sample mill to roaster storage bins (5,000 tons capacity) by belt conveyor, thence to roaster feed hoppers by belt conveyor.

Copper Department: The McDougall roaster building contains 2 sections, each 64x162' and holding 32 furnaces. These furnaces are 16' in diameter, 18' high and have 6 hearths. Roaster gases pass through a 120x140' hopper bottomed brick dust chamber 30' high above hoppers, containing two 4' banks of wires; thence through brick flue 255' long to stack. The brick stack is 350' high and 25' inside diameter at the top. The reverberatory plant receives the calcine by electric tram system. It contains 5 coal-fired furnaces. Anaconda type, 1 with 19'x90' hearth, 4 with 19'x102' hearths. Each furnace is equipped with 750-h. p. waste-heat Stirling boiler. Gases go through a brick flue 1,360' long to stack.

The converter plant has 5 electric-driven stands for 96x150" shells and a 60-ton crane. Converter shells are lined with magnesite brick. Copper is cast in steel moulds by 30-ton crane. Slag is cast in beds and broken up and sent to the lead blast furnaces. Gases from plant go through a steel flue to a 50x126' brick bag house containing 960 31x1'6" woolen bags. From the bag house the gas is discharged through a 150' stack 15' in diameter at the top.

The power house contains 2 Corliss engines direct-connected to 250-k. w. 500-vdc. generators; 2 vertical triple-expansion engines direct-connected to 750-kva. 2,200-v. generators; 2 converter blowing engines, 15 lbs. air; 1 steam-driven 90-lb. air compressor; 1 electric-driven 90-lb. air compressor; 2 No. 10 Roots blowers, direct-connected to tandem compound Corliss engines; one 750-k. w. Westinghouse-Parsons turbo-generator; and 2 Leblanc condensers and necessary auxiliaries. Condensing water is cooled in natural draft cooling tower. In addition to the waste-heat boilers, there are 3 hand-fired 350-h. p. Stirling boilers.

Lead Department: The lead plant contains blast furnaces, sinter plant and charge bins. There are 26 double steel bins with a capacity of 10,000 tons of ore and concentrate, receiving material from the crushing plant by belt conveyor. Fine concentrates and ores already sampled can be dumped direct. Charges for blast furnaces and sinter machines are weighed in scale hoppers and dropped into charge cars, going direct to furnaces, but sinter charges go by car to a hopper-feeding belt conveyor delivering to sintering machines.

The sinter plant contains 10 Dwight-Lloyd machines, 42x264" 

capacity 100 tons per day per machine. Sinter from machines goes to blast-furnace charge bins by standard railway cars.

The blast-furnace plant is a steel and concrete building with two 45x180" and two 60x180" furnaces whose daily capacity averages 250 tons of charge. Gases pass to brick bag house containing 1,440 bags, lead to drossing plant and the lead-copper matte to the converter plant. A slag settling furnace is being erected. The drossing plant has four 30-ton kettles and uses a Howard press.

Tooele Valley railway has 7 miles of main line; 1 locomotive, 6-wheel switching type, 57 tons weight; 1 locomotive Mogul type, 60½ tons weight; 2 locomotives, Consolidation type, 96 tons; 30 steel hopper-bottom ore cars; 3 flat cars and 4 passenger coaches.

This plant has a fully-equipped assay office and laboratory, shops, weather observation department, emergency hospital, offices, etc.

Industrial equipment consists of four 18-ton and four 12-ton electric locomotives, with necessary slag trucks, matte trucks, calcine and coal cars. All buildings are of steel and concrete construction.

The smelting practice of copper ores largely follows Anaconda methods. The sulphide fines are roasted with a certain amount of silicious ore added upon the fifth hearth of the roasters to heat the ore and keep the temperature at the right point. The ore is roasted down to .7% sulphur corresponding to a matte fall of 15 to 18 tons per day. The reverberatory slag, carrying 40 to 42% silica, is tapped at the back of the furnace and the matte, carrying 20 to 30% copper, conveyed in ladles to the converters. The converters, when operated only on day shift, are kept hot over night by filling them with cinders from the reverberatory furnaces. Silica is applied to the converter in lump ore, 2 boats to each 8-ton charge. The bag-house dust from the smelter fumes is removed by reversing the fan and direction of current, drawing the dust into the chamber beneath.

The completion of the Utah Metal Mining Co.'s 11,000' tunnel in 1913, gives direct connection with the Bingham mines. In 1915 the plant treated 270,374 tons copper ore, 395,574 tons lead ore. **Production:** 14,271,174 lbs. fine copper, 113,002,657 lbs. lead, 5,090,157 oz. silver, and 48,020 oz. gold.

RARITAN COPPER WORKS

The Raritan Copper Works: E. C. Clark, supt., Perth Amboy, N. J., is on New York harbor. Completed 1899, and since enlarged repeatedly, it is one of the largest and most modern electrolytic copper refineries in the world.

The smelting department consists of one 200-ton, one 150-ton and one 100-ton furnaces for casting anodes, and two 225-ton, one 150-ton and two 100-ton furnaces for casting wire bars, ingots and cakes.

The electrolytic refinery includes 2 tank houses with their respective power houses; power consumption being about 7,000 k. w. The department has special shears for trimming cathode sheets and Morrow loop machines for attaching copper lugs to the cathode starting-sheets.

The tank house No. 1 has 1,800 tanks and a capacity of 22,000,000 lbs. per month. The general arrangement and method of operation is very similar to that in No. 2 tank room. This room is 210x582'.

No. 1 power house, which furnishes power for No. 1 tank room, contains four 1,000-k. w. Nordberg triple-expansion Corliss engines and Allis-Chalmers barometric condensers. The engines are direct-connected to 1,000-k. w. electric generators, 2 being furnished by the General Electric Co. and 2 by the Crocker-Wheeler Co.

No. 2 tank house has 3 bays running lengthwise, with two 10-ton 3-motor Whiting cranes in each bay, equipped with special devices for hand-

ling an entire tankful of anodes or cathodes at 1 load. There are 3 electric circuits running lengthwise, 1 in each bay, each circuit of 396 tanks being handled from the power house by an electric generator. Current is 7,500 amperes, giving a current density of 20 amperes per sq. ft. The main conductor has a cross-sectional area of $12\frac{3}{4}$ ". There are 1,188 depositing tanks arranged in 108 nests of 11 cells each, with electrode arrangement on the Walker system.

In 1915 the plant treated 162,282 tons copper bullion, and 719,343 oz. silver bullion. **Production:** 323,850,718 lbs. fine copper; 16,025,993 oz. silver, and 174,408 oz. gold.

INTERNATIONAL LEAD REFINING CO.

The International Lead Refining Co.: Wm. Wraith, gen. mgr., G. P. Hulst, supt., a subsidiary company, with an extensive plant located at 151st St. and McCook Ave., East Chicago, Ind., has 64 acres of ground. Construction work started April 20, 1912, and plant was in operation Oct. 3, 1912. Plant comprises main refinery building, all steel and concrete, with 3 standard-gauge tracks entering the building. There are 2 crane runways running the full length of the building, with 3 traveling cranes. A men's change house, of brick, is equipped with toilets, shower baths, steel lockers, and 1 room equipped as a dining room. Bag house is constructed of brick and concrete, divided into 4 compartments of 144 bags, 30'x18".

Equipment: consists of one 12,000-ton battery Parkes process, two 300-ton softeners, four 60-ton desilverizing kettles, one 300-ton refining furnace, and one 200-ton molding furnace. The bullion comes in on a high track, is charged into furnace with charging machine and flows by gravity through the plant. Lead is hand-molded and trucked into cars. Sampling is done in two 40-ton kettles and bullion pumped into softeners with centrifugal pump. Residues are worked up in three 30-ton reverberatory furnaces. There are two 40-ton blast furnaces, 1 for antimonial slag, and 1 for by-products and ores; 8 retort furnaces for treating zinc skim and two 5-ton cupels for treating high-grade retort metal.

Common lead is double refined by crystallization in kettles in the corroding lead plant. Refining plant is in complete operation. All furnace gases except softeners and retorts are drawn through a sheet flue 700' long and passed through the bag house.

Power is supplied by the Northern Indiana Gas & Electric Co. Two waste-heat boilers supply steam for compressors and refinery. High-pressure air is supplied by centrifugal air compressor and air for blast furnaces is supplied by a Connersville blower. A 50,000-gal. tank elevated 50', and 100,000-gal. sump tank, waste running back into sump tank and pumped into the 50,000-gal tank, the elevated tank being connected with the East Chicago Water Co.'s mains. Oil storage capacity, two 12,000-gal oil tanks.

The International is not burdened by old smelteries acquired at exorbitant prices, but has new and up-to-date plants, capable of handling ore as cheap, if not cheaper, than any of its competitors and is a big factor in the mining world. It is in strong and competent hands, both technical and financial, and its profitable operation is assured.

In 1915 the plant treated 55,376 tons of lead bullion from Tooele, and 2,266 tons foreign ore. **Production:** 103,121,355 lbs. common and corroding lead; 9,164,073 lbs. antimonial lead; 4,031,610 oz. silver, and 18,136 oz. gold.

INTERNATIONAL SMELTING AND REFINING CO.

Properties and assets: purchased 1914 by Anaconda Copper Mng. Co. for \$10,392,709. Company dissolved and properties transferred to In-

ternational Smelting Co. Properties described thereunder. Entire stock issue owned by Anaconda Copper Mng. Co.

All stock exchanged for that of Anaconda Copper Mng. Co. stock, 1914, on the basis of 3.3 shares Anaconda for 1 International. Shareholders who did not exchange their stock received at the rate of \$103.92 a share, plus quarterly dividend of \$2.

INTERNATIONAL TUNGSTEN CORPORATION. ARIZONA

Office: 52 Broadway, New York. **Officers:** Hiram Whitcomb, pres.; W. C. Taylor, v. p.; J. Ralph Bloomer, v. p.-sec.; Richard Lounsbury, treas.; with Thos. A. Doe, Chas. Stillman and Wm. M. Clark, directors; Reginald Ronalds, asst. treas.

Inc. June 16, 1916, in Virginia. **Cap.**, \$10,000,000; shares \$10 par. Company acquired entire capital stock of the Emery-Whitcomb Tungsten Co. and the National Tungsten Co., both inc. in Arizona.

Property: 8 patented claims, 143 acres, and 18 unpatented claims, 350 acres, all contiguous, in the Arivaca mining district, Pima Co., 65 miles S. W. of Tucson and 23 miles from Amada on the So. Pac. R. R. Claims are said to cover an area of granite, rhyolite and diorite, the latter with quartz-filled fissures containing tungsten ore. Two of the veins are said to traverse the property for over 10,000' with widths ranging from 2½' to 12'; one ore-shoot claimed to be 12' wide, 175' long and containing 1% tungstic oxide, WO₃.

Development: mainly by tunnels, longest 500', with several shafts, deepest 156', which is said to be sunk on a 30' vein that traverses the property for a mile; 15' of this vein is said to contain rich tungsten ore; the balance, 2½% copper sulphide ore, "which taken together constitute a mammoth mine." Ore reserves are undoubtedly greatly over-estimated.

Equipment: includes a hoist, compressor and a 7½-ton auto truck for delivering ore to the mill. The 10-stamp mill has three 50-h. p. gas engines, Blake crusher, gyratory crusher, 8 Wilfley tables, Johnson vanner and 2 small air compressors.

Production: during May and June, 1916, said to have been 20 tons monthly. Early in July an engine suffered a breakdown and nothing has been produced since. Management states that production will start when repairs are made.

INTERSTATE SILVER-LEAD MINING CO.

IDAHO

See Cons. Interstate-Callahan Mng. Co.

INYO COPPER MINES CORPORATION.

CALIFORNIA

Office: 215 Balboa Bldg., San Francisco, Cal. **Mine address:** Keeler, Inyo Co., Cal. R. G. Paddock, pres. and gen. mgr.; F. J. O'Dea, sec. **Inc.** Nov. 19, 1910, in California. **Cap.**, \$1,000,000, shares \$1 par, assessable; issued, 550,000.

Company is a reorganization of the Inyo Copper Mines & Smelters Co. The president stated that it is free of debt but waiting for better financial conditions before attempting to raise money and only a small amount of work was being done.

Property: 19 claims in Ubehebe district, covering a contact zone between limestone and granite porphyry. For a mile this contact is said to show places where there is 1 to 20' of ore carrying 8 to 40% copper. The steep mountain side permits development by tunnel and future work will be of this character. **Development:** amounting to 650', includes 6 shallow prospect shafts and as many short tunnels, the longest 120', together with 100' of trenching. Ores carry appreciable values in gold and silver, as well as copper.

INYO GOLD MINING CO.

CALIFORNIA

Cap., \$1,000,000; shares \$1 par; assessable. Stock listed on Salt Lake Exchange. **Property:** 17 claims, patented, at Elko, Inyo county, Calif., developed by 350' of shafts, 700' of tunnels and 75' of crosscuts. Company officials estimate \$650,000 worth of gold-silver ore in sight.

IOWA COPPER MINING CO.

UTAH

Property: on Scott hill, which is the divide between Park City and the Big Cottonwood district, is developed by a 300' tunnel, showing several rich stringers; an 1,100' tunnel develops a fissure vein carrying silver, lead and copper ores, latter of good grade. Mine is quite wet, causing some trouble in operation. Hopes to cut big fissure that carries good ore in Barry Coxo ground. Is generally regarded as a silver mine, copper occurring in small quantities only. W. D. Lewis, Dave Scott and others of Park City, Utah, said to have taken a lease and bond on property, 1914.

IOWA MONTANA DEVELOPMENT CO.

MONTANA

Address: Fraser, Iowa. **Mine address:** Jefferson Island, Madison Co., Mont. **Officers:** T. J. McGinnis, pres.; F. H. Hoeffner, sec.; E. H. Daniels, treas.; all of Fraser, Iowa, and John Young, J. D. Morrison, F. Wood, directors. J. D. Morrison, mgr., Butte, Mont.

Inc. June, 1915, in Iowa. **Cap.**, \$75,000; shares \$50 par. Is a leasing company. Company obtained a 3-year lease, taking possession June 1, 1915, on the Bismark mine of the Montana-Illinois Copper Mining Co., which see for description.

IOWA TIGER MINING CO.

COLORADO

Property at Silverton, San Juan county, is operated by the Melville Leasing Co. and several sets of independent lessees.

IRON BLOSSOM CONSOLIDATED MINING CO.

UTAH

Officers: W. Lester Mangum, sec.-treas., 11 Knight Blk., Provo, Utah. Jesse Knight, pres.; J. Wm. Knight, v. p.-gen. mgr.; preceding, with R. E. Allen and A. M. Knight, directors. H. V. Birch, asst. mgr.; Chas. Zabriskie, supt.

Inc. Nov. 7, 1899, in Utah. **Cap.**, 1,000,000 shares, 10 cts. par; assessable; all outstanding. **Dividends:** to March, 1916, \$2.55 per share; \$300,000 paid in 1915. Balance sheet of Dec. 31, 1915, showed receipts: \$770,980; \$557,184 from ore sales, with a cash balance on hand of \$340,000, April 1, 1916.

Property: 15 claims, patented, 147.75 acres in the Tintic mining district, Juab Co., Utah. The Iron Blossom mine is in limestone cut by a large fissure on which the orebodies are aligned. **Development:** property is opened to a depth of 1,900' and is mining a very large orebody of silver-lead ore. In Oct., 1915, high-grade copper ore, carrying silver, was opened in a winze on the 900' level and a large tonnage of this ore is expected to run 10%. A crosscut 80' from the winze on the 1,000' level, mostly in vein matter, carried 20' of copper ore, assaying from 9-16%. A drift is being driven on the 1,700' to connect with the winze. Diamond drilling for 1,300' on the 1,900' level failed to disclose anything of value.

Mine had 52,442' of underground workings, March, 1916, of which 5,293' was done in 1915.

Production: in 1914 was 41,082 tons of ore, averaging 25 oz. silver, 9% lead, 0.2% copper and 0.14 oz. gold, netting \$306,150, and in 1915 was 16,548 tons, averaging 25-31 oz. silver, 2-8% lead and 1% copper, netting from \$9 to \$13.52 per ton. Costs were \$5.36 in 1914 and from \$8-\$9 per ton in 1915.

Property good, but ore shoots erratic, and while it is impossible to

say where next year's ore supply will come from, past experience indicates that the company will keep up its record for several years.

IRON CAP COPPER CO.

ARIZONA

Office: 50 Congress St., Boston, Mass. Mine at Copper Hill, Gila Co., Ariz. **Officers:** Frank P. Knight, pres.; J. Judson Dean, Andover, Mass., v. p.; Jas. F. Lockwood, sec.-treas.; F. A. Woodward, supt.; preceding and Alvin T. Baldwin, directors.

Inc. Feb. 7, 1911, in Maine. **Cap.**, \$2,000,000; shares \$10 par, fully paid and nonassessable; 50,000 preferred and 150,000 common; issued, 35,985 preferred, 100,225 common. First quarterly dividend, $1\frac{3}{4}\%$ on pfd. shares, declared Dec., 1915.

Bonds: \$50,000 7% authorized and \$37,015 issued. Federal Trust Co., registrar; Exchange Trust Co., transfer agent. Stock listed on Boston curb. Annual meeting first Tuesday in January.

Is practically a reorganization of the National Mining Exploration Co., buying its property under foreclosure sale, May 25, 1911. To provide money for development purposes, the company offered 30,000 shares of common stock in July, 1915, 21,560 being subscribed for. Company reports Dec. 31, 1915, cash and accounts receivable, \$175,109; gross earnings 1914-1915 were \$216,463 (ore sales \$167,949), with operating expenses for same period of \$81,715, exclusive of a 5% depreciation charge. Net earnings for 1915 were \$102,370. No debts except outstanding bonds.

Property: 2 groups, the Iron Cap at Globe, and the Fumarole group in Graham county, Ariz. The Iron Cap group, 21 claims, 16 patented, 193 acres, 5 surveyed for patent, lies immediately W. of the Arizona Commercial holdings and next to the Old Dominion property at Globe, Ariz. The claims show shale and quartzite cut by diorite in depth and traversed by a fissure vein running N. E. and S. W. and dipping at 70°.

Development: by the William shaft, 881' deep, with levels at 660', 765' and 868'. The vein has been developed to a depth of 765' and for a length, on the 2 upper levels, of 600'. A crosscut is being driven to the vein on the 9th level. Another shaft, the Iron Cap, 600' deep, idle for several years, is being enlarged preparatory to sinking. Total extent of underground workings, 6,400'.

The Fumarole group, 7 patented claims in the Lone Star mining district, 9 miles N. E. of Safford, Graham county, Ariz., is supposed to contain gold ores in a volcanic neck, but has thus far been unremunerative, though the former company spent \$125,000 on the Fumarole mine and opened up a little low-grade ore on the 500' level. The Fumarole shaft, 570' deep, has been idle since Dec., 1909. The mine has 2,000' drifts and crosscuts on the 200', 500' and 700' levels.

Equipment: includes a new Wellman-Seaver-Morgan double-drum hoist, capable of hoisting from 1,500' depth. Employs 60 men.

During 1915 the average grade of ore shipped contained 10.37% copper and 6.71 oz. silver, with a net output of 1,209,767 lbs. copper at a cost of 9.687 cts., including selling commission. Average price received for copper was 18.15 cts. per lb. Shipments are made to El Paso, Texas. No shipments were made between Nov. 1, 1914, and April, 1915, when the mine was closed on account of low price of copper.

Development work planned for 1916 includes the opening of the 9th level and sinking the Williams and Iron Cap shafts to 1,000' depth.

IRON DIKE MINE

NEVADA

Address: care W. R. Smith, Mina, Nev. **Property:** 10 claims in Gold Range mining district, Mineral county, about 5 miles from Mina, shows

fissure veins in lime-porphry formation. A tunnel, 1,016' long, Jan. 1, 1916, is expected to tap the vein at 417' vertical depth.

IRON DYKE COPPER CO.**OREGON**

Mine near Homestead, Baker Co., Ore. **Officers:** C. N. Conrad, pres.; H. G. Fink, v. p.; A. A. Clauss, sec.; F. F. Curtze, treas.; preceding, with Geo. R. Metcalf and Davenport Galbraith, directors. **Inc.** in Pennsylvania. **Cap.**, \$500,000; shares \$100 par. Erie Trust Co. holds title by trust deed and bond. Worked by Homestead-Iron Dyke Mines Co., Inc.

Property: a copper deposit discovered 1897, about 2,000' from railroad at Homestead. Lower tunnel, 300' above town, is about 1,300' long, cutting the orebody at 800' in and connected by raise with 3 tunnels above. The mine has several thousand feet of workings. The lower tunnel shows massive chalcopryrite and pyrite ore about 6' wide, said to extend upward to the upper tunnel. Ore said to contain \$2 to \$3 gold, 3 oz. silver and 5% copper per ton.

Shipments started in Sept., 1915, were at the rate of 100 tons daily in June, 1916. Ore is treated at Salt Lake City. **Production:** to June 1, 1916, approximately 2,000,000 lbs.

IRON KING MINE.**NEW MEXICO**

Oro Grande, Otero Co., N. M. James H. Parker, operating mine, 1916. **Property:** near Brice, shows fissure vein and replacement deposits of oxidized copper ores carrying gold and silver values.

IRON KING MINING CO.**UTAH**

Mine near Eureka, Juab Co., Utah. **Officers:** Col. C. Edw. Loose, pres.; Reed Smoot, v. p.; P. G. Peterson, sec., all of Provo, Utah. Property is in Tintic district and has not yet found a body of silver-lead ore. Assessments of 1 ct. a share have paid for development work. Mine has a 600' shaft and a 3,500' tunnel, planned to be driven 6,000' eventually. The mine is said to show 100,000 tons of iron ore blocked out and ready for stoping. Mine closed down March, 1912, owing to inability to market the iron ore at a profitable figure. No recent returns secured.

IRON MASK MINE.**BRITISH COLUMBIA**

Owned by Kamloops Copper Co., at Kamloops, Yale district, B. C.

IRON MASK MINING CO.**MONTANA**

Office: St. Maries, Idaho. Mine near Carter, Missoula Co., Mont. **Officers:** T. B. Huey, pres.; Leon Demers, v. p.; P. Martin, sec.-treas.; preceding, with F. Perrier, J. J. Bouchard, directors. **Inc.** May, 1908. **Cap.**, \$1,000,000; shares \$1 par; \$500,000 outstanding. Assessment No. 3 of 2 mills per share, levied June, 1913.

Property: 6 claims, well timbered and watered, 3 miles from a railroad, are said to show a 10' vein of concentrating ore, with an 18" vein of smelting ore. **Development:** by tunnel 1,700' long, with back of about 700', and 2,400' of drifting on the vein in the various tunnels. The workings show silver-lead ore of good average grade, with a small percentage of copper. **Equipment:** includes gasoline power and necessary mine buildings.

IRON MOUNTAIN COPPER CO.**CALIFORNIA**

Office: 301 First National Bank Bldg., Riverside, Cal. Mine near Blythe City, Riverside Co., Cal. **Officers:** Harwood Robbins, pres.; E. W. Tucker, v. p.; Holton Webb, sec.-treas. **Inc.** about July, 1911, in California. **Cap.**, \$10,000; shares \$1 par; issued, 5,000 shares.

Property: 35 claims, about 700 acres, known as the Crescent group, in Ironwood mining district, Riverside county, Cal., 26 miles S of Blythe

Junction on the Parker cut-off of the Santa Fe railroad. Claims show fissure veins in granite and porphyry, the main ledge being traceable 2 miles.

Development: includes 120' shaft with a level at 100' depth that is 70' long and shows high-grade copper ore containing visible gold. Ore shipments by former owners averaged \$100 per ton. Outcrop shows high-grade ore at several places. Mr. Robbins, who is said to have furnished all the money thus far, plans putting in a small smelter.

IRON MOUNTAIN TUNNEL CO.

MONTANA

Purchased in July, 1915, by Federal Mining and Smelting Co., which see.

IRON QUEEN MINING & SMELTING CO.

ARIZONA

Address: Wm. T. Read, 15 William St., New York City. Mines near Mayer, Yavapai Co., Ariz. **Directors:** F. W. Wood, Wm. T. Read, A. D. Barnhart, I. D. L. Williams and H. B. Bishop. **Cap.,** \$3,500,000; shares \$10 par. Company formed to take over, subject to a mortgage for \$130,000, the greater part of the former holdings of the George A. Treadwell Mining Co., sold at tax and foreclosure sales. The Boggs and Hackberry properties are not included, being bought by the Commercial Mining Co., controlled by Phelps, Dodge & Co. The organizers of the Iron Queen offered stock at 75 cts. a share to stockholders of the Treadwell Co.

Property: consists of Iron Queen group near Mayer, the narrow gauge railway, the smelter plant, 31 claims and interests in 3 others in the Verde mining district. The Iron Queen group was favorably reported upon by M. A. Finney, former manager of the Consolidated Arizona Smelting Co. (Humboldt smelter), who states that property is leached down to 300' level, has zinc ore between that and 400' level and has 6' pyritic ore carrying 3% copper, 38% iron and 38% sulphur below that and on the 500' level.

As the former Treadwell holdings are not considered as even decent prospects, the shares of the new company are considered unfavorably. Letters neither answered nor returned, 1915-16.

IRON SILVER MINING CO.

COLORADO

Offices: Room 1408, 40 Exchange Place, New York, and 615 Stevens Bldg., Detroit, Mich. Mine near Leadville, Lake Co., Colo. **Officers:** W. R. Cobb, pres.; Henry G. Stevens, v. p.; Homer A. Hoit, sec.; Fremont Woodruff, treas.; preceding, with Bruce G. Broad, R. H. Webber, Isaac J. Meyer, Eber W. Cottrell, H. C. DuVal, Samuel E. Reinhard and Chas. E. Hilton, trustees. Geo. O. Argall, gen. mgr.; Philip Argall & Sons, cons. engr.

Inc. March, 1880, in New York. Cap., \$10,000,000; shares \$20 par. Net earnings were \$267,034.64 in 1904; \$515,127 in 1906; \$65,366 in 1907; \$6,960 in 1908; \$183,121 in 1909; \$138,308 in 1910; \$187,639 in 1911; \$274,322 in 1912; \$123,927 in 1913; \$174,629 in 1914; \$184,199 in 1915. **Dividends:** \$400,000 in 1906; \$300,000 in 1907; none in 1908; \$50,000 in 1909; \$200,000 in 1910; \$100,000 in 1911; \$200,000 in 1912; \$200,000 in 1913; \$100,000 in 1914 and 1915, with total dividends, to Jan., 1916, \$5,050,000. Stock listed on N. Y. Consolidated Stock Exchange and the Detroit Exchange. Farmers Loan & Trust Co., New York, registrar. Annual meeting, first Tuesday in March.

In 1915 company mined 38,264 tons of ore which, after sorting, amounted to 34,217 tons, of a net value of \$387,214. Total income for year was \$418,620, and total expenses \$234,420. Balance sheet Dec. 31, 1915, showed cash surplus of \$398,528.

Company owns and operates the Moyer, Tucson and Blind Tom

mines. on Iron hill, about 2 miles E. of Leadville, and also controls, through stock ownership, the Nisi Prius Cons. Mining Co. and the New Marian Cons. Mining Co., which see. In 1915, company purchased an undivided 1/2 interest in the Proserpine and Cumberland lode mining claims, U. S. Survey No. 5214, which secured for the Iron Silver Co. a 5/8 interest in these claims, consisting of 9.9 acres, adjoining the company's property on the N. W.

The Moyer mine yielded 16,474 tons of ore in 1915, net value of \$224,351. The mine has over 2 miles of workings and contains large orebodies of very low-grade complex lead-zinc ore from which large tonnages have been extracted for several years past. The "East" orebody opened and stoped in 1912, 18' thick, 70' wide and 360' long, was completely exhausted in 1915, and ore production was secured from older workings, abandoned in former years because the ore was considered too low-grade to pay. Company averaged 13.05 cts. per lb. for spelter, as compared with 5.06 cts. in 1914.

In 1915, 1,828' of development work and 992' of diamond drilling was done, but failed to locate ore in commercial quantities. The North Moyer shaft is being deepened to 200' below the old workings. Main development is on the 3rd and 4th levels.

The Tucson mine yielded high-grade copper ore in 1911, from a lens of copper sulphide found in the Tucson fault between the 600' and 700' levels, but extensive prospect work has not revealed any other orebody and this lens is now practically worked out. An orebody opened in 1914, and developed for 120' between the 4th and 5th levels, is 80' wide, 16' thick and furnished the chief portion of the 1915 production. The bulk of ore mined in 1915 was a complex zinc-lead sulphide, not suitable for production of spelter, consisting mainly of a mixture of iron, zinc and lead sulphides, changing near the Tucson fault to copper-bearing iron pyrite with silver.

Development: in 1915, consisted of 2,130' of drifts and 858' of raises. A 3-compartment raise is being put up to connect with the intermediate level from the 5th level; when completed the ore shoot will be extensively developed.

Six leases were given on the upper workings of the Iron mine and lessees produced 2,190,112 lbs. zinc, 234,966 lbs. lead, 384,934 lbs. iron and 9,169.86 oz. silver. Company derived an income of \$17,901 from royalties and hoisting of lessees' ore. On the Blind Tom mine, 148' of drifting failed to disclose new deposits in the limestone underlying the main ore shoot and operations were confined to mining of a small zinc carbonate orebody. **Production:** was 499,805 lbs. iron, 145,275 lbs. zinc and 2,850 oz. silver. The total production of the mine for 1915 was 16,794 tons of a net value of \$154,805. The Tucson has a 1,200' aerial tram, of 12 tons hourly capacity, from the shaft to the railway siding, costing \$7,855, which has cut the cost of ore transportation from 60 cts. to about 12 cts. per ton.

Recent production: of the mines as a whole:

	Copper lbs.	Gold oz.	Silver oz.	Lead lbs.	Zinc lbs.	Iron lbs.
1915....	33,694	575.	136,674	4,205,616	16,674,848	2,957,235
1914....	12,751	923.1	327,976	10,608,734	17,396,362	5,247,433
1913....	7,230	509.	391,603	12,105,921	25,658,913	2,745,511
1912....	58,543	323.92	470,403	12,874,099	21,601,428	2,816,079

Property is well equipped and well managed.

IRONSIDE MINE.**MONTANA**

Address: care Dr. F. A. Ironsides, Butte, Mont. Mine near Whitehall, Jefferson Co., Mont., at head of Little Boulder river, 15 miles from Butte. Shows fissure vein in granite developed by adit tunnel opening a shoot of silver-copper-lead ore. Property has been equipped with a concentrator, including flotation equipment, and is shipping regularly.

IRONSIDES MINE.**CALIFORNIA**

Jas. Ironsides, owner. **Property:** 7 miles S. W. of Yreka, in Sec. 26, T. 45 N., R. 8 W., Greenhorn mining district, Siskiyou Co., Cal.; is slightly developed and is a small producer.

IROQUOIS COPPER CO.**NEVADA**

Goldfield, Nev. **Officers:** H. B. Lind, pres.-mgr.; J. M. Fenwich, sec., with M. A. Lind, directors. **Cap.,** \$12,000; shares \$1 par. All the stock is owned by the Nevada & Boston Copper Company, a Wyoming corporation.

Property: 10 unpatented claims, about 180 acres, in New York canyon, Sante Fe mining district, Mineral county, $4\frac{1}{2}$ miles E. of the S. P. R. R. and 7 miles S. E. of Luning. **Development:** by crosscut tunnels, said to show an orebody averaging 4% copper and \$2 silver per ton. Shipments commenced in 1914 and to date amount to about 2,000 tons of ore carrying from 5-12% copper. Mine being worked by lessees in 1916.

IRVINGTON SMELTING & REFINING CO.**NEW JERSEY.**

Address: Charles Engelhard, treas., 30 Church St., New York. Works at Irvington, N. J. **Officers:** W. L. Glorieux, pres.; C. O. Baker, v. p.; C. W. Baker, v. p.; Robert A. Knorre, sec. Property is an electrolytic smelter and refinery for gold, silver, platinum and copper ores.

ISABELLA COPPER MINING CO.**CALIFORNIA**

Directors: R. E. Rader, M. A. Fesler, Howard W. Williford, of Berkeley; E. J. Rader, Sacramento, and E. E. Rader, of Barzilla, San Mateo Co., Cal. **Inc.** 1911. **Cap.,** \$500,000. 100' tunnel was being driven, 1915.

ISABELLA MINES CO.**COLORADO**

Office: 203 Burns Bldg., Colorado Springs. **Officers:** Ira Harris, pres.; E. E. Quentin, v. p., with Horace G. Lunt, R. M. Carson, and John T. Hawkins, directors. Daniel Thatcher, sec.-treas.; Clark G. Mitchell, gen. mgr.-supt., Box 133, Independence, Colo. **Inc.** 1903 in Wyoming. **Cap.,** \$3,000,000; shares \$1 par; 2,528,291 outstanding. Stock listed on Colorado Springs Exchange. Colorado Title & Trust Co., registrar. Annual meeting 1st Monday in February at Cheyenne, Wyo. Balance sheet for year ending Dec. 31, 1915, showed assets: property \$2,966,589; cash \$36,393, accounts receivable \$24,450, and liabilities: \$109,701, with a surplus of \$85,993 at end of year. Receipts from ore sales were \$507,791; total receipts amounted to \$534,099, as against total expenditures of \$490,525, showing an operating profit of \$43,573.

Property: 116 claims, patented, in N. E. $\frac{1}{4}$ of Sec. 20 and N. W. $\frac{1}{4}$ of Sec. 21 on Bull Hill, Cripple Creek district, shows quartz veins in breccia carrying gold and some silver values. **Development:** by 2 main vertical shafts, the Lee, 1,274' and the Empire, 9,407'. During 1915, 17,289' of development work was done, as compared with 10,766' in 1914. Of this 1,509' was done by the company and 15,699 by lessees. Much work was done on the lower levels of the mine and a 3' vein of high-grade ore has recently been opened on the 1,275', or 15th level of the Lee shaft.

Equipment: includes a 100-ton concentrating mill, entirely remodeled in 1915, to use a cyanide process with sand leaching, pump, Parkison fur-Heine boiler, etc.

Recent production: has been as follows:

Years--	Tons Mine ore	Tons Dump ore	Total tonnage	Gross Value
1915.....	23,861	837	24,698	\$507,791
1914.....	15,706	2,040	17,746	345,819
1913.....	11,385	6,903	18,288	243,251

Total production to date estimated at \$8,000,000. Company is one of the oldest in the Cripple Creek district and is operated successfully along conservative lines.

ISLAND COPPER CO.

CALIFORNIA

Office: Security Bank Bldg., Oakland, Calif. Frank A. Leach, pres.; O. H. Wilcox, v. p.; E. R. Leach, mgr. **Property:** 4 patented mining claims and other property aggregating 265 acres, in the S. W. corner of Trinity county, within 500 yards of the Northwestern Pacific R. R., operating from San Francisco to Humboldt bay. The postoffice is Island Mountain, Trinity Co., Calif.

Ore: lenticular bodies of copper-iron sulphides occur in metamorphosed sedimentary rocks, outcropping at several places. Development is said to indicate that these various outcrops are part of one mass, whose estimated dimensions are 90 to 100' in width, 450' in length and a proven depth of from 60 to 145'. Ores are stated to carry 2½% copper, 1½ oz. silver and \$2 in gold per ton.

Development: by 4 tunnels and 4 shallow incline shafts with 1,100' of underground workings, is estimated to block out 275,000 tons of ore. Some of the workings are now caved. Jan., 1916, company reports having recently shipped 2,500 tons ore.

ISLAND COPPER CO.

MICHIGAN

Office: 1400 Alworth Bldg., Duluth, Minn. **Officers:** Thos. F. Cole, pres.; Geo. C. Stone, v. p.; Frederick W. Nichols, sec.; preceding, with F. W. Heimick, Oscar J. Larson, Henry Nolte, Geo. G. Barnum, Geo. A. Tomlinson and Julius H. Barnes, directors; Edw. J. Maney, treas. **Inc.** March 9, 1909, in Michigan. **Cap.**, \$1,000,000; shares \$25 par, \$6.00 paid; issued, \$678,375. Annual meeting, first Tuesday in June.

Property: on Isle Royale, over 92,000 acres out of the 125,000 acres comprising the island, includes the former holdings of the Isle Royale Land Corporation, Ltd., and the Island Mining Co. Idle. See Vol. XI, Copper Handbook.

ISLAND MOUNTAIN COPPER MINE.

CALIFORNIA

Owned by Island Copper Co., which see.

ISLE ROYALE COPPER CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Houghton, Mich. **Officers:** E. V. R. Thayer, pres.; Jas. MacNaughton, gen. mgr.; Chas. O. Whitten, F. L. Whitcomb, E. C. Lewis, E. V. R. Thayer, R. M. Saltonstall, G. R. Whitten, and Chas. N. King, directors; Geo. A. Flagg, sec.-treas.; Clarence H. Bissell, asst. sec.-treas.; Jas. E. Richards, mine supt.; A. G. Andrews, Jr., mill supt.; Harry Reeder, engr.; John T. Reeder, chief clerk and purch. agt.; Harry E. Lukey, clerk; Edward Colenso, chief mg. capt.

Inc. March, 1899, in New Jersey, as a merger of the Isle Royale Cons. Mining Co. and Miners' Copper Co. **Cap.**, \$3,750,000; shares \$25 par. Is controlled through ownership of 32,910 shares of outstanding stock, by the Calumet & Hecla. Old Colony Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Company owns a one-sixth interest in the Lake Superior Smelting Co. Annual meeting, first Wednesday in April, at 243 Washington St., Jersey City, N. J.

Company ended 1915 with balance of current assets, \$1,230,654. Net profits 1915 were \$498,277, as compared with \$24,374 in 1914 and an operating loss of \$128,313 in 1913. **Dividends:** \$1 per share was paid March 31, 1913 and July 31, 1916.

Property: 3,520 acres and an 80-acre mill site. Mineral lands include the old Isle Royale, Grand Portage and Huron mines, the Dodge and Frue prospects, the mineral rights in the Montezuma tract of about 200 acres purchased, 1913, for \$100,000, and sundry undeveloped tracts. The Hussey-Howe tract of 280 acres, lying N. E. of the Superior, supposed to carry the extension of the Baltic bed, was bought, 1907, for \$220,000. Lands include all of Secs. 1, 2 and 11, and parts of Secs. 3, 9, 10 and 15, T. 54 N., R. 34 W., also 160 acres in Sec. 6, T. 54 N., R. 33 W., 40 acres in Sec. 31, T. 55 N., R. 33 W., and 160 acres in Sec. 36, T. 55 N., R. 34 W., giving a compact tract carrying about 2½ miles of the strike of the system of copper-bearing beds.

The Isle Royale has 3 parallel amygdaloidal beds, with strike of N. 32° E. and average dip of 56°, of which 2 have been extensively opened, these being the Isle Royale and Portage beds, the latter lying approximately 200' W. of the former. The shafts are on the Isle Royale, but the Portage bed is opened on many levels by crosscuts. East of the amygdaloids is the "Mabbs vein," lying near the Eastern sandstone, 4 to 7' wide and rich in mass and barrel copper, but deficient in stamp rock. It was opened to a depth of about 250' by John and Austin Mabbs, about 1875, and has been tested to some extent by the present owner. There also are unidentified and unexplored copper-bearing amygdaloids lying W. of the Portage bed and occasional narrow fissure veins carrying arsenical copper ores.

The 3 old mines included in the present Isle Royale tract produced 48,452,590 lbs. fine copper, under primitive conditions, at a net aggregate loss of about \$2,500,000. The old Isle Royale and Grand Portage mines were opened in 1853 and the Huron in 1855. The history of these 3 mines is given in detail in Vol II.

Development: considerable diamond drilling has been done. Underground openings were 19,106' in 1912; 13,626' in 1913; 9,694' in 1914; 14,446' in 1915. About 75 rock drills are used.

No. 1 shaft, near the northern boundary, was completely gutted by fire, Dec., 1903, and was abandoned. This shaft had 3 compartments and is 1,614' deep, opened on the Isle Royale bed, with crosscuts driven on the 11th to 15th levels, inclusive, to the Portage bed, lying 150 to 220' W., with about 2 miles of drifts opened thereon, stoping having been about equally divided between the 2 beds, which were found markedly similar in characteristics and copper values. Concrete dams have been built across the south drifts of No. 1 at the 13th and 14th levels, holding back the mine water. Surface water is collected on the 8th level and sent to No. 2 shaft for taking out. The surface plant at No. 1 was dismantled, 1908, machinery going to No. 4 shaft.

In May, 1914, work was started to retimber the shaft, preparatory to sinking and exploring the Portage lode. In Feb., 1916, the work had been finished down to the 14th level and hoisting was being done from the upper levels.

No. 2 shaft, with 3 compartments, 2,280' S. W. of No. 1, is 3,211' deep. This shaft produces less mass copper than formerly, and the north drifts have not looked especially well for several years, the average of ground being below that of the mine as a whole.

No. 2 shaft has a combination shaft rock house, with Portage Lake

crushers. The engine house is equipped with a hoist capable of raising 6-ton skips from a depth of 6,000'.

No. 3 is merely a site for a shaft, to reopen the old Huron mine.

The new shafts, Nos. 4, 5, 6 and 7, are all on the Isle Royale bed, at the southern end of the property, and have several miles of workings showing considerable heavy copper. These shafts are unconnected with the former workings, in shafts Nos. 1 and 2, at the northern end of the property. Shafts 4, 5 and 6 are connected by drifts on the upper levels.

No. 4 shaft, about 3,100' S. of No. 2, is 2,244' deep, developing stamp rock of very fair average grade. Equipment includes a Nordberg duplex-cylinder hoist, good for 1 mile depth and a 35-drill air compressor, both taken from No. 1 shaft. There is a cylindrical steel shaft rock house, built by the Wisconsin Bridge & Iron Co., having cylindrical rock bins 42' in diameter and 32' high.

No. 5 shaft, about 5,100' S. of No. 2, on Sec. 2, was started Oct., 1906, and was 1,758' deep Jan., 1916. The shaft is sunk in the footwall, and is equipped with a hoist, good for a depth of 3,000'.

No. 6 shaft, about 7,300' S. W. of No. 2, near the center of Sec. 11, has 3 compartments and was 1,912' deep Jan., 1916, developing very good average ground, the bed showing much epidote. The levels are opened at 100' and 120' intervals. On surface there is a circular steel shaft rock house, similar to that at No. 4. The plant at No. 6 includes a brick engine house, with hoist and 45-drill air compressor, and a steel boiler house.

No. 7 shaft, 2,400' S. of No. 6, was started in 1913. Work was stopped on account of the strike and was not resumed until late in 1915.

"A" shaft, started Sept., 1908, on the Hussey-Howe tract, is 972' deep, with the first plat cut at depth of 350'. A 205' crosscut, at depth of 474', discloses only the bed in which the shaft is sunk. On the 3rd level, at depth of 714', a drift was run S. to within 50' of the Houghton Copper Co. boundary, disclosing a fair amount of amygdaloidal rock, not carrying copper in promising quantities. "A" shaft is supposed to be sunk on the Baltic bed, but there is very great doubt as to whether the shaft really is opened on the northern extension of the Baltic, and failure to locate the twin Baltic bed, within a distance of 205' in the crosscut on the 474' level, accentuates this doubt.

The Sec. 12 shaft, begun Oct., 1905, and discontinued Jan., 1908, at depth of 812', also was sunk in search of the Baltic bed and drifts and crosscuts were opened in 4 directions, without securing satisfactory results. The shaft was sunk in a badly disturbed amygdaloidal bed, practically barren of copper.

A shaft was started, 1904, on Sec. 10, but was discontinued because of the heavy overburden, and a diamond drill substituted, the drill cores showing an amygdaloidal bed of which about 5' in width carried stamp-copper in fine grains.

The main plant, at No. 2 shaft, includes No. 2 engine house, a compressor house having a 35-drill Nordberg 2-stage air compressor; a 44x72' boiler house, with a 16x72' coal-storage addition and a 3,000-ton coal trestle, having three 150-h. p. 84" Burt horizontal boilers, taking water from a dam 300x500x6'. The machine shop is of steel, on stone foundations. Shaft houses and rock houses are lighted by electricity, commercial current being taken from the Houghton County Electric Light Co. The company has a private telephone system. There are about 100 dwellings on the company's lands.

The Isle Royale railway, owned by the company, connects the mine and mill with about 5 miles of main line, having easy grades. Equipment

includes 35-ton, 55-ton and 60-ton locomotives, and 40 forty-ton steel rock cars, equipped with air brakes.

The mill site, at the mouth of Pilgrim river, has nearly 1 mile of frontage on Portage lake. The old mill, insured for \$100,000, was burned Dec. 24, 1914. Work on a new 2,000-ton mill was started immediately and in June, 1915, the first stamp head was operating. By the end of August the 3 heads were working. The mill cost \$220,000 and has three 300-ton rock bins and 3 Nordberg stamps having circular mortars and $\frac{5}{8}$ " screen openings. The stamps rest on concrete bases, 20' thick, and are fitted with steeple-compound steam cylinders. Each stamp has a maximum capacity for 700 to 750 tons daily. The dressing floor has 78 rough jigs, 6 finishing jigs and 55 Wilfley tables to treat slime. There are rolls with fixed bearings to regrind coarse gravel from the mortars.

The mill has a complete machine shop on the second floor, power being furnished by a 600-k. w. mixed pressure G. E. Curtis Turbo generator, taking steam from five 200-h. p. boilers in a boiler house at the rear of the mill.

There is a 32x600' wharf, with deep water alongside, at the mill site, with appliances for unloading coal and general freight and for the dispatch of mineral, in scows to the Dollar Bay smelter, 2 miles across Portage lake.

Water is furnished the mill by a 16,000,000-gal. Nordberg Corliss pump, especially designed to handle muddy water, having a triple discharge into a 30" riveted steel water main, running 2,200' from pump house to mill, the pump being located some distance from the mill, to obviate stamp sand clogging the intake. Three 100-h. p. boilers furnish power for the pumps, fuel being taken from a large coal trestle at the rear of the pump house boiler rooms. A dam near the mill supplies feed water for the boilers.

Recent production: has been as follows—

Year—	Tons R'k Treated	Lbs. Min. Produced	Lbs. Mine		Lbs. Cu. Produced	Total Cost per Lb.	Rec'd per Lb.
			Cu. per Stpd.	Cost per Ton (a)			
1915.....	680,270	13,727,832	13.7	\$1.45	9,342,106	(b)14.94c	18.36c
1914.....	474,349	9,451,115	13.9	1.49	6,601,235	13.05c	13.16c
1913.....	314,679	5,887,000	13.2	2.12	4,158,548	18.81c	15.29c
1912.....	531,105	11,461,410	15.4	1.54	8,186,957	11.89c	16.66c
1911.....	457,440	10,339,171	16.4	1.47	7,490,120	10.85c	.....
1910.....	520,860	10,433,060	14.5	1.42	7,567,399	11.84c	.....

(a) Includes mining, transportation, stamping and taxes. (b) Includes nearly 2c per lb. extraordinary expense of rebuilding stamp mill, reopening No. 1 shaft, and No. 7 shaft expense.

Isle Royale's production in 1914 was greatly restricted by the Lake Superior labor strike; normal production was again resumed in June, 1914, to be soon followed by the demoralized copper market due to the outbreak of the European war; the property operated on a three-quarters time basis until Feb., 1915.

The Isle Royale is a low-grade mine, but shows itself capable of earning substantial profits. In 1915 the property made amends for its short-comings of the previous 2 years; and at present more men are employed and more rock is being hoisted than ever before in its history. Production has reached 1,000,000 lbs. copper per month. Large ground reserves are maintained and necessary, and with a still larger output in prospect, profitable operations for many years to come are confidently anticipated.

IT MINING CO.

Ketchikan, Alaska. Mine 1 mile from the shore on Kasaan bay, Prince

ALASKA

of Wales Island, Alaska. **Officers:** H. C. Strong, pres.; J. C. Barber, sec. and mgr.; C. H. Black, treas. **Inc.** 1908 in Washington. **Cap.**, \$30,000; shares \$1 par; nonassessable.

Property: 12 claims, 5 in process of patenting, in the Ketchikan district, showing a number of contact deposits between diorite and limestone. The ore deposit consists of magnetite with chalcopyrite and some bornite, varying up to 15' in width, and estimated by the management to average 8% copper, 1 oz. silver and \$3.50 gold per ton. Mine was opened 1908, and is only worked summers. **Development:** by a prospect shaft and 1,400' tunnel, driven to cut the orebody 200' below the workings from the 200' shaft. Old workings include open cuts and overhand stopes above 200' level.

Equipment: includes a 15-h. p. hoist and a 2-stage Sullivan air compressor. The mine has ore bunkers and a 1,200' gravity tram connecting with a 4,000' ground tram leading to 1,000-ton shipping bunkers on a substantial wharf. The company planned driving a new 1,400' tunnel to cut the present workings at depth of 400', or 200' below the bottom of the shaft, to serve also for drainage, as there are water courses in the limestone that cause considerable trouble.

Net smelter returns to end of 1910, \$150,000. Property considered promising. Letters neither answered nor returned, 1915.

ITMAY COPPER MINING CO.

WYOMING

Idle. Office: Rawlins, Wyo. Mine near Rambler, Carbon Co., Wyo. I. C. Miller, mgr.; Albert Bryle, supt., at last accounts. **Property:** 4 miles S. of Rambler, is said to have a 20' vein, carrying a paystreak of high-grade ore, apparently undeveloped, and another vein up to 8' in width carrying sulphide ore averaging about 8% copper. **Development:** by a 300' shaft. Mine has been a complete failure to date.

IVANHOE CONSOLIDATED MINES CO.

ARIZONA

Main office: 591 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Ariz. **Officers:** E. A. Carter, pres.; C. C. Spicer, v. p.; S. M. Warmbath, sec.; with Fred Fox and F. P. McLain, directors. A. G. Keating, supt. **Inc.** March 29, 1915, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; 790,800 shares issued. Stock listed on New York Curb and Los Angeles Stock Exchange. Security Transfer & Registrar Co., New York, transfer agents and registrar.

Property: 5 claims and 2 fractions in the N. W. section of Oatman mining district, Mohave county. Claims cover about 3,000' along the strike of the main vein. Four veins have so far been disclosed. Developed by 500' shaft. A crosscut at 204' intersected a vein, 60' wide, showing average values of \$9 per ton. A crosscut is now being driven S. on the 500' level to encounter this vein. A drift will also be carried westward to intersect the Nancy Lee vein, from which a 20-ton shipment of \$150 gold-silver ore was made early in 1916. Company leased the Nancy Lee claim to L. V. Le Grand in 1916. Is a promising prospect.

IVANHOE MINE.

ARIZONA

Patagonia, Santa Cruz Co., Ariz. Formerly owned by Ivanhoe Mining Co., which has been dissolved. Property now owned by A. H. Ives, of Minneapolis, and J. E. Hurd, who, in 1915, did assessment work only.

Property: the Ivanhoe mine and various claims, 25 in all, unpatented, 500 acres, in the Wrightson district, 4 to 6 miles S. W. of Patagonia, the nearest rail point. The group shows rhyolite, andesite and diorite, with brecciation zones carrying orebodies, of which 5 are estimated by owners to average 27' in width, carrying chloride, silver ore, gray copper and chalcocite, estimated by management to average 16% copper, 6% lead and 225 oz. silver per ton.

Development: by the 200' Commercial shaft, with considerable cross-cutting, developing, it is said, large bodies of milling ore. There are also several tunnels, with 2,700' of workings, estimated to show 100,000 tons of ore. **Equipment:** includes a 70-h. p. steam plant with a 50-h. p. hoist good for 1,000' depth. There are 5 buildings, and water is supplied by a 6-h. p. gasoline pump.

IVANHOE MINING CO.

IDAHO

Oscar Nordquist, mgr., Wallace, Ida. **Cap.**, \$1,500,000; shares \$1 par. **Property:** the Ivanhoe and Palisades groups, patented, adjoining the Star Group on the S., 3 miles N. W. of Mullan, Shoshone county, shows lead-silver-zinc ore. Mine supposed to have continuation of Morning vein. A crosscut from the Star main tunnel intersected the main vein at 1,400' vertical depth. Drifting on the ledge for 200' proved it to average 6' in width with 2' of low-grade milling ore. Property has been under development since 1904. Employing 15 men in 1916.

IVANHOE MINING CO.

WASHINGTON

W. B. McChesney, mgr., Oroville, Wash. **Property:** on Palmer Mtn., 7 miles from Oroville, Okanogan county, is developed by a 4,400' tunnel to a vertical depth of 1,559', at which depth the main orebody was intersected in Dec., 1915.

JACK POT MINING & MILLING CO.

WYOMING

Idle. Office: 55 High St., Oshkosh, Wis. Ole Granberg, pres. and gen. mgr.; H. Thorsgaard, v. p.; H. O. Granberg, sec.-treas. **Inc.** Dec. 23, 1903, in Wyoming. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 9 patented claims, 180 acres, in the Battle Lake district, showing fissure veins in diorite and chloritic schist, and 2 contact veins, between diorite and porphyry, carrying carbonate and sulphide ores. Two veins, slightly developed, are said to average 14' and 60' width. The smaller vein has averaged 8% copper and \$3 to \$12 gold per ton, the larger vein showing very low-grade copper ore. **Development:** 75' tunnel, 100' shaft and 8 pits of 20 to 36' depth, with 411' of workings. Though inactive for many years, company still in existence and reports that all taxes have been paid to date.

JACK WAITE MINING CO., LTD.

IDAHO

Officers: Robt. Sheffell, Govan, Wash., pres.-gen. mgr.; J. P. Schroeder, v. p.; Fritz Marschante, Spokane, sec.-treas.; with E. Winsby, Chas. Feehan and Chas. Chamberlain, directors. H. T. Ahrens, supt. **Cap.**, \$1,500,000; shares \$1 par; assessable; 1c levied Oct., 1915. Stock listed on Spokane Stock Exchange.

Property: in the North Coeur d'Alene district near Murray, Shoshone county, a group of claims covering a large vein carrying lead ores, whose silver values are much lower than those of the mines of the main Coeur d'Alene district. The oreshoot is said to be large and the property a good one. Is being extensively developed by crosscuts and tunnels, the upper one 1,500' and the lower main tunnel 3,000' long, early in 1916. The work is done under contract system. Company neither issues reports nor furnishes information.

JACKET-CROWN POINT-BELCHER MINES CO.

NEVADA

Office: Mills Bldg., San Francisco, Calif. Mine near Virginia City, Nev. **Directors:** M. B. Forman, C. L. Moore, J. L. Brainard, H. W. Glen-sor and L. M. Bliss. Wm. P. Miller, supt. Virginia City, Nev. Company is a merger of 3 of the big Comstock mines. **Inc.** Feb. 11, 1915, in Calif. California Corpor'n Commission authorized issue of 360,000 shares common and 12,000 shares preferred to the Yellow Jacket G. & S. Mng. Co.; 208,000 common and 10,400 preferred to Belcher Mng. Co., and 150,000 com-

mon and 10,000 preferred to the Crown Point G. & S. Mng. Co. Above stock is in payment for all properties of these 3 companies subject to debts of \$80,962; 217,600 shares to be sold at par, money to be used for development.

These are the bonanza properties which made the fortunes of Flood, Mackay, Lucky Baldwin and D. O. Mills. The mines are in the southern part of the Comstock lode, a great fissure vein 4 miles long, filling a fault plane in the andesite-diorite rocks of Mt. Davidson, near Virginia City. The ore is quartz carrying silver-gold. Geology described in Monograph 3, U. S. Geological Survey.

The merger made it possible to install modern pumps, to unwater the 1,700' and 1,800' levels of the mines where good ore was formerly worked until a great influx of hot water stopped mining. A fire in Dec., 1915, interrupted operations, but a centrifugal pump now installed on the 1,600' level has successfully handled the water and deep mining can now be resumed.

Production: for 1915 and first half of 1916 has come from old stopes and workings on the 1,600' level and above, the average production from both mines being about 1,000 tons per week.

JAMESTOWN EXPLORATION CO.

CALIFORNIA

Office: 546 E. Weber Ave., Stockton, Calif. **Officers:** A. R. Kirkland, pres.-mgr.; J. P. Mangante, v. p.; L. T. Freitas, sec.; J. H. Utt, treas.; with W. S. Kelly, directors. **Inc.** April 19, 1913, in Calif. **Cap.**, \$100,000; shares \$1 par; assessable; 25,000 shares issued. Annual meeting, 1st Tuesday in April.

Property: 1 claim, patented, 20 acres, $\frac{3}{4}$ mile W. of Jamestown, Tuolumne Co., shows a 5' quartz vein with gold values, said to average \$14 per ton. Developed by 700' tunnel to depth of 100'. Work was stopped in 1915, owing to lack of funds.

JAPAN-FLORA MINES & TUNNEL CO.

COLORADO

Idle. Office: 709 Colorado Bldg., Denver, Colo. Mine near Telluride, San Miguel Co., Colo. **Officers:** J. J. Fisher, pres.; Chas. H. Johnson, v. p.; Wm. E. Humphreys, sec.; J. P. H. Cunningham, treas.; preceding, with Geo. W. Johnson, directors. **Inc.** Aug. 22, 1903, in Colorado. **Cap.**, \$2,000,000; shares, \$1 par; nonassessable; fully issued. **Bonds:** \$300,000 authorized, at 6%; issued, \$240,800. Annual meeting in October.

Property: 43 patented claims, 311 acres, and a 35-acre mill site, in the Upper San Miguel district, near Telluride, 4 miles from a railway. Property shows 5 fissure veins, in brecciated andesite and porphyry, 3 being extensively developed and said to show a width of 1 to 8', carrying complex sulphide ores with gold and silver, associated with pyrite, in a quartz gangue. Ore said to average 1 to 2% copper, 3 to 40% lead, 2 to 20% zinc, 20 to 50 oz. silver and \$8 to \$30 gold per ton.

Development: by 2 shafts and a 3,000' tunnel, total underground workings amounting to nearly 35,000' in 1913. The mine is estimated by its manager to have 100,000 tons of ore blocked out for stoping. **Equipment:** includes a 2-drill Leyner electric air compressor and 17 buildings.

Property has a concentrating mill equipped with Blake and Gates crushers, 2 trains of rolls, three 6-compartment Hartz jigs, 4 Wilfley tables, 2 Frue vanners, 4 sizers and a 5' Huntington mill. Property has produced considerable ore in the past.

JARILLA CONSOLIDATED COPPER CO.

NEW MEXICO

Mine at Brice, Otero Co., N. M. **Officers:** E. S. Plaisted, pres.; John B. Boss, treas.; I. W. Crozier, John McLean, Geo. W. Kimball and W. W. C. Spencer, directors; W. W. C. Spencer, gen. mgr., 1888 Beacon St., Brookline, Mass.; Geo. W. Moffett, supt., mg. engr., chemist-assayer and purch. agt. **Inc.** 1912 in Arizona. **Cap.**, \$2,000,000; shares \$1 par; fully paid and

nonassessable; issued, \$1,000,000. Annual meeting, first Monday in December.

Property: 40 claims, about 800 acres, in Jarilla (Silver Hill) district, Otero Co., N. M., carrying sulphide ore in contact deposits between limestone and monzonite porphyry. Vein said to be 3 to 30' wide, 300' to a half mile long and proven to 170' depth, averaging 3 to 5% copper, 2 oz. silver and \$1 gold per ton. **Development:** by 5 shafts, deepest 172', and the Harvey tunnel, 165' long.

Company is a merger of and holds the properties formerly owned by the Eureka Mines Cons. Co., Boston Jarilla Copper Co., Amarillo Mining Co. and Eureka Placer Mining Co., whose combined capitalization of \$8,000,000 is reduced to \$2,000,000.

JARILLA COPPER SYNDICATE, INC.

NEW MEXICO

Brice, via Oro Grande, Otero Co., N. M. **Officers:** R. B. Hutchinson, pres.; J. J. Mundy, v. p.; T. B. Rains, sec.-treas. and acting mgr. Inc. July, 1912, in Arizona.

Property: the By-Chance group comprising the Stokes, Butterfly, Buckeye and By-Chance claims, all owned outright, is in the Jarilla district, 4 miles from Oro Grande on the El Paso & S. W. railroad. District shows Paleozoic limestone and shale cut by intrusive masses of monzonite porphyry. The By-Chance claim, the only one operated, has a contact metamorphic deposit of chalcopyrite-hematite-garnet ore lying alongside of a porphyry mass with ore along a fracture zone in the limestone.

Development: includes 150' vertical working shaft with a level at 86' on which the blanket orebody, 12 to 30' thick, has been stoped. A 60' winze from this level is reported to show a second and lower orebody estimated to have an average assay value of 3% copper, with streaks of copper glance running up to 30%.

Production: to Oct. 1, 1913, 6,000 tons of ore shipped to El Paso and Douglas, averaging 2% copper and \$2 gold per ton. Shipments to middle of 1914 average 600 tons monthly with returns which just about covered development and operating expenses. Operations resumed late in 1915. Property promising and management good.

JASPER COUNTY LAND & MINING CO.

MISSOURI

Frank Danglade, Webb City, Mo., supt. **Property:** the McKinley mine, near Carterville, Jasper Co., Mo., developed by 2 shafts and 15 drill holes, showing a large body of zinc blend and lead ore at depth of from 190-210' A 350-ton concentrating mill was erected in 1914 and started operations in April, 1915.

J. BENNETT SMITH MINING CO.

MINNESOTA

Idle. **Office:** 280 Chestnut St., Kingston, Pa. Mine address: Pine City, Pine Co., Minn. **Officers:** J. Bennett Smith, pres.; Herbert Conyngnam, sec.; Edw. Hilles, treas.; Henry Hoefler, gen. mgr., at last accounts. **Property:** 500 acres of copper-bearing ground, along Snake river, a mile below Cross lake, in Pine county, Minn. The lands show the western extension of the Keweenaw copper-bearing beds of Lake Superior, the bedded formation having a strike of about N. 20° E., with dip of about 72° S.-E., showing the beds to be on the northern fold of the syncline.

Development: includes 560' shaft; also several shallow pits and shafts. Several of the amygdaloidal and conglomerate strata, showing native copper, have been proven by test pitting and diamond-drill borings. Company reports having expended about \$50,000 on exploratory and development work since 1879.

JEFFERSON CALHOUN MINING CO.

COLORADO

Company was adjudged bankrupt and its property sold under judg-

ment proceedings. The old company was a reorganization of the Wabash Consolidated Co. Reorganized as Calhoun Consolidated Mines Company, which see.

JEFFERSON MONTANA COPPER MINES CO. MONTANA

Corbin, Jefferson Co., Mont. C. K. McCormick, pres.; P. A. Bell, supt. **Property:** 16 patented claims, in Colorado mining district, 3 miles from Corbin, shows fissure veins, 3-5' wide in granite. The course of the orebody is N. E.-S. W., with dip of 60-70°. Developed to depth of 540' by vertical shaft. Electric power to be installed in 1916.

JENNIE SAMPLE CONSOLIDATED MINING CO. COLORADO

Office: 218 Burns Bldg., Colorado Springs. **Officers:** Daniel Thatcher, pres.; Jas. I. Burns, v. p.; with A. E. Carlton, Ira Harris and J. N. Beaty, directors; R. M. Frank, sec.; F. H. Gay, treas.; John T. Hawkins, gen. mgr. **Inc.** in Wyoming. **Cap.**, \$25,000; shares 1c par; 1,668,885 shares issued. Stock listed on the Colorado Springs Stock Exchange. Gross earnings for 1915 were \$42,351, all from ore sales; operating expenses amounted to \$16,061. Company had no liabilities and \$3,319 cash in treasury, Jan. 1, 1916.

Property: 5 patented claims, 31 acres, on S. slope of Raven Hill, in Cripple Creek district, shows fissure veins with streaks of gold. Developed by shafts and drifts to depth of 1,000'. Equipped with hoist, drills and steam power. Company inactive, but property worked by lessees in 1915.

JEROME-OATMAN MINING CO. ARIZONA

Office: Jerome, Ariz. **Mine office:** Oatman, Ariz. **Officers:** Walter C. Miller, pres.; D. J. Shea, v. p.; S. F. Denison, sec.; H. W. Lewis, treas.; with H. E. Campbell and Henry Lovin, directors. **Jas. P. Rice, supt.** **Inc.** July, 1915, in Arizona. **Cap.**, \$150,000; shares 10c par; 442,251 shares in treasury, Oct., 1915. Stock is listed on Los Angeles Exchange.

Property: 11 claims, unpatented, in San Francisco mining district, 3 miles N. W. of Oatman, Mohave Co., shows gold-silver ore in quartz veins cutting andesite and rhyolite. The veins run N. W.-S. E. and dip N. 70°. A 2-compartment shaft, 300' deep, April, 1916, is being sunk to 500', on a 30' ledge yielding assays of from 20c to \$6 per ton. About 16 men employed, 1916.

JEROME SUPERIOR COPPER CO. ARIZONA

Organized by R. E. Tally, Thos. Taylor, J. J. Stanton and Leroy Anderson, all of United Verde Copper Co., Jerome, Ariz. **Inc.** May, 1916, in Ariz.

Property: 60 claims, the Sutcliffe and Stanridge group, lying east and south of the Arkansas and Arizona and the North Verde.

JEROME VERDE COPPER CO. ARIZONA

Office: 223 Security Bldg., Los Angeles, Cal. **Mine office:** Jerome, Yavapai Co., Ariz. **Officers:** Henry Werner, asst. sec., 60 Broadway, New York; Truman Berry, pres.; H. T. Helm, v. p.; I. Mabbett Sutton, sec.-treas.; with F. V. Henshaw and T. E. Campbell, directors.

Inc. Dec., 1906, in Arizona. **Cap.**, \$5,000,000; shares \$1 par; nonassessable; issued May 31, 1916, \$4,952,545. Registrar & Transfer Co., New York, transfer agent and registrar. Listed on New York Curb. Was organized as successor of Verde Queen Copper Co., giving old shareholders \$2,501,000 in stock, which is held by the old company in a single certificate, and is practically escrowed; 1,000,000 shares of this stock will be distributed on and after July 3, 1916.

Property: 28 claims, patented, 486 acres, lying E. of the United Verde and adjoining the Little Daisy mine of the United Verde Extension, shows an iron gossan with outcrops of copper ore on the Verde and Columbia claims. **Development:** by 700' two-compartment Columbia shaft, with

about 2,190' of workings, showing mainly copper carbonates, with small quantities of oxide and silicate ores, also some sulphide and a little native copper, all slightly auriferous and argentiferous. Average assays were reported, by former management, at 8.4% copper. Up to June, 1916, no pay ore had been developed. The mine is wet, and has electric pump, with capacity of 175 gals. per min., working against 500' head.

Equipment: includes a hoist, good for 1,000' depth, and a 5-drill air compressor. Commercial current is taken from the Arizona Power Co. There are a number of mine buildings, and a 35-ton smelter.

The promising disclosures on the Little Daisy mine of the United Verde Extension, adjoining this property, resulted in an option being given on the Jerome Verde property until June 15, 1915, to the United Verde Extension Co. This option provided for the payment of \$500, per month and that 100' of work per month should be performed. Under the option 935' of drifting and crosscutting was done on the 800', 775' on the 1,200', and a little work done on the 1,400' level. Results were unsatisfactory and option was relinquished after an expenditure of \$50,000. In April, 1916, an agreement was made with United Verde Extension under terms of which said company is to do 150' of development work per month, to be paid for by Jerome Verde on the basis of the company's working costs, plus 15% royalty; the work is being done on the 1,400' level of Jerome Verde. This is the only interest United Verde Ext. has in Jerome Verde. Company plans enlarging Columbia shaft to 3 compartments and sinking 330', equivalent to 1,400' level of United Verde Extension.

The mine shows geological conditions similar to those of the United Verde Extension and the stock is therefore a good gamble.

JEROME-VICTOR EXTENSION COPPER CO.

ARIZONA

Office: Laurium, Mich. **Mine office:** Jerome, Ariz. Is a reorganization of the Haynes Copper Co., which succeeded the Jerome Mines Development Co. **Officers:** Jas. T. Fisher, pres.; Brainard Avery, v. p.; J. B. Paton, sec.; with A. H. Floeter, A. F. Heidkamp and D. F. Printz, directors; J. P. Peterman, treas.; D. Leveque, asst. sec. **Inc.** 1916 in Ariz. **Cap.**, \$1,000,000; shares \$1 par; 450,000 shares issued, of which 250,000 are offered for subscription at par.

Property: 8 patented claims, 160 acres, known as the Harryhausen group, adjoining the United Verde on the N. W., shows lenticular orebodies in dioritic schist, reported to be 3'-19' wide and traceable for 2,000'. **Development:** includes 1,200' shaft, with 2,000' drift and crosscut work, also a 350' prospect shaft and 248' tunnel. Excessive flow of water encountered in drill holes, 2-300' deep, said to have forced former management to pull the pumps and close down the property in 1914.

Equipment: includes 150-h. p. steam hoist, 10-drill Ingersoll-Rand compressor and 12 buildings. Operations to be resumed in 1916.

Is a J. A. Minnear Co. promotion.

JERRY JOHNSON GOLD MINING CO.

COLORADO

Office: 427 Symes Bldg., Denver, Colo. **Mine office:** Cripple Creek, Colo. **Officers:** A. P. Mackey, pres.-mgr.; C. F. Potter, v. p.; J. W. Graham, sec.-treas.; with J. F. Mackey and C. A. Graham, directors; D. C. Smith, supt.

Inc. 1902 in Wyo. **Cap.**, \$250,000; shares 10c par; all issued. Has paid \$187,500 in dividends to date. Last payment of \$5 per 1,000 shares in Nov., 1914. Stock listed on the Colorado Springs Exchange. Company had \$30,000 cash in treasury, May, 1915, and no debts. Derives income from royalties on leasing operations.

Property: 35 claims, patented, in Cripple Creek district, shows gold-

silver ore in contact veins. Developed by 975' vertical shaft to depth of 850'. The mine is being worked from surface to the 650' level by Frank Caley, and below the 650' level by the Cripple Creek Deep Leasing Co.

Equipment: includes steam power, 8 drills, concentrator and 75-ton cyanide mill, erected in 1915 by Frank Caley and reported operating at capacity in 1915. Total output to 1916, 1,500,000 tons. During first 6 months in 1916 the mine produced \$25,632 in ore.

JERSEY VALLEY MINES CO.

NEVADA

Worcester, Mass. W. Prince Catlin, mgr., Battle Mountain, Lander Co., Nev. **Property:** in Kimberly or Hill Top district, 23 miles from Battle Mountain, comprises the Jersey Valley group, and the Gray Eagle claims, acquired Sept., 1913, from the Gray Eagle Mining Co. Four sets of leases were taking out ore from the last named claims at last reports.

JESSIE BELLE M., M. & SM. CO.

CALIFORNIA

T. S. and Ray Daulton, of Madera, Madera Co., Calif., reopened the mine in 1914, under a 4-year lease. Inc. 1902. in Arizona. **Cap.**, \$1,500,000; shares \$1 par. **Property:** 3 patented claims, 40 acres, 7 miles from and in same belt as the Copper Queen mine, in Mariposa county. Contains copper carbonate ore with gold and silver values.

Development: by 200' main shaft, shows 4 fissure veins, carrying oxide, carbonate and sulphide ores. Has steam power, air compressor and a 30-ton concentrator. No recent returns secured.

JEWEL-DENERO MINES, LTD.

BRITISH COLUMBIA

Secretary's office: W. Robertson, 71 George St., Edinburgh, Scotland. Mine office: Greenwood, B. C. **Directors:** J. Galloway, chairman; A. H. Bremner, J. E. Rogerson and W. W. Slater. C. A. Banks, mgr. Inc. Nov. 22, 1912, in Edinburgh. **Cap.**, £70,000; shares 5s each; 279,400 shares issued. Authorized bond issue, £12,500, 8%; £11,202 issued.

Property: the Jewel gold mine at Greenwood and the Idaho Alamo mine in the Slocan district, B. C. The Jewel mine is developed to depth of 500' by shafts and crosscuts and started production in 1911. Produced 16,525 tons of ore in 1914, yielding £31,360. In 1915 only development work was done and in 1916 the mine was being operated by lessees. **Equipment:** includes a 15-stamp cyanide mill. Company expects to resume operations on both properties in 1916.

JEWELL MINES & REDUCTION CO.

COLORADO

R. A. Schwab, sec., Century Bldg., Denver, Colo. W. E. Hager, v. p.-gen. mgr. **Property:** the Pandora mine and mill site, 231 acres, partially patented, 7 miles E. of Pitkin. Gunnison Co., Colo., said to carry 8 fissure veins. **Development:** by 1,800' tunnel **Equipment:** includes air compressor, machine drills. water power.

JIM BLAINE MINE.

OREGON

Owned by L. A. Lewis, Portland, Ore. Worked under lease by G. S. Epperly and Wm. H. Borgman, Placer, Ore. **Property:** 1 patented claim, 20 acres in Placer mining district, Josephine county, shows gold-silver ore in quartz veins in porphyry formation. The orebody runs N. W.-S. E. and dips 65°. Developed by 200' tunnel to depth of 150'. **Equipment:** includes compressor and concentrating mill. Concentrates reported to average 1 oz. gold and 50 oz. silver. Mine produced 1,000 tons of ore in 1915, yielding a gross return of \$9,842.

JIM BUTLER TONOPAH MINING CO.

NEVADA

Office: 501 Bullitt Bldg., Philadelphia, Pa. **Officers:** Clyde A. Heller, pres.; Wm. M. Potts, v. p.; K. Kitto, sec.-treas.; R. G. Wilson, asst. sec.-treas.; C. B. Taylor, gen. counsel. **Directors:** Clyde A. Heller, Wm. M. Potts, R. G. Park, H. W. Davis, S. D. Sinkler, T. W. Synnott, M. B. Cutler

and J. C. Fraley† Fred'k Bradshaw, gen. supt.; L. R. Robins, mng. engr.; W. J. Pike, supt.

Inc. Nov. 13, 1903, in Delaware. Cap., 2,000,000 shares; \$1 par; all issued; 281,979 in hands of Trustee for company. Initial dividend 10% paid Aug. 2, 1915. Treasurer's statement for 6 months ended Jan. 1, 1916, shows: available resources, cash in banks, loans and silver stored @ 50c per oz., \$477,974; receipts, \$285,436; operating and administration expenses, \$144,969. Net earnings for 6 months, \$140,466, exclusive of misc. income of \$1,236.

Property: 16 patented, 2 unpatented claims, 241.7 acres, at Tonopah, Nev.; also Ophir King group, 91.69 acres, bought at sheriff's sale Nov., 1914, for \$1,750.

Geology: of Tonopah is complex; a series of volcanic rocks, partly lava flows, partly intrusive sheets and masses of quickly varying thickness overlie one another irregularly. The productive veins are in the Mizpah "trachyte," overlaid by the Midway andesite and intruded by the Westend rhyolite. The veins are cut through by the Midway andesite and do not commonly outcrop, but terminate against the Midway andesite at depths up to 1,200'. They are fissure veins which for some distance lie on or in planes of contact between eruptive rocks. Values are in gold and silver. See U. S. G. S. Prof. Paper, No. 42. The company holdings are identical in character to those of its neighbors, the Tonopah Mining and Belmont companies.

Development: is through the Desert Queen and Wandering Boy shafts. Development for fiscal year 1915 was 8,569', costing \$64,783, or \$7.48 per ft.; drifting cost \$8.11; crosscutting \$6.928, and raising \$7.512 per ft.; ore developed, 5.6 tons per ft.

Ore reserves: Sept. 30, 1915, consisted of 26,773 tons positive ore, 15,537 tons possible ore, a total of 40,310 tons, compared with 50,197 tons in preceding year; 53,311 tons were mined in the fiscal year. Further exploration of the orebodies and of virgin territory is expected to add largely to this amount.

Ore in 1915 averaged 0.301 oz. gold and 26.42 oz. silver per ton, compared with 0.304 oz. gold and 27.14 oz. silver in 1914. Silver realized \$0.4623 per oz., or 95% of \$0.4866. Ore is milled for cost plus 5% (plus 50c p. t.) by the Belmont Milling Co., with 91.45% recovery in 1915.

Recent production and Costs per ton:

	Ore	Value	Mng.	Trmt.	Gen.	Total	Oper.		
	Tons	p. Ton	(A)	Dev.	Trans.	Chge.	Exp.	Oper.	Profits
1915.....	48,533	\$19.25	\$1.74	\$4.29	\$1.08	\$5.02	\$0.28	\$10.40	\$7.11
1914.....	34,722	21.45	2.14	5.36	1.07	5.58	0.32	12.18	7.13

(A) Deductions by ore purchasers.

The \$3,000,000 apex suit of the Jim Butler against the West End Co. for trespass and ore extracted was decided July, 1916, in favor of the West End Co. by the State Supreme Court. Case will be appealed.

JIMULCO MINING CO.

MEXICO

Letters returned, 1916, from Otto, Coahuila, Mex. Otto Wahrmond, pres.; Otto Koehler, v. p.; S. G. Newton, sec.; Arthur L. Tuttle, gen. supt.; John D. Moore, mine supt. Inc. 1901 in Texas. Cap. \$500,000; shares \$50 par, increased March, 1906, and reduced 1908 to \$1,000,000, shares \$100 par. **Dividends:** to end of 1912, \$1,005,000.

Property: 111 hectares, carrying argentiferous copper ores, oxidized ores predominating, as replacement deposits in limestone. **Development:** by a 500' main shaft and 10 prospecting shafts of 100 to 150' depth, with 6 main tunnels and 4 short prospecting tunnels. The mine has about 10

miles of workings showing good ore in the bottom levels. Ore is shipped to the Aguascalientes smelter for reduction.

Equipment: includes gasoline and electric power, with an electric hoist. There is a 5-mile private narrow-gauge railway connecting with the Mexican Central line, at Otto.

Production: in 1912 was 684,420 lbs. Property considered valuable and management good. Probably idle owing to revolutionary disturbances in Mexico.

JOE BOWERS MINING CO.

UTAH

Office: 515 Dooly Blk., Salt Lake City, Utah. John Dern, pres.; A. Reeves, sec. Inc. in Utah. **Cap.**, 450,000 shares; 25c par; assessable; 460,216 shares outstanding. Listed in Salt Lake City. **Property:** 40 acres in the Tintic district shows silver-lead ore. Is a prospect.

JOE CREEK COPPER CO.

CALIFORNIA

Idle. Hutton, Siskiyou Co., Cal. Is one of the many prospects of the copper belt of northern California, whose owners believed a copper outcrop could be made to pay cost of development and equipment from ore mined from shallow workings. **Property** apparently owned formerly by Copper King Mining Co., lying between the Blomfield group and the Blue Ledge mine, has opencuts and crosscuts developing the mine to depth of 400'. Mine is said to carry several large orebodies, ranging 5 to 8% in copper tenor and \$8 per ton in combined gold and silver values, an estimate considered excessive.

JOE DANDY LEASING CO.

COLORADO

Thos. Smith, supt. Operates a lease on the Joe Dandy mine on Raven hill, Cripple Creek district, Teller Co., Colo. Mine developed to about 1,000' depth by shaft and drifts, exposing an orebody, 2-4' wide, said to average \$30 per ton. Reported shipping from 3 to 5 cars of ore per week, Jan., 1916.

The Joe Dandy cyanide leaching plant, operated under lease by Thos. Kavanaugh, treats about 2,000 tons of ore per month, partly \$2 per ton dump ore.

JOHNNY BULL MINE.

NEW MEXICO

W. H. Henry, Boston Road, New York, N. Y., owner; David L. Creswell, Steins, Grant county, N. M., purch. agt. **Property:** 3 patented claims, south of Steins Pass, between S. P. and E. P. & S. W. R. R., on western slope of Peloncillo range, shows a contact deposit between limestone and a N-S. monzonite dike. The ore is said to average 5% copper and to run high in lime and iron.

Development: includes 2 old shafts 100' and 150' deep, with 1,000' of work, exposing 2 parallel veins, each 125' wide. Property was formerly owned by the Johnny Bull Copper Mining Co., whose charter was forfeited in 1902. Owner claims to have done development work in 1915.

JOHNSON COPPER DEVELOPMENT CO.

ARIZONA

Office: Frankfort, Ky. Mine address: J. T. Tong, mgr., Johnson, Cochise Co., Ariz. **Officers:** Henry S. Krug, St. Louis, Mo., pres.; Ralph R. Wilson, v. p.; E. H. Elliott, sec.-treas.; preceding, with P. S. Head, Hon. A. A. Hazelrigg, Hon. Baily D. Berry, Hon. A. C. Van Winkle and H. P. Hubbell, directors. **Inc.** March 13, 1908, in Arizona. **Cap.**, \$2,000,000; shares \$1 par; nonassessable; issued, about \$1,400,000. Annual meeting, second Monday in October.

Property: 8 claims, 3 fractional, unpatented, 123 acres, known as the Climax group, in center of the Johnson camp, between the Peabody, Peacock, Republic and Black Prince mines. Claims show granite and limestone, with replacement deposits carrying malachite, chrysocolla, bornite and chalcocite, averaging 4% copper and 5 oz. silver per ton for the sev-

eral thousand tons thus far developed. Orebody has a flat dip, averaging 32°, and is about 2' wide on the 250' level. **Development:** by 250', 1½-compartment working shaft, said to be bottomed in bornite disseminated in limestone. The 100' level has about 500' of crosscuts and drifting, much of it in ore, but ground is leached and broken. The 250' level has N. and S. drifts, 500' of workings, on a 2' vein. A 500' winze was sunk from the S. drift. Development is said to show large bodies of low-grade carbonates near the surface and some sulphides at 400' depth. Reported that some shipments have been made, also that a new hoist and compressor will be added.

Equipment: includes a 40-h. p. gasoline hoist, compressor and 5 buildings.

JOLLY JANE LEASING CO.

NEVADA

Has 3-year lease on the Jolly Jane claim, of Pioneer Extension Mines Co., which see.

JOPLIN-KENTUCKY LEAD & ZINC CO.

MISSOURI

Joplin, Mo. **Inc.** in Kentucky. **Cap.**, \$50,000. Operates a lease on 33 acres of mineral land owned by the St. Louis-Joplin L. & Z. Co., in Sec. 32, T. 28, R. 33, at Joplin.

Development: by 3 shafts to depth of 150'. **Equipment:** includes 125-ton concentrating plant, 2 pumps, 3 drills, steam power, 3 hoists, Carterville crusher and 2 Wilfley tables.

JOPLIN ORE AND SPELTER CO.

KANSAS

Offices: 40 Exchange Place, New York, and Joplin, Mo. **Works** at Pittsburg, Kan. **Officers:** Wm. Barret Ridgely, New York, pres.; E. Allendorf, Joplin, Mo., treas.

Inc. April, 1916, in West Virginia, to take over the property of the Joplin Ore & Spelter Co., of Missouri. **Cap.**, \$2,000,000; shares \$5 par; all issued and fully paid. An initial dividend of 5.5c paid May 25, 1916. Empire Trust Co., New York, registrar. Stock transferred at company's office.

Property: a zinc smelter at Pittsburg, Kan., about 37 miles from Joplin, Mo. Plant consists of 6 blocks of furnaces, each having 224 retorts, a total of 1,344 retorts. Two additional blocks of 224 retorts are being built, which will give the company a total of 1,792 retorts and an estimated capacity of 14,380,000 lbs. of spelter annually. Property reported on by Arthur E. Feust, E. M., in 1916.

JOSEFINA MINE.

MEXICO

Owned by Chenowith Bros., of Nogales, Ariz. **Property:** 5 miles from Santa Cruz station, on the Cananea branch of the S. P. R. R. and 40 miles N. W. from Cananea. Shipments are made to the Douglas smelter.

JUALIN ALASKA MINES CO.

ALASKA

Company is a subsidiary of the Algonican Development Co. W. B. Hoggatt, pres.; H. G. Young, mgr., Juneau, Alaska. **Property:** 20 claims on the north shore of Berners Bay, in the Juneau region, is developed by 360' main shaft, crosscuts and a drainage tunnel, 2,000' long, planned to be driven 7,500'.

Ore is reported to be 85% free milling. **Production:** under former owners said to total 50,000 tons of \$11.20 per ton gold ore. **Equipment:** includes 5½-mile tram, connecting the mine with the wharf, 450-h. p. compressor and hydro-electric plant. Operations were curtailed at outbreak of European war, but diamond-drill prospecting continues and management plans erecting a mill.

JUANITA MINING CO., S. A.

MEXICO

Office: Sellwood Bldg., Duluth, Minn. **Operating address:** Bisbee, Ariz. **Officers:** Martin Pattison, pres.; Byron M. Pattison, v. p. and mgr.;

Lemuel E. Shattuck, sec.-treas. **Property:** about 1,000 hectares, known as the Juanita group adjoining the Carnegie L. & Z. Co. property, 3 miles N. W. of Cananea, is traversed by several narrow fissure veins in volcanic tuff beds. These veins carry small oreshoots with chalcopryrite, galena and sphalerite. No. 1 shaft is 220' deep and there also is a 75' shaft. Work suspended since 1912 owing to political disturbances in Mexico. Is an undeveloped prospect.

JUANITA MINING & MILLING CO.

ARIZONA

Office: Phoenix, Ariz. Mine at Prescott, Yavapai Co., Ariz. **Officers:** M. Dwight Jennings, pres.; W. S. Heflin, v. p.; D. A. Seaman, sec. and gen. mgr.; E. J. Bennett, treas.; preceding, with B. F. Peters, Otto Kring and E. Payne Palmer, directors. **Inc.** April, 1905, in Arizona. **Cap.**, \$1,500,000; shares \$1 par; nonassessable; issued, \$1,200,000. Annual meeting, first Tuesday after second Monday of April.

Property: 16 claims, unpatented, 300 acres, and a 5-acre mill site about 4 miles from the Senator mine in the Hassayampa district, about 17 miles S. of Prescott. Management reports the property to carry 11 fissure veins in porphyry and schist with 4 under development of 1 to 60' width, traceable 1,000 to 3,000' carrying copper sulphides assaying 2 to 10% copper, 1 to 100 oz. silver and \$1 to \$1,700 gold per ton. Apparently the main vein is of 8' average width.

Development: by 210' shaft and several tunnels from 45 to 450' long, with 3,500' of workings estimated, 1913, to have blocked out 5,000 tons of ore with 25,000 tons in sight. **Equipment:** includes 25-h. p. hoist, 2-stamp mill, 7 tons capacity.

Property leased to D. A. Seaman until Nov., 1916, lessee to develop mine and install machinery, leaving not less than a 20-stamp mill, and pay royalty on all ore taken from opencuts and stopes. No recent returns secured.

JUDGE MINING & SMELTING CO.

UTAH

Office: 1022 Kearns Bldg., Salt Lake City, Utah. Mine P. O.: Park City, Summit Co., Utah. **Officers:** H. Otto Hanke, pres.; M. C. Fox, v. p.; G. M. Lambourne, sec.-treas. and mgr.; W. M. Bradley and A. C. Wall, directors; O. N. Friendly, gen. supt.; Geo. D. Blood, cons. engr.

Inc. 1901 in New Jersey as the Daly Judge Mining Co. Reorganized, 1916, under present name. **Cap.**, \$300,000; shares \$1 par, increased March, 1916, to \$500,000. Stock listed on Salt Lake Exchange and New York Curb. **Dividends:** paid in 1915 amounted to \$300,000; total dividends to date, \$1,155,000. Present rate is 25c per share quarterly. Balance of \$678,906 in treasury, Jan. 1, 1916. Total receipts from ore sales in 1915, \$1,041,413.

Property: company has valuable holdings, about 1,100 acres patented ground, covering 11,000' of a fissure vein system, in Park City district, adjacent to the Daly West mine. Is a large producer of silver-lead ores with much zinc and a small amount of copper.

Development: mainly by tunnel and drifts, amounting to 12,017' in 1915, was towards the Bonanza Flat section from the 300' to the 2,300' level, principally on the 1,200' level, opening an 18" vein, said to run 30% lead, 60 oz. silver and 3% copper. The Snake Creek tunnel driven 14,000' to the property line was completed early in 1916; it will unwater the mines at greater depth and provide transportation.

Equipment: includes 400-h. p. electric hoist, compressor and 500-ton wet concentrating plant with flotation unit for treatment of slimes, making a zinc and lead product.

Production: for 1914 was 54,701 tons and 69,744 tons in 1915. Mill treated 49,095 tons in 1914, producing 9,675,200 lbs. lead; 7,838,984 lbs. zinc;

384,782 lbs. copper; 519,979 oz. silver and 724 oz. gold, and 63,935 tons in 1915, producing 10,828 tons lead concentrates, 7,169 tons zinc concentrates, a concentration ratio of 5.8 to 1 of lead concentrates and 3.5 to 1 of all products combined. Crude ore mined in 1915 amounted to 5,809 tons, averaging 30.32 oz. silver, 17.73% lead, 10.82% zinc, 7.67% iron, 1.86% copper and 0.034 oz. gold, returning \$23.93 per ton. Total production to 1916 was 5,622,420 oz. silver, 11,800.22 oz. gold, 116,601,381 lbs. lead, 86,937,150 lbs. zinc, 2,984,875 lbs. copper, which sold for \$6,482,833.

Property is a regular dividend payer and the unexplored portion of the mine is promising. The increase in capitalization provides funds to construct a new zinc plant near Park City and enables the company to continue dividends at the present rate.

JULIAN MINING & MILLING CO.

UTAH

Idle. American Fork, Utah Co., Utah. **Officers:** Jas. Chipman, Jr., pres.; Wm. Thornton, v. p.; J. E. Bennett, sec.-treas. Inc. Aug., 1909, in Utah. Cap., \$50,000; shares 5 cts. par. Apparently succeeded a company of same title organized in Nebraska, with an office at Geneva, Neb., which lost its charter 1909. **Lands:** 5 claims, unpatented, showing gold, silver and copper ore.

JUMBO EXTENSION MINING CO.

NEVADA

Goldfield, Nev. **Officers:** Chas. S. Sprague, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas.; preceding, with C. D. Olney, and N. P. Ward, directors. Inc. April, 1904, in Ariz., as successor of the Jumbo & Vernal Extension Mng. Co. Cap., \$1,250,000, increased to \$1,550,000 in 1915; shares \$1 par; all issued. Securities Transfer & Registrar Co., N. Y., and Registration Surety Co., San Francisco, transfer agts. and registrars. Annual meeting 2nd Tuesday in July. Listed on New York Curb and in Salt Lake City.

Comparative Income Statement

Year Ending June 30

	Previous			Other	
	Cash Bal.	Receipts	Dividends	Expend's	Cash
1916	\$120,533	\$688,086	\$465,100	\$240,255	\$103,274
1915	29,100	473,335	125,317	256,585	120,533

Dividends: first dividend, 10c per share, was paid in July, 1911, out of proceeds of sale of Vinegorone fraction. Dividends since then have been as follows: Dec., 1914, 5c; March, 1915, 5c; Sept., 7½c; Dec., 10c; March, 1916, 7½c; June, 5c per share. Dividend for 3rd quarter passed.

On Jan. 1, 1912, the company had cash on hand \$106,575, and on Jan. 1, 1914, only \$9,350, a cash loss of \$97,000 in 2 years and nothing to show for it. In Dec., 1913, control of the property passed to C. S. Sprague and associates of Goldfield, with H. Schwaikert, New York, as president. In first 5 months of new arrangement, net profits were \$53,342. In August, 1914, stock sold down to 12½c per share. In October a rich orebody was found that started the stock on a sensational career, making it a storm center on the New York Curb, that lasted for several months. A time-worn and familiar but, nevertheless, effective trick played on brokers carried the price to \$4 in December, after which record it immediately dropped to lower levels.

In February, 1915, an apex suit was filed by the Reorganized Booth Mining Co. against the Jumbo Extension to recover \$900,000 for ore claimed to have been mined from one of the veins of the Goldfield Booth Co. and the mine was closed. Within a short time an agreement was reached whereby operations were resumed, pending the hearing of the case in May. The litigation was settled by the Reorganized Booth Mining Co. deeding to the Jumbo Ext. Co. all ore in the Velvet claim and in return the

Booth Co. was given 300,000 shares of Jumbo Ext. stock, the cause of the increase in Jumbo Ext. Co. capitalization, and also \$15,000 in cash. The Jumbo Ext. Co. now has side-line agreements with the Booth, Goldfield Cons. and Goldfield Merger Mines Co., thus protecting itself from all future litigation.

Property: 9 claims, 97 acres, in Goldfield district, Esmeralda Co., Nev. **Ore:** gold, silver and copper in a quartz vein, occurring on the contact between shale and latite, locally called "Goldfieldite." Vein strikes N.-S.; dips 30° E. The pay ore occurs in shoots averaging 4' in width. For geology of the district, see U. S. G. S. Prof. Paper, No. 66.

Development: by two shafts, one on the Paloverde claim, 1,017' deep, and the Original Velvet, or No. 2 shaft, on the Velvet claim, 400' deep, until May, 1915, when work was started on enlarging it from a 2-compartment to a 3-compartment shaft and sinking to the 1,017' level, where connection will be made with No. 1. In June, 1916, sinking had reached a depth of 900'. Shaft is equipped with 100-h. p. double drum hoist and Cameron pump. Air is supplied from the 16-drill compressor at No. 1.

During the first quarter of 1916 development work from No. 1 shaft totaled 2,430' and cost \$6.86 per foot. The Velvet shaft and the 770 and 880' stations were completed in this period.

Ore reserves: estimated at end of fiscal year, June 30, 1915: (none given for 1916)

Mill ore on dump.....	1,500 tons
Shipping ore	49,500 tons
Milling ore	35,750 tons

Total 86,750 tons

Average grade of shipping ore was figured at \$41.21 per ton and the milling ore at \$8.67 per ton.

The company's leased mill at Bonnie Clare, Nev., was shut down June 10, 1914, and ore was sent to the mill of the Goldfield Cons. Milling & Trans. Co. until Sept. 10, 1914. The ore was not susceptible to the treatment used there and experimental work has since been carried on to find a satisfactory milling process, but without success thus far.

Production: for fiscal year ending June 30:

	Ore Tons	Gross Value	Loss in Treatment	—Value— Total Per Ton	
1915:					
To smelter.....	10,873	\$669,560	\$51,161	\$618,399	\$56.87
To Cons. Mill (3 mos.)	5,547	81,850	49,302	32,548	5.87
1916:					
To smelter.....	35,541	1,124,487	153,703	970,785	27.32

Total output in 1915 was 22,562 tons, yielding \$403,827 net, of which \$333,750 was paid in dividends. The ore contained 1,259,388 lbs. copper, 30,480 oz. gold, and 99,459 oz. silver. Earnings for first quarter, 1916, reported as \$64,120.

Net operating expense for the last fiscal year was \$15.656 per ton; \$2.91 for mining, \$2.49 for development, \$9.26 freight and treatment on ore shipped, \$1.17 for general expense, etc. Total mining, development, repair and other costs for first quarter of 1916 were \$5.34 per dry ton of ore.

It is evident that the property has been forced to pay dividends for stock market effect. The Bonanza orebody, 150' long and 56' vertical, was greatly over-estimated. The boosting of the price to \$4 a share was a case of rank market rigging by brokers, the real value being believed to be less than \$1.00. Property has, however, possibilities of further ore and needs

development. Reported by the management in August, 1916, that "No new commercial ore has been opened in the mine for the past six months and the production has come entirely from the one ore-shoot first opened 18 months ago. The drain on this one ore-shoot has been very heavy and the end of the productive life of the mine is not remote, unless further development discloses new orebodies. Engineer Turner's plan of development will require at least \$100,000. It is also the purpose of the company, in order to perpetuate the corporation, to acquire a new producing property."

It is worthy of note that the property produced 1,259,388 lbs. copper in 1915, sold at an average price of 14.33c per lb., which at early 1916 prices gives a profit of double that of 1915. **Production:** for first quarter of 1916, was 9,230 tons smelting ore sold, and 99 tons dump ore, which realized \$247,192 gross, or \$120,062 net; mining costs \$3.07 per ton.

JUMBO JUNIOR MINING CO.

NEVADA

Goldfield, Nev. **Inc.** 1915 in Nev. **Cap.** \$1,500,000; shares \$1 par. Stock listed on San Francisco Exchange. **Property:** the Spearhead Fraction claim, 6 acres, located between the Velvet, Kewanas and Spearhead properties at Goldfield, purchased of the Spearhead Fraction Mining Company, is merely a prospect.

JUMBO MINING CO.

IDAHO

Wallace, Idaho. John Carlson of Gem, J. N. Morgan of Mace and John Wood, C. E. Conn and Chas. Minch of Gem, Idaho, incorporators. **Inc.** Aug. 28, 1913. **Cap.** \$1,000,000, shares \$1 par. No returns secured.

JUMPER CALIFORNIA GOLD MINES CO.

CALIFORNIA

Stent, Calif. P. E. de Caplaine, pres., W. D. Waltman, v. p., Lester S. Grant, mgr. **Property:** 120 acres at Stent, Tuolumne Co., Calif., on the Mother Lode, is developed to depth of 1,800' by an incline shaft. **Equipment:** includes a 60-ton 20-stamp mill. The mine was operated by 7 sets of lessees in 1915 who are reported to have produced \$10,000 worth of ore in 10 months, ending August, 1915. Company receives 25% royalty and charges \$1 a ton for milling ore extracted.

JUNE BUG DEVELOPMENT CO.

NEVADA

Office: Ogden, Utah. **Mine office:** Las Vegas, Clark Co., Nev. **Directors:** Lester S. Scoville, pres.; Milton J. West, v. p.; Frank L. Scoville, sec.-treas.; above with John Hochett and Walter B. Scoville. Milton J. West, mgr., L. S. Scoville, supt. **Inc.** Jan., 1916. **Cap.** \$100,000, shares 10c par; 825,000 issued. Annual meeting Jan. 4th.

Property: 9 claims, surveyed for patent, 18 miles N. W. of Las Vegas, in the Good Springs district, Nev., said to show gold, silver and zinc ore. Pay ore occurs in shoots 30' long, from 6-10' wide and from 14" to 5' thick, reported to assay 40% zinc, \$1.50 gold and \$4 silver per ton. The ore is a zinc silicate. Veins are in limestone formation.

Development: by shallow shafts and about 1,200' of underground workings. Shipments of 650 tons for 4 months ending June, 1916, to the Utah Ore Sampling Co., returned \$35,000. Management reports that company is marketing sufficient ores to take care of all extensions and new developments, 1916.

JUNE COPPER CO.

WASHINGTON

H. S. Spedden, supt., Chewelah, Stevens Co., Wash. **Inc.** June, 1913, in Washington, by R. C. Toole, L. B. Cottingham and W. L. Hansom. Presumably owns the June-Echo mine near Chewelah, where a 40-h. p. gasoline hoist has been installed and a 200' shaft sunk. Vein shows copper-silver ore. Reported under lease to J. W. Douglas, 60 Wall St., New York, in May, 1915.

JUNE GROUP.**BRITISH COLUMBIA**

See Copper Mountain Mining & Development Co.

JUNIATA GOLD & COPPER CO.**ARIZONA**

Office: 315 South Broadway, Los Angeles, Cal. **Mine address:** Parker, Yuma Co., Ariz. **Officers:** P. W. Powers, pres.; E. S. Field, v. p.; Dalton S. Patterson, sec.-treas.; H. B. Ailman, supt. **Inc:** Oct. 29, 1907, in Arizona. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 10 claims, 200 acres, lying between the Gray Eagle and Carnation mines, in the Seneca district about 9 miles N. E. of Parker, on the E. side of the Colorado river. Claims show gray micaceous schists with interbedded limestone. The schists dip about 45° and are cut by shear zones in which copper ores occur. **Development:** by 200' shaft with 2 prospect shafts reported to expose 8' of ore carrying 4% copper and \$9 gold per ton. A second vein said to be 18' wide is reported to carry 2½% copper and \$6 gold. Property is a prospect. No recent returns secured.

JUPITER MINES, LTD.**ONTARIO**

Succeeded, 1915, by the McIntyre-Jupiter Mines, Ltd., which see.

JUSTICE GOLD MINING CO.**NEVADA**

Goldfield, Nev. Officers: O. M. Justice, pres.; John La Foe, v. p.; Mrs. A. B. Hays, sec.-treas.; C. W. Hays, gen. mgr., with J. R. West, directors. **Inc.** 1914, in Nevada. **Cap.**, \$1,000,000; shares, \$1 par. Stock listed on San Francisco Stock Exchange. **Property:** the Gold Coin Extension claim in the Diamondfield section of the Goldfield district and a lease on the adjoining property of the Diamondfield Daisy Gold Mining Co., which carries a 2½' vein of gold-copper ore running from \$18-\$39 per ton.

Development: by 265' Daisy shaft, with crosscuts, drifts and stopes. Several carload shipments in 1915 from stope above the 265' level reported to have yielded \$70 per ton.

KAMLOOPS COPPER CO.**BRITISH COLUMBIA**

General office: 609 First National Bank Bldg., Duluth, Minn. **Mine address:** Kamloops, Yale district, B. C. **Officers:** E. G. Wallinder, pres.-mgr.; W. H. Eaton, v. p.; Louis Ramstad, treas.; J. J. Eklund, Reiner Hoch, C. E. Evans, Theodore Michel, Otto Johnson, directors; W. W. Blackshaw, sec., 1412 Tower Ave., Superior, Wis.; Arthur Wallinder, supt. **Inc:** Sept. 7, 1909, in Arizona. **Cap.**, \$3,000,000, shares \$10 par, part paid; 128,561 issued, none preferred. Has issued \$282,100—6% bonds.

Property: 10 claims, 2,041 acres, 228 acres mineral land, including the Iron Mask mine, 4 miles S. W. of Kamloops. The Iron Mask shaft is sunk on a shear zone, mineralized for 20 to 30' in width, with segregations of better grade ore forming a paystreak of variable width, carrying chalcocopyrite, associated with magnetite in a choric gangue containing orthoclase intercrystallized with copper sulphide. The country rock is a diorite with smeary basic patches of gabbroic material. The Iron Mask orebody averages 28' in thickness, but is lenticular in shape. The ore averages 5% copper, 0.2 oz. silver and .09 oz. gold per ton. It is troublesome to concentrate by ordinary methods owing to its chloritic and quartz-orthoclase gangue.

The mine shows several orebodies besides the Iron Mask, all of them due to "igneous aftereffects," and occurring in fresh diorite, filling fissures as replacements along fissures and in patches, the ore consisting of orthoclase, chlorite, epidote and other secondary pneumatolytic minerals, with interlocked chalcocopyrite, pyrite, magnetite, etc.

The Erin orebody shows excellent ore and numerous pits at various points on the property all show ore.

Development: includes the 780' Iron Mask shaft and some 9,000' of workings, on 9 levels; the 330' Erin shaft sunk on ore for 300' with 600' of drifts and crosscuts; the 50' Lucky Strike shaft and 3 other prospect shafts. Electric power is obtained from the City of Kamloops power station.

Equipment: includes one 150-h. p. compressor, one 225-h. p. motor for the "Iron Mask" hoist and 8 smaller motors, 6' double-drum hoist, 3 air compressors of 1,300 cu. ft. capacity, good for 15 drills, an electric-light plant and a sawmill. Transportation is by a good wagon road with steep grades, leading to the railway siding below Kamloops. The management plans a 2½-mile tram, having a drop of 1.100'.

Company reports mining costs at \$1.12 and concentration costs at \$0.28 per ton, which low figures are regarded as a result of not charging up general expenses, development, etc., to costs.

Property is valuable but needs churn drilling as Iron Mask mine alone is not a sufficient basis for a big company, and surrounding ground, while mineralized, is unproven. **Ore reserves:** of Iron Mask and Erin mines claimed to be 1,800,000 tons of 2½% copper ore. Mine shows a large tonnage of low-grade ore susceptible to concentration by froth flotation. The old 160-ton concentrating mill has been enlarged to a 30 ton per hour capacity. **Production:** Jan. 1, 1915, was 1,500,000 lbs. of copper, 5,548 oz. silver and 807 oz. gold. Property not worked in 1912, company husbanding its resources to meet payments on the property. Operations in 1913 were confined to ore extraction from the Erin shaft and to cleaning up the old Iron Mask workings.

In 1915 considerable crosscutting and raising was done from the 750' level and a crosscut started on that level toward the Erin mine, 1,500' distant. It is understood that the English corporation has extended the time for further payments on the property. About 2,000 tons of ore and concentrate were shipped in 1915.

KAMLOOPS MINES, LTD.

BRITISH COLUMBIA

Office: 151 Coronation House, 4 Lloyds Ave., London, E. C., Eng. Company in hands of trustees, as property is under lease and bond to the Kamloops Copper Co.

KANSAS CITY-JOPLIN MINING CO.

MISSOURI

Office: West Fourth St., Joplin, Mo. Is reopening the Red Lion mine at Joplin, Mo. Has a 200-ton mill on the property.

KANSAS CITY-NEVADA CONS. MINES CO.

NEVADA

Office: 411 Commerce Bldg., Kansas City, Mo. **Mine office:** Bruner, Nev. **Officers:** E. C. Sooy, pres.; E. M. Ridenour, 1st v. p.; C. R. Jones, 2nd v. p.; B. H. McGarvey, treas.; R. E. Bruner, sec.; H. W. Bruner, gen. mgr., with Jas. B. Welsh, H. M. Wheaton and Wm. J. Morse, directors.

Inc. 1915 in Nev. **Cap.,** \$6,000,000; shares \$1 par; 1,500,000 shares in treasury, Feb. 1916. Company gave 100,000 shares for the property of the Big Henry Gold Mining Co.; 2,000,000 shares to redeem the outstanding stock of the Phonolite Paymaster Mng. Co.; 800,000 shares to redeem the outstanding stock of the Phonolite Silent Friend Mng. Co., and 1,600,000 shares for the Duluth Gold Mng. Co. holdings, in the Bruner district, Nye Co., Nev.

The Paymaster property has about ½ mile of underground workings. In the main 1,000' tunnel an orebody, 110' long, has been opened up, reported to carry gold-silver ore averaging \$20 per ton. Management plans extensive development in 1916.

KANSAS COPPER CO.

ALASKA

Inactive. Inc. by W. G. L. Totten, Buckannon, W. Va., J. C. McWhor-

ter, E. W. Martin, U. G. Young and G. F. Smith, to operate copper and other mines in Alaska.

KANSAS NEVADA MINING CO.**NEVADA**

Goodsprings, Clark Co., Nev. **Officers:** Frank Williams, pres.; Chas. Locknow, v. p.; J. T. Bristow, sec.-treas.; with John Williams and Thos. Williams, directors.

Inc. July 16, 1907, in Nev. **Cap.**, \$1,000,000; shares \$1 par; 706,895 outstanding. Operating expenses for 1915 were \$2,128 and gross earnings from ore sales were \$1,560.

Property: 3 unpatented claims, about 53 acres, 9 miles W. of Goodsprings, shows zinc, lead and silver ore in a 4' vein in limestone formation. The vein runs E. W. and dips N. Developed by 500' tunnel to depth of 130'. An initial shipment of 53 tons of ore made in 1915 averaged \$30 per ton.

KATE HARDY MINES CO.**CALIFORNIA**

Office: Bacon Bldg., Oakland, Calif., A. D. Grant, supt. **Property:** the Kate Hardy mine and mill at Forest, Sierra Co., Calif., has been operated intermittently since 1860 and is credited with a production of over \$225,000 in gold. Six veins have been cut on the property from 6-10' wide, carrying mainly oxides, but some sulphides. The main vein runs N. 20° W. and dips about 80° W. Pay ore occurs in patches of free gold and auriferous arsenopyrite. Developed by several tunnels, longest 600'. **Equipment:** includes a 3-stamp mill, 1 classifier and Wilfley tables. Geology fully described in U. S. G. S. Bull. 580, p. 181.

KATINKA GOLD MINING CO.**COLORADO**

Owns property at Guyot Hill, operated under lease 1915 by Progressive Gold Mining Co. Chas. Warden, mgr. Work stopped Jan. 1916 by threatened apex litigation.

KATTENHORN BROS. MINE.**NEVADA**

Battle Mountain, Lander Co., Nev. **Property:** 3 claims, 54 acres, unpatented, in the Pittsburgh mining district. Gross earnings reported for 1914, \$80,000, all from ore sales; operating expense, \$60,000.

Ore: silver in fissure vein in limestone and quartzite with N. W.-S. E. strike and dip of 55°, said to assay 200 oz. silver per ton. **Development:** 1,800' tunnel, with 3,000' of workings; greatest depth 200'.

Production: amounted to 750 tons ore, yielding 150,000 oz. silver in 1914. No production in 1915.

KAUFMAN & RANDALL MINE.**NEVADA**

Charles Oberg, lessee, Yerington, Nev. **Property:** in west side of Yerington district, Lyon county, Nev., shows 12 to 15' of oxidized ore containing cuprite from which shipments to the Wabuska smelter are said to have yielded \$615.80 per ton net.

KAY COPPER CO.**ARIZONA**

S. J. Tribolet, pres. and mgr., Phoenix, Ariz. Company owns the Starkweather mine and claims on the Agua Fria river, at the mouth of Black Canyon creek, 50 miles N. of Phoenix and some 9 miles from Cave creek. Past reports indicate that company developed a body of high-grade ore. The main shaft, 340' deep, is said to have shown 17' of 10% ore on the 260' level and 8' of gray copper ore, averaging 17.7% copper, on the S. drift of the 300' level. No recent report on the mine, presumably idle.

KAY MINE SMELTING CO.**VIRGINIA**

Address: R. F. D., No. 2 South Boston, Va. **Officers:** Z. L. Kay, pres. and gen. mgr.; J. R. Wilbourne, v. p.; H. P. Wilder, sec.; H. J. Watkins, treas., and Jas. S. Sebree, directors. **Inc.** Aug. 8, 1905, in South Da-

kota. **Cap.**, \$1,000,000; shares \$1 par; 525,000 shares paid Z. L. Kay for property; 200,000 issued.

Property: 261 acres, comprising the Kay farm at the N. end of the Virgilina district, 9 miles from South Boston, in Halifax county, Virginia. The tract shows lenticular quartz veins enclosed in schistose rocks formed from old volcanic tuffs and andesite, of the type characteristic of the Virgilina district. Veins consist of white quartz and carry primary copper glance below the water level with carbonates, oxides and some native copper in the oxidized zone. The vein varies from 3 to 6' in width and is said to be traceable 1 mile.

Development: by two 50' shafts, said to show ore averaging 4.8% copper with small values in gold and silver. Owner estimates 1,000 tons in sight. There is a 15-h. p. gasoline hoist and a 1-drill compressor. A trial shipment of ore was sent to the Reid electric smelter, Newark, N. J.

Development money is supplied by local residents, the work being contingent upon their ability to supply the funds. As work has been intermittent since 1905, and property now has but 109' of workings, the outlook is not very hopeful. The future of the entire district, including this property, depends upon the use of some cheap method of concentration, which froth flotation apparently supplies.

KEARNS-KEITH MINING CO.

UTAH

Thomas Kearns, pres.-gen. mgr. and David Keith, v. p., Salt Lake City, owners. Is a privately owned corporation, which is being sued by the Keystone Mining Co. for \$1,500,000 for alleged illegal extraction of ore in 1901-1907.

KEATING GOLD MINING CO.

MONTANA

Office: care Jesse B. Roote, Lewisohn Bldg., Butte, Mont. Mine near Radersburg, Mont. **Officers:** Julius H. Barnes, pres.-treas., Duluth, Minn.; Jesse B. Roote, v. p.; A. P. Barnes, sec.; preceding with Ward Ames, Jr., and A. T. Banning, Jr., directors.

Inc. 1908 in Mont. **Cap.**, \$2,000,000; shares \$5 par; 375,000 issued. No dividends to date. Superior State Bank, Superior, Wisc., registrar and transfer agt. Annual meeting 1st Tuesday in June. Listed on Butte Stock Exchange.

Property: 19 patented claims, about 300 acres, contains the Keating gold vein in andesite with a number of other veins, two of which have been worked. The Keating is a strong fissure vein with well defined walls and quartz-pyrite filling with more or less calcite. The ore is pyrite, frequently very coarsely, but massively crystalline, with some chalcopyrite and no visible gold, only occasionally showing gray copper, lead or zinc sulphides. The pay ore varies from a few inches to 8' in width, the average stopping width being about 3'. The value cannot be estimated from the amount of pyrite present, nor from its physical character but must be determined by assay. The ore shipped for several years past has averaged about 1% copper.

Development: to the 1,200' level has been by an inclinal shaft on the vein with a vertical southerly shaft, now idle, down to the 600' level. Cross-cutting to adjacent veins has disclosed ore but not in large amounts. The geology is described by Stone in Bull. 470, U. S. G. S., p. 93-96.

Equipment: ample for an output of 100 tons a day. As the mine is wet and the water from the old stopes very acid the pumping item is a large one.

Production: for 9 years has aggregated about \$4,500,000, but without profit to the stockholders, heavy teaming charges with freight and smelter

treatment costs aggregating over \$7.00 a ton, having absorbed temporary profits. Lack of railway transportation and failure to mill the ore is therefore responsible for the present financial position of the company.

It is understood that measures are being taken to develop the mine to the 1,500' level and to erect a 50-ton mill to treat the ore at the mine. A careful investigation of the ore treatment problem is being made by experts. 1916. The mine was examined by Walter Harvey Weed, Jan., 1916.

KELLOGG SUNNYSIDE MINING CO.

IDAHO

Jacob Thorpe, pres., Kellogg, Ida. Inc. April, 1916. in Idaho. **Cap.**, \$150,000; shares 10c par. J. A. McEachran, S. A. McCoy and Geo. H. Wilson of Spokane, incorporators.

KELLY MINE.

NEW MEXICO

Kelly, Socorro Co., N. M. Owned by Tri-Bullion Smelting & Development Co.

KELVIN-SULTANA COPPER CO.

ARIZONA

Office: 339 Monadnock Bldg., Chicago, Ill. **Mine office:** Kelvin, Pinal Co., Ariz. **Officers:** A. H. Westfall, pres.; Geo. P. Baldwin, v. p.; H. Carman Lutkin, sec.; Jas. W. Nye, treas.; preceding with Jas. A. Russell, Donald G. Ross, and Dr. J. A. Glenn, directors. A. L. Flagg, supt. Inc. April 19, 1910, in Arizona. **Cap.**, \$3,000,000, increased Dec., 1914, to \$5,000,000; shares \$1 par, nonassessable; issued 3,842,752 shares. Authorized bond issue to Nov. 1, 1919, \$200,000, \$198,700 outstanding. Company was a reconstruction of the Sultana-Arizona Copper Co. financed by the Baldwin Syndicate of Chicago and the entire floating indebtedness eliminated.

Property: 21 claims and 3 fractions, 530 acres; all patented but 2 claims and fraction, in Ray-Kelvin district, Pinal county, Ariz. Company also owns 30 acres of gold and silver lands in Ures district of Mexico.

The Arizona mines were formerly known as the Riverside and Bryan groups, and are across the Gila river from and 1½ miles S. E. of Kelvin. Management reports 21 contact deposits, between granite and diorite, of which 5 veins have been developed; reported as 18" to 6' wide, and estimated to average 5' in width, with a generally N. W. trend. The property also was said, formerly, to show a 6' vein carrying chalcopryrite in the lower workings, from which shipments to the Humboldt smelter returned 8.7 to 10.6% copper. Average tenor of ore in all veins is estimated by the company as 6% copper and 3 to 4 oz. silver per ton.

Development: by 6 shafts, deepest 590', and the Hunter and Agnes tunnels. About 10,000' of underground work has been done and is said to show widening of veins at depth. A 165' shaft on Diamond Joe claim is reported by Ralph Harris, mining engineer, to cut cuprite, chalcocite, chalcopryrite and pyrite. Vein No. 2 is said to show 6' of 4% ore and in a winze from the 300' level 3' of 6% ore. On the Bryan claim, a 175' incline shaft has exposed shipping ore, reported to be very rich.

A crosscut on the 540' level, being driven 2,000' and 1,267' long, Feb. 1916, is reported to have intersected 3 veins which are now under development; No. 510—a vein 4' wide, carrying 2% copper ore and No. 510-b, about 1' wide, with from 3-17% copper, 4½% lead and 2½ oz. silver.

Equipment: includes a 575-h. p. oil-burning electric plant, a 1-mile aerial tram across the Gila river, to the railway station of Kelvin and a concentrator of 200 to 300 tons daily capacity.

Production: of old company, to end of 1909, was 522 tons of ore, yielding \$12,450. Production in 1907 was 45,838 lbs. fine copper and 653 oz. silver. Daily shipments of 20 tons to the Hayden smelter were made in summer of 1913. The mill has been closed down until sufficiently large

reserves have been blocked out to insure profitable operation. Lessees are working on the surface and have made shipments said to average 8-14% copper.

Company not favorably regarded.

KELVIN TUNNEL SITE & MINING CO.

ARIZONA

Letters to J. D. Ferree, pres.-treas., P. O. Box 126, Phoenix, Ariz., returned unclaimed. N. Nelson, v. p.; W. S. Mahin, sec.; Thos. Hall, supt. Inc. 1906 in Arizona. **Cap.**, \$2,000,000; shares \$1 par. Authorized bond issue \$100,000; \$40,000 bonds issued.

Property: 11 claims and a fraction, 230 acres, and a 5-acre mill site in Riverside district, 2¼ miles from Kelvin, Pinal County, Ariz.

Development: since 1906 consists of an 8x9' tunnel, in 700', at last accounts, which cuts 4 veins. Unselected average ore said to have assayed 2.10-9% copper; \$1.24-\$5.92 gold-silver and 9.60% iron per ton. Five men employed. Assessment work only being done.

KENAI-ALASKA GOLD MNG. CO.

ALASKA

Jas. Hayden, mgr., Seward, Alaska. **Property:** on Great Falls Lake, adjoining the Skeen-Lechner. shows a 2' vein, cut on the 260' level, which is said to carry ore mining better than \$60 per ton. **Developed:** by 1,700' of tunnels and stopes. **Equipment:** includes 5-stamp mill, operating since 1914 and a 6,000' aerial tram connecting mine and mill.

KENEFICK ZINC CORPORATION.

MISSOURI

Controlled by United Zinc Smelting Co., which see. **Office:** 115 Broadway, New York. **Officers:** Wm. Kenefick, pres.; Arthur Day, v. p.-treas., with Russel Cowles, C. Buckman, Arnold Davis, C. V. Jones and Paul H. Easley, directors. A. Anderson, sec. Inc. Feb. 2, 1916, in New York. **Cap.**, 5,000 7% preferred shares at \$100 par and 200,000 shares of common stock of no par value; all issued. Stock listed on New York Curb.

Dividends: two of 10c each were paid on common stock to May 1916. After payment of a 7% dividend on preferred and \$1.20 annually on common stock, 50% of net earnings are to be applied to the retirement of the preferred stock at par. Empire Trust Co., New York, transfer agts. Bankers Trust Co., New York, registrar.

Property: includes 5 producing zinc mines: the Samson and Coyote mines at Joplin, the Media and Electric at Webb City and the Milan mine and mill at Prosperity, Mo.; company also owns and operates 4 mills with total daily capacity of 3,000 tons.

Production: in 1915 was 30,000 tons of high-grade zinc concentrates, assaying 60% zinc with only a small percentage of lead.

KENNEBEC MINING CO.

UTAH

W. J. Craig, pres.-mgr.; S. M. Levy, v. p.-sec. Inc. in 1901. **Cap.**, \$400,000; shares \$1 par; 130,000 shares in treasury.

Property: 30 patented claims, about 400 acres, in the South Fork of the Big Cottonwood district, Salt Lake Co., Utah, adjoins the Cardiff on the east and west and the Wasatch Mines and Columbus Extension on the north.

Development: by a 700' incline shaft, a 3,000' lower tunnel and an upper tunnel, now being extended to intercept the main vein.

Property is an old-time silver-lead producer and has been under development by present management for many years.

KENNECOTT COPPER CORPORATION.

ALASKA

Office: 120 Broadway, New York. **Officers:** Stephen Birch, pres.; Wm. Pierson Hamilton, v. p.; Thos. Cochran, H. O. Havemeyer, Elliot

C. Bacon, S. W. Eccles, Seward Prosser, Samuel J. Clarke and John N. Steele, directors. C. T. Ulrich, sec.; E. S. Pegram, treas. Inc. April 29, 1915, in New York Cap., \$6,000,000, increased May 1915 to \$15,000,000, in 3,000,000 shares, fully paid and non-assessable.

On December 31, 1915, there were outstanding 2,754,625 11-13 shares of the stock, issued for the following purposes:

	Shares
Cash (original incorporation).....	100
For Kennecott Mines Co. property, assets and liabilities.....	599,900
For Beatson Copper Co. property, assets and liabilities.....	119,996
For 404,504 shares of Utah Copper Co.....	606,756
For all C. R. & N. W. Ry. Co. stock and bonds, and 13,000 shares of Alaska S. S. Co. stock.....	200,000
For 1,330,280 shares stock of Braden Copper Mines Co. and \$5,887,000 bonds of Braden Copper Mines Co.....	771,593 11-13
For \$9,782,000 Kennecott Copper Corporation bonds.....	391,280
Compensation to Underwriting Syndicate.....	65,000
Total	2,754,625 11-13

Bonds: authorized, (June 1, 1915) \$10,000,000 1st mortgage 6% 10-year convertible Sinking Fund Gold Bonds. An initial dividend of \$1 was declared Feb. 1916, calling for the disbursement of \$2,780,583. D. A. Crockett, 120 Broadway, transfer agt.; Bankers Trust Co., New York, registrar. Annual meeting first Tuesday in May. Stock listed on New York Exchange.

Statement of Assets and Liabilities, December 31, 1915.

Assets

Property Accounts:

Mining Property.....	\$17,990,296.37
Less—Depletion	430,661.40
	<u>\$17,559,634.97</u>
Construction and equipment.....	1,041,993.05
Less—Depreciation	169,338.60
	<u>\$872,654.45</u>

Investments:

404,504 shares Utah Copper stock.....	\$30,337,800.00
1,330,280 shares Braden stock.....	20,465,846.16
\$5,887,000 par Braden bonds.....	18,113,846.15
\$23,020,000 par C. R. & N. W. Ry. bonds.....	11,510,000.00
48,174 shares C. R. & N. W. Ry. stock.....	1.00
13,000 shares Alaska S. S. stock.....	1,300,000.00
	<u>\$81,727,493.31</u>

Current and Working Assets:

Metals on hand.....	\$7,066,157.22
Ore and concts. on hand and in transit.....	94,455.84
Materials on hand.....	206,949.84
Accounts collectible.....	39,374.00
Deferred accounts.....	17,997.61
Anglo-French notes (\$2,000,000 par).....	1,925,000.00
Cash	10,179.25
Cash due in Jan. for Dec. copper settlements.....	1,103,691.87
	<u>\$10,463,805.63</u>

Grand total..... \$110,623,588.36

Liabilities

Stock (without nominal or par value):	
Authorized	3,000,000 shares
Unissued	245,374 2-13 shares
Outstanding	2,754,625 11-13 shares
Stated capital.....	\$15,000,000.00
Capital surplus (from conv. of bonds and excl. of stock)...	85,377,984.84
	<u>\$100,377,984.84</u>
First mortgage bonds—Issued.....	\$10,000,000.00
In treasury.....	9,782,000.00
Outstanding	218,000.00
Current Liabilities:	
Accounts payable.....	\$2,056,350.86
Accrued interest and taxes.....	197,736.34
Deferred accounts	33,963.82
Treatment, refining and delivery charges (not yet due)...	820,853.56
	<u>\$3,108,904.58</u>
Development reserves.....	344,901.94
Undivided profits (after deduction of depletion and depreciation)	6,573,797.00
Grand total.....	<u>\$110,623,588.36</u>

Income Account: May 27 to December 31, 1915

Operating Revenue:	
57,555,183 lbs. copper @ 17.996c.....	\$10,357,706.00
591,692 oz. silver @ 50.557c.....	299,142.00
	<u>\$10,656,848.00</u>
Operating expense.....	2,924,954.00
Net operating profit.....	<u>\$7,731,893.00</u>
Misc. income at mines.....	6,717.00
	<u>\$7,738,611.00</u>
Less int. on current accts.....	29,106.00
Net income for period.....	<u>\$7,709,504.00</u>
Operating Expenses:	
Mine and mill.....	\$687,979.00
Frt. to smelter.....	1,257,862.00
Sm. & ref.....	785,757.00
Sell. comm.....	105,287.00
Marine ins.....	55,890.00
Gen. expense.....	32,179.00
	<u>\$2,924,954.00</u>

Undivided Profits

Net Income for period (as above).....	\$ 7,709,503.90
Less:	
Interest on bonds.....	350,000.00
Taxes—Estimated, for 1915.....	172,451.34
Taxes—1913 and 1914, of Kennecott Mines Co. and Beatson Copper Co., not previously paid because of litigation.....	13,255.56
	<u>\$ 185,706.90</u>
Depreciation of construction and equipment.....	169,338.60
Depletion of mining property.....	430,661.40
	<u>\$ 1,135,706.90</u>
Balance of Undivided Profits—December 31, 1915....	\$ 6,573,797.00

Property: Alaskan holdings of the Corporation include the Kennecott and Beatson mines; also 17 patented claims, 216 acres, at Latouche.

The **Kennecott** group, 3 miles from Kennecott on the C. R. & N. W. R. R. includes the Bonanza and Jumbo mines, with 22 additional patented lode claims and 14 patented placer claims, 2,314 acres.

The **Bonanza** mine has one of the most remarkable orebodies ever found by a prospector. This great mass of high-grade ore, much of it carrying 60% copper, outcrops on the crest of a precipitous mountain overlooking the Kennecott river, a tributary of the Chitina, which flows into Cooper river. In 1912 the ore reserves were estimated at 30,000 tons of 50 to 60% ore and 54,000 tons of 30% ore carrying \$13 per ton in silver, with 30,000 tons of broken ore as a talus pile beneath the outcrop. Recent development has indicated non persistence in depth.

There are no large masses of oxides or carbonates present, as glaciation and active erosion prevent the formation of an oxidized capping. The ore outcrops as massive chalcocite averaging about 50% copper and 0.2 oz. silver to each per cent copper. It was thought at first the chalcocite was primary, but later development showed chalcopyrite to be primary.

Geology: the various mining claims show Nicholai greenstone, consisting of a number of basaltic flows of lava, a hard close grained rock considerably altered and in places amygdaloidal, varying in color from brown to light green. The greenstone is overlaid by massive beds of Chitistone limestone of Triassic age, with bedding planes parallel to the flow planes of the lava, the limestone being of a bluish color, weathered to gray at the surface. There also are diabase and andesite intrusions and dikes.

Ore occurs in more or less irregular replacement masses and in a fault zone, the orebodies being more or less parallel to the vertical fault planes, though the ore follows, to some extent, minor fault planes, as well as the bedding planes of the limestone making stockwerks and irregular masses in the crushed limestone. The outcrop is 20 to 40' wide, with an average of about 25', and is something over 400' in length, the southern half showing 2 nearly parallel bands of chalcocite, 4 to 10' in width, separated by about 10' of limestone, showing breaks in places, and at the northern end of the outcrop the chalcocite bands give place to stringers and interlacing seams of chalcocite and azurite, which thin out as they follow the vein northward and fade out as they pass into barren limestone.

In addition to the Bonanza outcrop there was a large amount of ore in the talus, or slide rock, broken off from the outcrop. This mass of broken ore and rock was about 300' wide, extending for about 500' or more down the slope from the outcrop, varying from 3 to 20' in depth. A number of testpits, sunk to the outcrop, showed an average of 4' depth, with an average assay of 13% copper, this including both boulders of chalcocite up to 200 lbs. in weight and barren limestone. Ore is extracted from the slide by a system of cuts. Two grades of ore mined with 70% and 14% copper, respectively.

Development: to depth of 1,130' is by tunnels. The highest tunnel, at an elevation of 6,200' above the sea level, extends through the vein, near the southern end of the outcrop, from the western face of the ridge, and there is a small system of workings from the eastern slope of the ridge, further north, the latter comprising an upper tunnel extending through the ridge, and a longer lower tunnel of about 300' length, directly underneath, with had 10,500' of workings, Jan. 1, 1916.

The **Jumbo** mine is also being worked and had 9,692' of underground workings, Jan. 1, 1916. Orebodies on the 500' lowest level are larger and

higher grade than on the upper levels. In stope 581, ore has been developed for a width of 50' and will average 70% copper. The Jumbo mine has been under development since 1912 and up to August 1, 1915, shipped 35,000 tons of ore averaging 39% copper, from development work only.

The Bonanza mine is connected with the mill at the lower camp by a Bleichert aerial tram, in 2 sections, the upper of 7,000' and lower of 8,000', with a drop of 4,000'. The tram line has 40 towers, longest span 1,500', with ore bins at both terminals, and has an estimated hourly capacity of 25 tons. The lower camp has the mine buildings, power plant and mill. **Equipment:** includes a small steam plant and an air compressor. Buildings include a bunk house, mess house, assay office and 10,000' sawmill.

The 700-ton concentrator is equipped with Blake & Symonds crushers, Hancock jigs, bull jigs, rolls, Wilfley and Deister tables. Mill recovery averages about 85% and concentrates produced about 54% copper. The average grade of ore treated in 1915 was 10.20% copper. Rich ore is hand-sorted, and lower grade ores, though of excellent average tenor, are being concentrated in the mill and ore and concentrates shipped to the Tacoma smelter. An ammonia leaching plant is being built to treat the tailings from the concentrator.

Guggenheim interests have constructed the Copper River & Northwestern railway, at a cost of about \$20,000,000, this line of 195 miles length starting at Cordova, on the sea, and ending at the lower camp, having had to cope with tidal, river and glacial floods, blizzards and other difficulties inseparable from railway operations in an extremely mountainous country near the Arctic circle.

The **Beatson** mine comprises 17 patented claims, 268 acres, about 3 miles from the northern end of Latouche island, within one-half mile of tide-water, where there is a good natural harbor. Mine was located, July 4, 1897, by Andrew K. Beatson, and began shipping, 1903. Country rock is slate; ore is chalcopyrite, pyrite and pyrrhotite, occurring in brecciated portions of the country rock. The orebody is a large lens; total length developed is about 800' with an average width of 100'. Ore assays up to 30% and as shipped has returned 8% to 10% copper and 2 oz. silver per ton.

Development: includes 9,700' of underground workings. The ore is mined in an open pit and dropped through mill holes to the main tunnel level. Mine and mill are connected by an aerial tramway. A 700-ton concentrator, employing the oil flotation process and completed Feb. 1915, is to be enlarged to handle 1,000 tons a day. The average grade of ore milled, 1915, was 2.23% copper; average recovery 77.17%; concentration ratio 9.21, and average grade of concentrates produced 15.87%. Buildings include rooming, mess and change houses, office, store and a hospital with physician in charge.

Production: during seven months ending Jan. 1, 1916, approximately 63,000,000 lbs. of copper. Total costs were as follows:

Mining and milling, 1.19c per lb.; freight to smelter, 2.18c per lb.; smelting and refining, 1.37 per lb.; selling, .18c per lb.; general expense, .06c per lb.; marine insurance, .09c per lb.; proceeds silver contents, *.52c per lb., misc. earnings, *.01c per lb.; total, 4.54c per lb.

* Deduction. The average selling price of copper for the 7 months was 19.36c per lb. The average product shipped from both mines during the 7 months averaged 60.11% copper. Production for the first 6 months of 1916 was 61,400,000 lbs. copper.

The following figures show past production, costs and profits of the two Alaska companies prior to their acquisition by the Kennecott Corporation:

Kennecott Mines Co.:	Net Lbs. Copper	Cost per Lb.	
	Produced	Inc. Selling	Profit
1915 (5 months).....	14,240,412	4.00 cts.	\$1,522,747
1914	13,988,273	5.78 cts.	1,104,645
1913	14,621,834	5.48 cts.	1,424,635
1912	22,366,478	4.43 cts.	2,633,568
1911 (9 months).....	21,007,096	4.19 cts.	1,656,205
	<u>86,224,093</u>	4.57 cts.	<u>\$8,341,803</u>
Beatson Copper Co.:			
1915 (9 months).....	1,970,947	11.41 cts.	122,504
1914	5,286,667	8.75 cts.	241,895
1913	5,178,629	8.36 cts.	353,239
1912	3,254,858	9.74 cts.	221,116
1911 (9 months).....	3,078,444	7.44 cts.	163,939
	<u>18,769,545</u>	8.78 cts.	<u>\$1,102,696</u>

Management estimates 5 years ore supply blocked out at the past average rate of production.

The **Braden Copper** and **Utah Copper** companies are described under their respective titles.

KENNECOTT MINES CO.

ALASKA

Entire property, assets and liabilities purchased, May 27, 1915, by the Kennecott Copper Corporation, which see.

KENNEDY CONS. GOLD MINING & MILLING CO.

NEVADA

Office: Yerington, Nev. Mine at Buckskin, Douglas Co., Nev. **Officers:** W. C. Pitt, pres.; W. T. Campbell, v. p.; E. H. Whitacre, sec.; Lyon County Bank, treas.; Geo. F. Willis, T. Ebert, F. E. Baker and F. C. Biddleman, directors. **Inc.** May 16, 1906, in Arizona. **Cap.**, \$1,500,000; shares, \$1 par, nonassessable; 1,000,000 promotion and 500,000 treasury stock; issued, 1,039,000. Annual meeting, second Tuesday in May.

Property: 7 claims, 110 acres, patented, in Buckskin district, Douglas Co., Nev., developed by 3 shafts, 90', 147' and 220' deep and by one 240' tunnel, said to expose some large bodies of ore, mostly sulphides with gold, silver and copper. Mine is 4 miles from Nevada Copper Belt railroad and has power line within 1 mile.

KENNEDY GOLD M. & M. CO.

COLORADO

Georgetown, Clear Creek Co., Colo. David Kennedy, mgr., at last accounts. **Property:** the Centennial mine, 640 acres, shows cupriferous gold and silver ores in a 30" paystreak, assaying up to 24% copper, 5 to 50 oz. silver and 3 to 5 oz. gold per ton. Has steam power.

KENNEDY MINING & MILLING CO.

CALIFORNIA

Office: 409 Montgomery St., San Francisco, Calif. Webb Smith, supt. **Cap.**, \$100,000; shares \$100 par. **Dividends:** to date \$1,831,000; last payment 3c, April 10, 1916.

Property: 9 claims, covering 3,100' on the Mother Lode, includes the Kennedy mine adjoining the Argonaut, 1 mile north of Jackson, Amador Co., Calif. The Kennedy vein, one of three veins in the Lode, outcrops in andesite passing downward into Mariposa slate, following roughly the contact between the two rocks. The vein dips 57° E. and the payshoots rake to the north. The best ore occurs near the footwall over a black gouge 1-2' thick.

Development: by 3 shafts; the vertical south shaft, 2,300' deep, north shaft, 2,500' deep and the 3-compartment east shaft sunk to vertical depth of 3,900' with crosscuts and drifts, run N. and S. on the veins. Recent development on 3,300' level opened a 6' quartz vein with slate hanging-wall and diabase footwall. On the 3,600' level a drift is being run on a 12' vein between greenstone footwall and slate hanging-wall. Present ore extraction is from 2,700' and 3,600' levels.

Equipment: includes air-drills, 15"x30". Murry compressor, 25"x30" Fulton compressor, nine 80-h. p. boilers, oil fired, steam power, 800-h. p. double-drum hoist and 100-stamp mill, making an extraction of 83%. Monthly capacity is 15,000 tons. Concentrates assay \$100 per ton and tailings run about 60c per ton. Concentrates are treated at the mine in a 10-ton chlorination plant with 2 roasting furnaces. Employs 200 men. Company purchased the Zeila mine and 40-stamp mill at Jackson, about 1½ miles S. of the Kennedy, in 1915, for \$35,000. The Zeila is worked out down to the 450' level, but new orebodies averaging \$4 per ton are said to have been disclosed below the old workings. A flotation unit is to be installed.

KENTUCKY-DOUGLAS MINING CO.

UTAH

Address: care Roger Traweck, sec., 62 W. 3d St. N., Salt Lake City. **Officers:** E. S. Holt, pres.-treas.; Thos. E. Brooks, v. p., with T. S. Fowler, directors. Inc. 1916 in Utah. **Cap.**, \$1,000,000; shares \$1 par; 600,000 paid for property, 400,000 in treasury.

Property: 10 claims, in Silver mining district, western Tooele Co., Utah, said to show silver-lead ore in veins and deposits in limestone, at and near porphyry contacts. **Development:** 150' crosscut tunnel, expected to cut vein at 250'. Is a prospect.

KENTUCKY LEAD & ZINC CO.

MISSOURI

W. S. Pate, Joplin, Mo., mgr. Inc. in Missouri; \$75,000 has been invested in land and equipment. Operates a lease on a portion of the St. Louis-Joplin L. & Z. Co. property. **Development:** by 3 shafts to depth of 150'. Sinking new shaft 300' S. of mill.

Equipment: includes 150-ton concentrating mill, 3 pumps, boilers, drills and steam power. Shipments of concentrates were commenced in August 1914. Diamond drill prospecting to determine extent of the orebody is in progress.

KERR LAKE MINING CO.

Office: 61 Broadway, New York. **Officers:** Adolph Lewisohn, pres., Sam A. Lewisohn, v. p.; E. H. Westlake, sec.-treas., with J. J. Steindler, D. M. Steindler, S. S. Rosenstamm, J. Parke Channing, J. H. Susmann and Wm. B. Joyce, directors. Inc. Sept. 14, 1905, in New York. **Cap.**, \$3,000,000; shares \$5 par; all outstanding. Federal Trust Co., Boston, Bankers Trust Co., New York, transfer agts.; Equitable Trust Co., New York, Old Colony Trust Co., Boston, registrars. Annual meeting 4th Monday in September. Stock listed on Boston and Toronto Exchanges; traded in on New York and London Curbs.

Balance sheet as of Aug. 31, 1915, shows: assets, \$3,155,843, which includes, Kerr Lake Mining Co., Ltd., stock, \$3,000,000; 150,000 shares Wettlaufer Lorrain Silver Mines, Ltd.; stock, \$22,500; 200,000 shares Kerr Lake Majestic Mines stock, \$79,548; 837,400 shares Caribou Cobalt Mines Co. stock, \$50,000. Current liabilities include: reserve, \$1,250; Kerr Lake Mng. Co., Ltd., \$58,000; profit and loss, \$94,976. Total receipts for the year were \$620,534, of which \$620,000 was received in dividends from the Kerr Lake Mng. Co., Ltd. Expenditures totaled \$24,163. Dividends paid quar-

terly at the rate of 20% annually, last payment of 5%, March, 1916. Payments have been as follows:

1916*.....	\$0.25	1909.....	\$1.15
1915.....	1.00	1908.....	.75
1914.....	1.00	1907.....	.40
1913.....	1.00	1906.....	.22½
1912.....	1.65	1905.....	.02½
1910.....	2.00		

This makes 209%, or \$6,270,000.

* 1st quarter 1916.

Company is a holding company owning the entire stock issue of the Kerr Lake Mng. Co., Ltd., and controls the Cobalt Comet. Ltd., through majority stock ownership in the Caribou Cobalt Mines Co., the holding company for the former. The operating companies are separately described.

KERR LAKE MINING CO., LTD.

ONTARIO

Office: 61 Broadway, New York. Robt. Livermore, gen. mgr., Cobalt, Ont. Is controlled through ownership of entire stock issue by Kerr Lake Mng. Co., of New York, which see.

Balance sheet of Aug. 31, 1915, shows assets: \$959,876, which includes mining property, \$104,178; ore on hand, sold and in transit, \$104,818; cash, \$265,777; short term bonds, \$355,154; Kerr Lake Mng. Co., of N. Y., \$58,000; Kerr Lake-Crown Reserve drainage account, \$27,900; liabilities: 400 shares of capital stock at par \$100, \$40,000; accts. payable, \$6,655; accrued wages, \$7,688; reserve for outstanding liabilities and taxes, \$13,664, leaving a surplus balance of \$891,868 after payment of \$620,000 in dividends.

Dividends: to April, 1916, amounted to \$6,820,000. Payments are at the rate of \$1 per share annually. Total proceeds from ore sales were \$890,013; operating expenses were \$197,077 for production and development; \$119,911 for shipment and treatment; \$14,165 for general expenses; written off on property acquired, \$24,589. Operating profit for the year was \$550,774.

Property: one patented claim and two fractional claims, 57 acres in Coleman Twp., Nipissing district, Cobalt, Ont., Can. For description of geological features see Nipissing Mines Co. The ore occurs in several small vertical fissure veins in Horonian slate and conglomerate. The veins and ore are characteristic of the Cobalt district. The oreshoots vary from a few feet to 400' in length and occur in an area of about 8 acres.

Development: comprises several vertical shafts, deepest 487', with a total of 46,000' of underground workings. New development for the fiscal year, 1915, amounted to 4,226', as compared with 5,399' in 1914. From the 6th level of No. 3 shaft a drift was run E. & W. on the Keewatin vein and a winze sunk 64'. The vein showed considerable smaltite with low silver values. A 450' crosscut on No. 2 level of No. 3 shaft failed to disclose new orebodies. Further exploration work was discontinued and the shaft has been closed down temporarily. Recent development by a 186' north crosscut from shaft No. 7 on the 140' level on the Fleming vein showed the orebody to average 350 oz. silver for a width of 6.3". This ore, however, does not extend below the 190' level.

Development work for 1916 is on the No. 10 vein. The entire block above the 225' level in the Fleming vein, about 11,911 sq. ft., has been stoped, producing 38,000 oz. of high-grade and 3,000 tons of milling ore. The Main E. vein was stoped for 8,622' and the No. 10 vein for 4,564', mostly above the 140' level, both veins producing high-grade and milling ore. Development on the No. 218 vein proved disappointing. Work on the Drummond failed to disclose any new ore and the working shaft was closed down in

August, 1915. Development will henceforth be carried on through the Kerr Lake and Crown Reserve workings. The Drummond produced 150,462 oz. silver during the fiscal year ended Aug. 31, 1915.

Equipment: includes 12-drill air compressor, 10x12 Jenckes hoist, sorting and jiggling plant of 125 tons daily capacity, fully equipped machine shop and a pot melting furnace to melt the rough metallics into bullion, installed in 1915.

Production for year ending Aug. 21, 1915, is reported as:

Grade of Ore	Net Weight	Silver cont.		Aver. Silver
		lbs.	oz.		oz. p. t.
1st class.....	564,273	954,112.37		3,831.24
Bullion from 1st class.....		126,802.04		867.55
2nd class.....	238,606	103,501.68		
Bullion from Metallics.....		14,141.07		
Mill ore.....	23,035 tons	838,405.38		36.396
		2,036,962.54		

Of the total silver production, 1,198,557 oz. were produced from shipping ore and 838,405 oz. from low-grade ore milled by the Dominion Reduction Co., Ltd.; 47,436 tons of rock were hoisted at a cost of \$4.15 per ton as compared with \$5.09 in 1914. Shipments for the year amounted to 1,992,065; total cost of production per oz. of silver was 21.45c.

Estimated production from Aug., 1915, to May 31, 1916, was 1,758,907 oz. silver. With silver at 64c and a cost of but 21c, this, if continued for the year would yield \$2.00 per share.

Management estimates total ore reserves at 4,172,400 oz. silver, Sept. 1, 1915. No permanent new reserves were added during the year's operations; the lake bottom was thoroughly explored and only a comparatively small block still remains to be explored. Development in the diabase and Keewatin formations in the S. half of the property was not encouraging.

Property is apparently exhausting ore reserves and new veins are not likely to be found.

KEWANAS EXTENSION MINING CO.

NEVADA

Inc. 1915, in Goldfield, Nev. Cap., \$1,000,000. Is a small well located property, 18 acres, adjoining Keewanas on the north and in direct line with its ore zone, as developed on its north drift. It adjoins the Booth mine at Goldfield. Is controlled by the Sprague interests and other California men who have underwritten the stock at 5c a share. Gave the Booth company 25,000 shares of stock for a sideline agreement, thus avoiding litigation.

KEWANAS MINING CO.

NEVADA

See Reorganized Kewanas Gold Mining Co.

KEWEENAW COPPER CO.

MICHIGAN

Office: Calumet, Mich. Mine near Mandan, Keweenaw Co., Mich. **Officers:** Thos. F. Cole, pres.; Spencer R. Hill, v. p.; Capt. Thos. Hoatson, 2nd v. p. and mining director; Chas. A. Wright, sec.-treas.; W. J. Uren, gen. mgr., and G. G. Hartley, directors. John C. Shields, railway supt.

Inc. March 11, 1905, in Michigan. Cap., \$10,000,000; shares \$25 par; issued \$3,826,872; paid in, \$18. Last assessment was \$1, June, 1915. Stock listed on Boston and Duluth Stock Exchanges. Controls, through stock ownership, the Phoenix Consolidated Copper Co., Meadow Mining Co., Humboldt Copper Co., and Keweenaw Central Railroad Co. Has about 2,300 share-holders. American Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agt. Annual meeting, second Monday in March.

Balance sheet, Dec. 31, 1915, shows:

Assets, \$3,836,582, which includes real estate, \$1,404,996; securities, \$1,387,544; cash, \$45,993; development acct., \$702,657; acct's. receivable, \$289,843; current liabilities include bills and accts. payable, \$2,976; misc. revenue, \$129; interest, \$6,605.

Property: 25,000 acres, mainly mineral lands, heavily timbered, in 3 main groups, carrying the strike of the Keweenaw mineral belt for about 14 miles, including practically all of the amygdaloidal and conglomerate cupriferous beds of the district, as well as numerous copper-bearing cross fissures. Lands are in T. 58 N., of Rs. 27, 28 and 29W., and include the tracts formerly owned by the Aetna, Copper Harbor, Empire, Girard, Hanover, Keweenaw, Mandan, Medora, Pennsylvania & Boston, Resolute and Vulcan companies, in addition to lands controlled through stock ownership in subsidiary corporations.

The company's lands carry nearly 2 miles of water frontage on either side of the Montreal river, including Fish cove, 1 mile east of the river's mouth, which might be made a fair harbor at comparatively small expense. The lands include 5 miles of the course of the river, on both banks, and, with other holdings, give the company the entire water-frontage of Mosquito lake, making possible the development of a great water power, with a hydro-electric installation at the mouth of the river. There is a mill site on Bete Gris bay, at the mouth of the Montreal river, having about 5 miles of water frontage.

The company also owns the Lac La Belle, or Mendota, ship canal, 1 mile long, connecting Lac La Belle with Lake Superior. This canal has a 14' channel, and leads to a splendid haven that should be made a harbor of refuge.

The Medora mine, opened about 1860, had 3 old shafts, about 100' apart, deepest 140'. The Medora amygdaloidal bed, traversing lands of the company for about 4 miles, lies immediately under the Allouez conglomerate, and outcrops several hundred feet north of the Montreal river bed. The Medora, about 12' in average width, is a soft chocolate-colored amygdaloid, carrying considerable prehnite, calcite and quartz, in connection with fine stamp copper and occasional heavy copper, a 30" paystreak along the foot-wall carrying some barrel work, the bed as a whole being bunched.

The Medora tract also carries other copper-bearing beds, among these being the Medora fissure vein, outcropping about 225' E. of No. 1 shaft, but making into the shaft at depth. About 100' S. of the Medora amygdaloid is another bed carrying copper in small quantities, and to the northward are the Wolverine amygdaloid, of about 15' width, and the Allouez conglomerate, lying about 280' N. of the Medora bed, at surface.

The Medora mine was reopened on a considerable scale to depth of 1,700' and length of 1,800', with about 2 miles of workings. All work in the mine was stopped Sept., 1909. The Medora workings are fully described Vol. VIII.

The Empire mine also carries the Medora bed, about 3 miles E. of No. 1 shaft, and some trenching and test pitting, done 1906-07, on the Empire tract, showed a bed of about 15' width, carrying some copper at surface. The Empire also carries the Montreal river amygdaloid, on which the Manitou did considerable work.

The Medora-Mandan-Resolute tract of 2,440 acres carries the Kearsarge bed under practically its entire territory. The shaft on the Kearsarge bed, known as No. 2, is about a mile S. of the old Medora workings, and was 1,355' deep when abandoned, 1911.

The company owns a diamond drill outfit and has made extensive borings, securing a cross section of the Medora, Mandan, Resolute and Empire

tracts. Operations, 1912-14, were confined to exploratory work in the horizon of the Ashbed lode, and the first drill hole located a copper deposit of considerable promise, early 1913, at a depth of about 500'. Mine has been idle since May 28, 1914.

The Keweenaw Central Railroad Co., is a reconstruction of the old Lac La Belle & Calumet railway. The entire capital stock issue, \$730,000, is owned by the Keweenaw Copper Co. The railway company has \$500,000 bonds, not issued, and ended 1915 with accounts and bills payable of \$197,046, owing mainly to the Keweenaw Copper Co., and a deficit of \$11,627. The railway, with about 40 miles of main line, spurs and branches, cost \$856,935, and runs from Centennial, a northern suburb of Calumet, where connection is had with the Copper Range line, to Lac La Belle. Service is discontinued from Nov. to May.

KEWEENAW LAND ASSOCIATION, LTD.

MICHIGAN

Office: Room 33, No. 87 Milk St., Boston, Mass. **Operating office:** Marquette, Mich. T. M. Davis, chairman; Dudley S. Dean, sec.-treas.; John M. Longyear, gen. agt. Is a land corporation, holding 400,000 acres, mainly timber lands, but with some mineral lands, partly on the Keweenaw copper belt, in the upper peninsula of Michigan, taken over from the Lake Superior Ship Canal, Railway & Iron Co.

KEYSTONE CONSOLIDATED MINING CO.

ARIZONA

G. S. Holmes, 163 S. State St., Salt Lake City, Utah, and T. H. Fitzgerald, organizers. **Property:** the Keystone mine, 4 claims, in Mineral Park, Cerbat Range, formerly owned by Ross D. McCausland of Kingman. **Ore:** silver-zinc-copper bearing, returning \$75 per ton. **Development:** 260' shaft, with 900' of work on 150 and 200' levels.

KEYSTONE CONSOLIDATED M. & M. CO.

COLORADO

Officers: Clifford A. Staley, mgr., Magnolia, Boulder Co., Colo. Willis K. Howell, pres., New York; Richard Howell, v. p. **Property:** the Keystone mine at Magnolia, is an old-time producer. **Development:** by 400' two-compartment shaft which will be sunk to 700' and is drained by the Sylvanite tunnel driven by Wheelman tungsten people from Boulder creek. **Equipment:** includes hoist, compressor and electric power. A 50-ton concentration mill with flotation equipment is reported under construction. Drifting is in progress on the 260' level and a shipment of 4 tons of \$62 ore made, 1916.

KEYSTONE COPPER MINING CO.

ARIZONA

Office: 603 W. Broadway, Newton, Kans. Mine at Johnson, Cochise Co., Ariz. **Officers:** W. W. Miller, pres. and gen. mgr.; A. Bannow, v. p.; T. C. Miller, sec.; W. J. Trousdale, treas.; preceding are the directors. Doane Merrell, territorial agt.; U. R. Miller, supt. Inc. 1908 in Ariz. **Cap.,** \$900,000; shares \$1 par; \$741,735 issued.

Property: the Bannon group, 16 unpatented claims, surrounding the St. George claim and 1½ miles from the Arizona United property, said to show a large deposit of iron ore and to have cut several veins in a 400' vertical shaft. Claims to have blocked out a considerable tonnage of milling ore between the 300' and 400' levels. Shipped 16 cars of ore during the spring of 1916, assaying 17.5% copper and 3.6 oz. silver. Plans further sinking and developing with possible erection of a 200-ton concentrator.

KEYSTONE DEVELOPMENT CO.

ARIZONA

Operating the Isabella mine, 20 miles from Casa Grande, Pinal Co., Ariz., at last accounts. Reported to have some 7% copper ore.

KEYSTONE EXTENSION MINING CO.

UTAH

Mine near Bingham, in West mining district, Salt Lake Co., Utah. Company inactive for some time owing to heavy flow of water in mine

workings. Property covers about 3,000' of the Keystone vein outcrop and shows ore said to average \$14 per ton in gold, silver, lead and copper values, from surface down to bottom of 165' shaft.

Development: by inclined shaft with drifts on vein opening up stopes from which shipments have been made. The Montana Bingham Consolidated Mining Co. was to open the ground by its deep tunnel, thus eliminating pumping costs and heavy wagon-haul charges on ore shipped, but no recent information can be obtained.

KEYSTONE MINES CORPORATION.

IDAHO

Officers: V. D. Williamson, gen. mgr., Empire St. Bldg., Spokane, Wash.; F. O. Berg, pres.; E. C. Tousley, sec.; M. L. Fox, treas.; E. A. Ely, engr.

Property: 21 patented and 22 unpatented claims in the Blacktail district, 5 miles east of St. Joe, Shoshone Co., Idaho, formerly held by the Little Joe M. Co. and W. H. Brown. Shows copper-gold-silver-lead ores. **Development:** 1,500' tunnel with a 1,000' upraise and about 3,000' of drifting and crosscuts. Plan extending tunnel another 1,200'. About 30 men are employed.

KEYSTONE MINING CO.

CALIFORNIA

Carlton R. Downs, Jackson, Calif., gen. mgr. **Property:** the Keystone mine at Amador City, Amador Co., covering 4,400' along the Mother Lode.

The Keystone is a quartz vein, 12'-200' wide, occurring on the contact between black clay slate footwall and meta-andesite hanging-wall. Two other veins, the Spring Hill and east veins, have been developed; the latter is now furnishing the ore. The contact vein was mined above the 900' level. See Mines & Min. Resources of Amador Co., State Mineralogist's Report, p. 34-36.

Development: by 3-compartment Patton shaft, 2,680' deep and 1,118' south shaft on 60° incline, with crosscuts and drifts E. and N. on the 100', 900', 1,000', 1,200' and 1,400' levels. Development work now being done on the 1,400'.

Equipment: includes 40-stamp amalgamation and concentration mill, making an extraction of 90%; electric hoist, 300-h. p. motor, air compressor and drills. Concentrates run \$50 per ton; the tailings 30c per ton. About 35 men employed.

Production: for 6 months ending Jan. 1, 1916, mine produced 38,663 tons of ore, returning \$86,167, or \$2.23 per ton, mostly from the 900', 1,000' and 1,200' levels. Mine is credited with a total production to date of \$14,000,000.

KEYSTONE MINING CO.

MEXICO

Office: Shamokin, Penn. Is a reorganization of Keystone Copper Smelter Co., of Philadelphia, and is the holding company for the Mexicana Co., Tapalpa district, Jalisco, Mexico. W. H. Childs, gen. mgr.

Lands: about 100 hectares, in 5 groups, in Tapalpa, including the Mexicana, America and Palma groups, also timber rights to 50,000 acres of adjoining lands. Principal development is on La Mexicana group, 82 hectares, 15 miles west of Tapalpa, mine having a 200-metre crosscut tunnel, cutting 4 veins, with about 1 mile of workings. Veins are fissures in porphyry, averaging 5' width, carrying auriferous and argentiferous chalcopyrite, sphalerite and pyrite.

Equipment: includes steam and electric power and 30-ton mill. The entire plant was enlarged and remodeled and resumed operations in Jan., 1912. Presumably idle, 1915-16, owing to revolutionary conditions in Mexico. Letters unanswered.

KEYSTONE MINING CO.**UTAH**

Offices: 163 S. Main St., Salt Lake City, Utah and 32 Broadway, New York. **Officers:** H. G. McMillan, pres.; Ernest Bamberger, v. p. and treas., with John Dern, H. I. Wilson, C. W. Saacke, Alfred Frank, John McGinnis, directors. L. B. McCornick, treas.; Herbert Cohen, sec.; J. L. Tilton, asst. sec.

Inc. Sept. 12, 1902, in Wyo. **Cap.**, \$700,000; shares \$1 par; outstanding \$500,000; assessable; last assessment 2c, Dec., 1915. **Transfer office:** J. L. Tilton, 32 Broadway, New York. Empire Trust Co., New York, registrar. Listed on Salt Lake Exchange and on New York Curb as a prospect.

Property: 16 patented claims, 66 acres, in Uintah mining district, 3 miles S. W. of Park City, said to show silver-lead ore. **Development:** 225' vertical shaft and 700' tunnel, work of former years. Has been idle a number of years; a little work done in 1915. Plans to continue sinking winze from tunnel level, 160' deep, June, 1916.

The property was rehabilitated in 1916, compressor and motor installed and exploration started. A suit against the Kearns-Keith Mng. Co. and the Silver King Coalition Mines Co., asking \$1,500,000 damages for alleged unlawful extraction of ore pending, June, 1916.

KILL BUCK MINING CO., LTD.**IDAHO**

Owned by estate of Jos. Clark and by Hon. W. A. Clark. **Cap.**, \$100,000; shares 10c par; all issued; unlisted.

Property: 5 claims on Lake creek, adjoins Chicago-Boston holdings, 2 miles S. W. of Wallace. **Development:** by extension of Coeur d'Alene Vulcan M. Co. tunnel, 3,500' southerly to cut vein, already opened 900' above. Shipped silver-lead ore many years ago but idle lately.

KIMBALL MINING CO.**WYOMING**

Address: Kimball, Neb. B. A. Lathrop, pres. and supt., Centennial, Carbon Co., Wyoming. G. W. Forsling, v. p.; A. J. Hull, sec.-treas.

Property: 19 unpatented claims, near Centennial. Has driven 800' of tunnels to develop a quartz vein with gold and silver-bearing copper ores. Management reports that development work has been done in 1915, opening up milling ore that will average about 3% copper and \$3 gold per ton.

KIMBERLY CONSOLIDATED MINES CO.**NEVADA**

Office: 1200 Franklin Bldg., Philadelphia, Pa. **Mine office:** Hilltop, Nev. **Officers:** Frank Le Bar, pres.; Geo. A. Ford, v. p.; E. Ross Carver, sec.-treas.-mgr., with Chas. A. Beach, S. P. Curtis and John L. Cox, directors H. Crouch, supt. **Inc.** 1910 in South Dakota. **Cap.**, \$5,000,000; shares \$1 par; 4,297,916 shares issued. Stock listed on the San Francisco Exchange. Annual meeting in May. Gross earnings in 1915 amounted to \$9,780.

Property: 24 claims, 16 patented, 460 acres, at Hilltop, shows gold, silver, copper and lead ore in quartz veins. The vein runs N.-S., dips W., and is said to have been proven for 5,000' in length. A crosscut driven on the 350' level reported to have cut a 12' vein assaying \$9.48 per ton. Developed by 5,000' tunnel and several shafts.

Equipment: includes compressor, ½ mile tram and 25-h. p. gasoline engine. **Production:** in 1914 amounted to 3,660,000 lbs. Ore is milled at the plant of Hilltop Milling and Reduction Co.

KIMBERLY SHIPPER MINING CO.**NEVADA**

Office: 417 McIntyre Bldg., Salt Lake City, Utah. **Officers:** R. B. Respass, pres.; Jas. C. Atkins, v. p.; C. W. Fleck, sec.-treas., with F. L. Goddard and John McGovern, directors. **Inc.** in Utah. **Cap.**, \$50,000; shares 5c par.

Property: 60 acres at Hilltop, Lander Co., Nev., 20 miles E. of Battle Mt., shows gold-silver ore in shoots. Developed by 800' tunnel and drifts. A shipment to the U. S. smelter in Dec., 1915, yielded \$75 per ton. Samples from a rich shoot opened in April, 1916, reported to have assayed 226.85 oz. gold and 317.2 oz. silver, or \$4,737 per ton.

KING COPPER MINING CO.**UTAH**

Office: Salt Lake City, Utah. Located on the divide between Emigration and Red Butte canyon, 12 miles E. of Salt Lake City, Utah. Controlled by the Baileys of Salt Lake. Property shows 6' ledge of copper carbonates on contact between quartzite and blue limestone. Is developed by 300' tunnel, principally in sandstone. Ore said to carry \$14 in gold, copper and silver.

KING DAVID MINING CO.**UTAH**

Is controlled by Knight Bros., Provo, Utah. Mine near Frisco, Beaver Co., Utah. **Officers:** Jesse Knight, pres.; Jacob Evans, v. p. and mgr.; R. E. Allen, sec.-treas. **Inc.** 1908, in Utah. **Cap.**, \$500,000; shares 50c par, assessable. Assessment levied Feb., 1912, one-half cent per share.

Property: 70 claims, patented, 940 acres, adjoining the Horn Silver mine, includes the Reciprocity group. Property is supposed to carry the extension of the Horn Silver vein. Mine has an 800' two-compartment shaft, showing values mainly in silver-lead ore, with some chalcopryrite.

Equipment: includes two 80-h. p boilers, a double-drum hoist, and a 5-drill air compressor.

KING EDWARD MINE.**ONTARIO**

Owned by J. S. Dobie and Mary C. Dobie, Thessalon, Ont. **Property:** 1,000 acres, patented, in Rose Township, includes Sec. 14 and part of 11 and 24, the two properties, King Edward and Canada Verdi being a mile apart. The latter claim shows a 16' vein, said to be traceable 2 miles, in diabase; it has steep southerly dip, and carries ore streaks, one 3' thick showing 3% copper and 2 oz. gold. Examined 1915 by C. G. Bateman and C. Rollins.

Development: by shaft and numerous shallow pits. Was under option to King Edward Mining Co. Idle in 1915.

In April, 1916, it was reported that the National Mines, Ltd. Co. had been formed to develop the property. Messrs. Jackman and E. Whitbeck, of Rochester, N. Y., incorporators. **Cap.**, \$2,000,000.

KING EDWARD MINES, LTD.**BRITISH COLUMBIA**

Idle. Fairview, Boundary district, B. C. **Inc.** 1904, in British Columbia. **Cap.**, \$500,000; shares \$1 par. **Property:** 10 claims, 500 acres, in the Similkameen division of the Osoyoos district. Opened by 350' workings to show a sulphide orebody 6 to 10' wide averaging 5% copper.

KING OF THE HILLS MINE.**UTAH**

Address: Milford, Beaver Co., Utah. Mine in Granite district, 25 miles N. E. of Milford, reported to have 14 to 18' contact metamorphic vein of copper-lead ore in limestone, cut by porphyry. **Development:** by tunnels. Equipped with concentrating mill, making a product carrying 10% copper, 42% lead and 10 oz. silver. Developing at last accounts.

KING MINING CO.**WASHINGTON**

Officers: V. D. Williamson, pres., Empire St. Bldg., Spokane, Wash.; J. W. Douglas, v. p.-gen. mgr. **Inc.** in 1916, to take over the Copper King and Copper Queen mines at Chewelah, Stevens Co., Wash.

The Copper King shows 4 veins carrying grey copper and chalcopryrite ore and is developed by 1,200' tunnel. A 4' ledge of high-grade ore was cut on the 500' level. Equipped with 100-ton oil-burning smelter, which was

completed by former management. The mine was bid in at receiver's sale for \$125,000, July, 1915.

The Copper Queen property, 6 claims, is developed by 200' tunnel and crosscuts. An 8' vein showing silver and copper ore was intercepted 50' from the portal of the tunnel, at a depth of 70'.

KING & QUEEN COPPER CO.

NEW MEXICO

Idle. Dr. J. Odd Hamilton, pres. and chief owner. Mine near Steins, Grant Co., N. M., 8 miles S. W. of Steins Pass, near the King Kendall and Johnny Bull mines, shows limestone cut by a large N.-S. dike of monzonite porphyry with ore occurring in contact metamorphic deposit of altered garnetiferous limestone. Ore carries a little bornite, chalcopyrite, pyrite, calcite and on the Queen claim, some chrysocolla. The ore is low grade, carries zinc and lead and is hard to concentrate.

Development: numerous shallow workings showing ore said to average 1½-2% copper. Property being developed under lease and bond in 1915-16.

KING & QUEEN MINING CO.

MONTANA

Mine near Keystone, (formerly known as Carter), Chouteau Co., Mont. **Officers:** G. T. McCullough, v. p.; John F. Hinckley, sec.; H. A. Spangler, treas.; C. H. McHeftry, supt. in charge. Inc. Feb. 22, 1905, in Montana, practically as a reconstruction of the Montana Mining & Development Co Cap., \$1,000,000; shares \$1 par.

Property: 15 claims, partly patented, 188 acres and a 20-acre mill site, well timbered, 3½ miles from Keystone the nearest rail point, in the Spring Gulch district, 9 miles N. W. from Superior. Property carries limestone, quartzite and shale with contact deposits between quartzite and limestone. The deposit under development, of 8' estimated average width, shows copper, lead and silver ore with malachite, chalcocite, chalcopyrite and galena, reported to average 4.5% copper and 12 oz. silver per ton with gold values ranging up to 8 oz. per ton.

Development: by 1,200' crosscut tunnel opening up 4' of 4.6% copper ore that carries 9 oz. silver and 11% lead. This tunnel, planned to be driven 1,600', has cut the vein 460' below the old workings and intersects several veins. A 200' raise gives ventilation with the upper workings now abandoned. The main workings total 5,000'.

Equipment: includes an 80-h. p. boiler, 25-h. p. hoist and 6-drill duplex air compressor. There are several small mine buildings and a sawmill. About 40 men are employed.

Production: in 1913 was 40' to 50 tons daily, shipped to Salt Lake smelters. A new 125-ton lead-silver concentrator erected, 1914, and development in progress, 1916.

KING SOLOMON LEASING CO.

CALIFORNIA

Nosser Illingsworth, mgr., Randsburg, Calif. Operating a lease on the King Solomon mine near Johannesburg, Kern Co., Calif., developed to 250' level by shafts and crosscuts. **Shipments:** in 1915-16 to the Red Dog mill said to have yielded from \$60-\$130 per ton.

KING SOLOMON MINE.

CALIFORNIA

Owned by C. B. Cottrell, Westerly, R. I. W. H. Young, supt. **Property:** 40 acres in Secs. 6 and 7, T. 38 N., R. 11 W., near Randsburg, in the Liberty Mining district, Siskiyou Co., Calif., shows a 5' vein of free milling ore, with quartz porphyry foot and slate hanging-wall. The vein runs N. S., and dips 60° E. Developed by 460' tunnel, 130' shaft and drifts. **Equipment:** includes an 8-stamp mill, hoist, boiler and buildings. Developing and producing at last accounts. Five men employed.

KING SOLOMON MINE.**WASHINGTON**

S. J. Gray, owner, Lakeside, Wash. **Property:** near Lucerne. Chelan Co., Wash., consists of 3 patented claims, developed by 1,500' of tunnels said to show fissure veins in gneiss porphyry, carrying gold-silver-copper values.

KING SOLOMON MINING CO.**MONTANA**

Clancey, Jefferson Co., Mont. S. N. Moreland, pres.; I. S. Moreland, mgr. and supt. **Property:** on Clancey creek, 2 miles W. of Clancey, shows granite with aplite cut by a dacite porphyry dike that forms the hanging-wall of the lode. This lode or shear zone is 25' wide, consisting of slabs of rock alternating with bands 1½ to 3" thick of sulphides, mainly gray copper, (tetrahedrite) galena and zinc blende with chalcadonic quartz.

Development: consists of a 300' inclined shaft being sunk to 700', with levels at 100', 200' and 300' W. of shaft. **Equipment:** includes hoist, skip and air compressor. Is a small silver property, which is not considered likely to become a dividend payer.

KING SOLOMON TUNNEL & DEVELOPMENT CO. COLORADO

Office: 810 Majestic Bldg., Denver, Colo. **Mine office:** Frisco, Summit Co., Colo. **Officers:** F. C. Dinsmore, pres. and gen. mgr.; S. H. Alexander, v. p.; C. W. Rowe, sec.-treas.; preceding with S. R. Theobald, C. A. Kissingner and Theo. Dungway, directors. H. S. Sanderson, managing eng. **Inc. Jan., 1903, in South Dakota. Cap., \$2,500,000; shares \$1 par; nonassessable.**

Property: 40 quartz claims and about 20 placer claims, in the Ten Mile district, shows fissure veins in granite, carrying auriferous and argentic copper and lead ores. **Development:** by a 5,200' tunnel with 5,000' drifting. Lessees working on the "Eleven" vein, 3,700' from portal of the tunnel are said to have opened up 40' of pay ore, showing gold-silver, copper and lead values, averaging \$35 per ton.

Equipment: includes a 160-h. p. steam and 115-h. p. electric plant, with an 8-drill compressor. Management plans erecting mill and granting further leases in 1916. Colorado & Southern R. R. runs by the property.

KING WILLIAM MINING CO.**UTAH**

Office: 546 E. 1st South St., Salt Lake City, Utah. **Mine address:** Eureka, Juab Co., Utah. **Officers:** Chas. H. Blanchard, pres. and gen. mgr.; J. H. Rouse, v. p.; A. C. Ellis, Jr., sec.; L. H. Farnsworth, treas.; W. M. Owen, supt. **Inc. 1907, in Nevada. Cap., \$1,250,000; shares \$1.25 par, nonassessable. Shares listed on Salt Lake Stock Exchange.**

Property: 2 claims, patented, 16 acres, surrounded by the holdings of the Eagle & Blue Bell, Centennial-Eureka and Grand Central. **Development:** is through the Eagle & Blue Bell workings, on the 500' and 1,000' levels, corresponding with the 1,400' and 1,900' levels of the King William. There are several shallow shafts.

Property was under option to sell for 25c per share to the Centennial-Eureka Mining Co., but the lease was dropped in March, 1915, after expenditure of a considerable amount of money, said to be in line with general orders of the U. S. Smelting, Refining and Mining Co. discontinuing much of its prospecting at that time. The company has a debt of \$4,000 and present plans are to reorganize, levy an assessment, pay off the indebtedness and resume work.

KINGS QUICKSILVER MINING CO., LTD.**CALIFORNIA**

Office: 502 King St., London, Ont., Canada. **Officers:** Wm. Gray, pres.; W. P. Darsh, sec.; A. A. Lewis, supt.

Property: a group of claims, in Sec. 20, T. 23 S., R. 16 E., Kings Co., 14 miles E. of Parkfield, Monterey Co., Calif. **Ore:** native mercury, cinnabar

and calcite, occurs in a crushed zone, 35' wide, running S. E. with dip 45° S. W. Country rock is serpentine, shale and metamorphic sandstone.

Development: to depth of 200' by 700' upper and 850' lower tunnels, with raises and winze. **Equipment:** includes 10-ton Scott fine ore furnace with brick condensers and 25-h. p oil engine. Mine worked intermittently since 1902. Present management plans installing concentrator and further development.

KINSLEY DEVELOPMENT CO.

NEVADA

Currie, Elko Co., Nev. **Officers:** John D. Kendall, pres.; W. M. Bradley, v. p.; Newton A. Dunyon, sec.-treas. and mgr.; R. J. Deighton, asst. sec.; preceding with B. F. Beaur and Wm. Fischell, directors. **Cap.**, \$1,000,000; shares \$1 par.

Property: 28 miles from Currie, on Nevada Northern railroad, shows limestone cut by parallel N.-S. fissures, which carry copper ore at the south end of the property and lead ore 1½ miles north. Has been worked intermittently by lessees for past few years. Has steam plant, 3 hoists, compressor and a concentrating mill erected 1909. Presumably idle. No recent returns secured.

KIRKLAND LAKE EXPLORATION, LTD.

ONTARIO

Office: care Wheater, Cornwallis-West & Co., Pinners' Hall, London, Eng. C. H. Villiers, G. Cornwallis-West and F. H. Hatch, directors. **Inc.** Jan. 1914, in England to acquire mining properties in the Kirkland Lake district, Ontario, Can. **Cap.**, £150,000; shares £1 par.

KIRKLAND LAKE PROPRIETARY, LTD.

ONTARIO

Secretary and office: J. J. Sneddon, Finsbury Pavement House, London, E. C., Eng. **Directors:** H. G. Latilla, A. Burt, C. A. Foster, J. D. G. Simpson and G. F. Wyatt. **Inc.** Nov. 27, 1913. **Cap.**, £200,000; shares £1 par; 75,000 issued and fully paid. First annual meeting was held Aug. 3, 1915. Company's assets consist of shares in the following companies: Tough-Oakes Mines, Ltd., Burnside Gold Mines, Ltd., Sylvanite Gold Mines, Ltd., Teck-Hughes Gold Mines, Ltd. and Sudbury Syndicate, Ltd. Balance sheet Feb. 28, 1915, shows liabilities, £168,409, which includes £75,000 outstanding stock, £84,899 loans and interest, £8,510 sundry debts; assets include £95,068 shares in other companies, £59,562 loan and interest and £102 cash in bank. The operating subsidiary companies are described under their respective titles.

KISHMAN LEASING CO.

COLORADO

Cripple Creek, Colo. **Officers:** J. Gottberg, pres.; Siebert Rudman, v. p.; M. W. Kishman, sec.-mgr. Operates a lease on 1 patented claim, 10 acres, belonging to the Trail mine, in Cripple Creek district, showing free gold and sylvanite in a fissure vein, 5' wide and 150' long. The vein runs N. E. and dips 15°. Developed by 600' vertical shaft and 2,000' tunnel to depth of 1,000'. **Production:** in 1915 amounted to 500 oz. gold, the ore averaging \$30 per ton.

KITCHIGAMI GOLD DEV. CO.

ONTARIO

Officers: John Daniell, pres., Calumet, Mich.; John MacRae, v. p.; Chas. Chynoweth, sec.; Jas. T. Fisher, treas. **Inc.** 1915 in Ariz. **Cap.**, \$300,000; shares \$2 par; 100,000 shares subscribed at 25c.

Property: 160 acres, Gordon McGuire claims, on Goldfish lake, Morissette township, Ont., Kirkland district, adjoining the Goldfish Lake Gold Mine Co. Ground acquired on advice of Chas. W. Botsford, E. M.

KITTIE LANE GOLD MINING CO.

COLORADO

Office: 507 Exchange Bank Bldg., Colorado Springs, Colo. **Officers:** Marx Lorig, pres.; B. F. Webster, v. p.; Arthur Cornforth, sec.-treas. Is a reorganization of the Gould Mining Co. **Inc.** in 1912. **Cap.**, \$2,000,000;

shares \$1 par; 265,000 shares in treasury. Company had no debts and \$2,776 cash and bills receivable, Jan. 1, 1916. Stock listed on Colorado Springs Exchange. Owns about 30 acres on Raven hill, adjoining the Elkton. Inactive.

KITTIMAC MINES CO.**COLORADO**

Silverton, Colo. **Officers:** Daniel B. Carey, pres.; Wm. Youngson, v. p.; Jos. L. Clark, sec.-treas.; R. J. Walter, gen. mgr.; Frank Card, mill supt. Inc. 1914, in Wyoming, as successor to company of same name inc. in Arizona and now dead, which is described in Vol. XI, Copper Handbook. **Cap.**, \$2,500,000; shares \$1 par; fully paid; nonassessable; \$2,000,000 shares issued and a \$40,000 bond issue outstanding.

Property: 800 acres in Eureka Mining district, near Silverton, San Juan Co., Colo., includes 70 claims and a 76-acre mill site. Mine has 2 sulphide and 7 quartz veins, outcropping on surface for 3,000' and developed by 2 tunnels, 920' and 1,050' long, with 2,000' of drifts. Ores carry gold-silver-copper-lead-zinc and iron values. On the Isabella vein an orebody 19' wide has been developed for 600', said to average \$10 per ton in gold and silver.

Equipment: includes compressor, drills, electric motors, 10,040' aerial tramway, 150-ton mill with flotation unit, Huff electrostatic separators and several buildings. **Ore reserves:** management estimates 500,000 tons of ore in sight. Company was selling treasury stock in 1915 in order to raise funds for further development at depth and installation of cyanide plant.

KLAMATH MINING & MILLING CO.**NEVADA**

O. W. Robertson, pres., Klamath Falls, Ore. Holdings in Jumbo district, near Virginia City, said to show 12'-20' ledge under development by crosscut tunnel.

KLONDYKE-PORTLAND MINES CO.**NEVADA**

Goldfield, Nev. **Officers:** Benj. Rosenthal, pres.; M. F. Hill, v. p.; J. F. Henry, sec.-treas.; with J. B. Witt and Peter Felis, directors. Inc. 1915 in Nev. **Cap.**, \$100,000. **Property:** 9 claims in the Klondyke district, near Goldfield, Esmeralda Co., Nev., showing gold-silver-lead ore.

KNIGHT INVESTMENT CO.**UTAH**

Offices: Knight Blk., Provo, and 817 Newhouse Bldg., Salt Lake City, Utah. **Officers:** Jesse Knight, pres.; Amanda M. Knight, v. p.; W. Lester Mangum, sec.-treas.; preceding, with R. E. Allen, J. Wm. Knight and Knight Starr Jordan, directors. Company controls 17 properties, ranging from prospects to successful dividend paying mines, in the Tintic district, Juab county, Utah, including the Beck Tunnel Cons., Black Jack Cons., Bonneville Mining, Dragon Cons., Iron Blossom Cons., Lucky Boy Cons., Opex Cons., Spring Canyon Coal, Tintic Milling, Utah Ore Sampling, Colorado Mining, Knight Christensen Metallurgical companies, the Rico Wellington Mining Co. at Rico, Colorado, and the Lucky Tiger and Black Hawk Zinc mines near Neck City, Mo., acquired in 1915. The latter 2 properties are fully developed, equipped with 250-ton mill and credited with production of \$115 ore.

Company also operates the Knight Woolen Mills and Eureka Hill R. R. Co. The new 100-ton Knight-Christensen custom milling plant at Silver City, designed by N. C. Christensen to treat the complex, low-grade Tintic ores, was started Oct., 1913, and operated successfully on Iron Blossom ore, attaining an 85% extraction at a cost of less than \$2 per ton, until completely destroyed by fire, April 4, 1915.

KNOB HILL MINING CO.**WASHINGTON**

Office: 622 Old National Bldg., Spokane. Mine office: Republic, Wash. **Officers:** Chester Shoudy, pres.; J. W. Lloyd, v. p.; John Burne, v. p.; O. A.

Broyles, sec.-treas.; S. H. Richardson, gen. mgr.; with T. A. White, J. W. Beckett, R. B. Gaines, H. C. Kreysler and Geo. J. Hurley, directors. Kenneth McEwen, supt.

Cap., \$1,000,000; shares \$1 par; all issued. Stock listed on Spokane Exchange. Annual meeting Jan. 12th.

Property: the Knob Hill and Mud Lake mines at Republic, Ferry Co., Wash. The Knob Hill is developed by shafts and crosscuts. A vein 4-7' wide, opened on No. 2 level at a vertical depth of 250', gave assays of \$27 per ton. On the intermediate level a 4' vein carrying values up to \$50 in gold is being developed; on the 3rd or lower level recent development work opened up a 7' vein of \$15 ore.

Shipments: to Trail smelter during 1915 amounted to 35,000 tons of ore, yielding 2.4 oz. gold and 7.2 oz. silver per ton. Smelter returns totaled \$62,000. Company expended \$7,795 on development work, \$1,500 on improvements and had \$5,746 cash on hand at end of 1915 after paying off debts amounting to \$13,000. Shipments of 24 cars of ore from Jan.-April, 1916, yielded \$11,562 and netted \$3,039, leaving a cash balance on hand at that date of \$8,248.

Company purchased the Alpine claim, adjoining the Knob Hill on the E., for \$20,000. It is believed to carry the extension of the Knob Hill vein. A 500' shaft is to be sunk on the Alpine, which will give a depth of about 900' on the dip of the vein and crosscuts will be driven to reach the Knob Hill orebody.

KOMET MINING CO.

COLORADO

M. Korff, mgr., Cripple Creek, Colo. Inc. 1915. **Cap.**, \$25,000. Operates a lease on the Jefferson vein of the Isabella Mines Co. property, in Bull Hill section of the Cripple Creek district. **Development:** by 300' Lee shaft, said to have opened up a 6' vein yielding \$182 per ton in gold.

KOOTENAY BONANZA MINES, LTD.

BRITISH COLUMBIA

Officers: W. Finch Page, pres., Nelson, B. C.; A. E. Rand, v. p.; R. S. Lennie, sec.-treas.; preceding, with A. C. Burdick and J. A. Hendry, directors. Inc. in British Columbia. **Cap.**, \$3,000,000; shares \$5 par; outstanding, \$200,000. Company organized to take over the Silver King mine from the bondholders of the Hall Mining & Smelting Co., Ltd.; the claims of the Kootenay Development Syndicate, Ltd.; Dandy & Ollie Cons. Mines, Ltd., and of the Starlight Mines, Ltd., as well as other properties.

Silver King and Dandy groups of claims were sold to the Silver King Mines, Ltd. The company now holds 34 other claims, comprising the North Star, Great Western, Starlight and Irene groups.

LA ANOZIRA GOLD MINING CO.

ARIZONA

Office: 218 Colorado Bldg., Denver. **Officers:** Walter C. Williams, pres.; Thos. B. Everett, v. p.; engr.; J. C. McDowell, sec.-mgr. Inc. Oct. 27, 1914, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; nonassessable.

Property: 2 claims in the Cerbat Mtns., Mohave county, about 12 miles from Kingman, said to carry a 4' vein of free gold, running from \$6 to \$80 per ton. In a stock selling campaign to raise funds for a mill, the President stated, Dec. 14, 1914: "The mine is developed by 640' of tunnels, 230' of shafts, all in ore. Shafts have been sunk to connect tunnels with surface and, in fact, a mine is fully proven by the thousands of dollars of work done. The property has been thus developed and is now ready for a mill."

In Oct., 1915, the public was notified that, "Our mines are well located; producing properties all around us. We have large development, large tonnage of high-class ore, and everything at hand for grand success, only awaiting the time when we have our 50-ton mill (which is ordered) paid for. Our

directors will not incur debts. We go on the policy of 'Safety First.' We have not much money to raise to pay for this mill and get it installed. This should attract the attention of investors because this company agrees to return your full invested money within one year from date of certificate and you to retain the stock. The physical value of the property is such that the company feels justified in making this liberal offer. The lowest estimated earnings will return all the stockholders money as promised, with a large dividend in addition." To date, June, 1916, no further report of development, mill or profits has reached us.

LA BELLE KIRKLAND MINES, LTD.

ONTARIO

Office: Home Life Bldg., Toronto, Can. Frank Loring, gen. mgr.

Property: the Gibson group of claims at Goldfish Lake, Kirkland Lake district, Cobalt, Ont., shows molybdenite and gold ore in Keewatin formation. Developed to depth of 240' by shafts and crosscuts, showing several 2' stringers of high-grade ore. Encountered fault on this level, April, 1916. On the 100' level a promising vein is under development. **Equipment:** includes compressor and hoist good for depth of 1,000'.

LA BELLE MINING CO.

ARIZONA

Vicksburg, Yuma Co., Ariz. **Officers:** A. W. Hompe, pres.; E. B. Moore, v. p.; L. S. Judd, sec. and gen. mgr.; James Bayne, treas. **Inc.** Aug. 3, 1909, in Arizona. **Cap.**, \$100,000; shares \$10 par; issued, \$82,600. Company is a close corporation, entire stock issue being owned by officers. Annual meeting, June 30.

Property: 11 claims, 220 acres, in the Plomosa district, said to be covered by rhyolite cut by fissure veins running N. W. and dipping steeply. The vein developed is traceable for 1½ miles, averages 6' wide and carries leached material with less than 1% copper, the sulphide zone not having been reached.

Development: aggregates 814', including a 478' shaft and 4 tunnels. **Equipment:** includes 10-h. p. hoist, 2-drill compressor, 65-h. p. gasoline engine and various mine buildings. Property is 10 miles from Santa Fé railroad. Only assessment work done in 1915.

LA COBRIZA DE COBRE.

MEXICO

Address: Rafael Elias, Cananea, Sonora, Mex. **Property:** 5 claims, adjoining Carnegie L. & Z. property on S. E., shows several veins in bedded volcanic tuffs with complex, silicious lead-copper-silver ore. Developed by 200' shaft with short drifts in ore.

LA COBRIZA MINING CO.

MEXICO

Office: 209 Nat. Bank of Ariz. Bld., Phoenix, Ariz. Mine at Noria, Sonora, Mex. **Officers:** J. W. Cook, pres.; E. B. Sharpe, sec.; J. E. Bentley, treas.; with J. H. Strong and F. C. Emery, directors. Robt. Mitchell, gen. mgr. **Inc.** June 5, 1905, in Arizona, and legalized in Mexico. **Cap.**, \$250,000; shares \$1 par. Balance sheet March 1, 1914, shows cash balance of \$21,507.

Lands: 142 hectares, 350 acres, in the Altar district near Puerto, 7 miles west of Noria. Property shows several contact deposits of nearly vertical dip, between limestone, quartzite and granite. The main orebody under development is reported by company as of 40' average width, traceable 1,500' on surface, carrying carbonates to depth of about 100', underlain by chalcopyrite ore averaging 6 to 8% copper, 4 to 6 oz. silver and \$1.50 gold per ton.

Development: by shafts of 200' and 520', and a short tunnel, management reporting 7,500' of workings. Property idle, 1912, but resumed work in Oct, 1913, on the 500' level, opening up a vein said to be 4' wide and to show ore assaying from 3-15% copper. Plans sinking a 3-compartment shaft and erecting concentrator.

Equipment: includes a 300-h. p. steam plant, with a new hoist, installed 1912, and a 10-drill air compressor. There are 20 buildings, including an engine house, shops, store, office and about 15 dwellings. The smelter has a 100-ton Macdonald hot-blast pyritic furnace and is operating steadily. Management estimated 70,000 tons of ore in the mine.

The company's affairs have not been harmoniously managed, and many stockholders have been desirous of a change of management. Reports indicate that a compromise has been effected and that operations will be continued at the property under the old management. A suit brought by minority stockholders at Chicago is now pending to nullify the transfer of the company's property to the La Cobriza Mining Co., the Mexican corporation.

LA DURA MILL & MINING CO.

MEXICO

See Mines Co. of America.

LA EXPOSICION MINING CO.

ARIZONA AND MEXICO

Office: Room 901, 25 W. 45th St., New York. **Officers:** Fred A. Swan, pres.; Forrester A. Linn, v. p.; Appollos Fuller, sec.-treas.; with Chas. Putnam, directors. **Inc.** May 20, 1910, in Ariz. **Cap.**, common, \$500,000; all issued; preferred, \$1,500,000; outstanding, \$750,000; all shares \$1 par. Security, Transfer & Registrar Co., New York, transfer agent and registrar. Listed on New York Curb as a prospect.

Balance sheet of May, 1916, shows assets \$2,623,550, which includes "ore in sight on Hurlbut lease" \$2,500,000, and "ore in sight on Zesiger lease" \$50,000. Neither tonnage, grade nor kind of ore are reported. The company had a lease and bond on property of the Leadville Mining Co. at Courtland, Ariz., but at last accounts had failed to make payments due and title reverted to the latter company.

Property: La Exposicion claim, 42 acres, at Cumpas, Sonora, and 2 claims, 74 acres, near Nacozari, Mex. In Arizona company has a bond on 7 claims near Wickenburg, adjoining the Monte Cristo on south, said to show copper sulphide ore.

Development: 2 incline shafts. A 100' incline shaft is said to show 20' of sulphide ore; the other shaft, ore 16' to 18' in width. Claim 30,000 tons of 8% copper ore in sight.

Company also has bond on a gold property, 5 claims, near Greaterville, Pima Co., Ariz., said to show a vein 200' wide and 1,000' long on surface, capable of being mined by steam shovel, and entire vein will mill better than \$8 per ton. **Development:** 2 tunnels, 250' and 300' long, and 90' incline shaft "all in ore." Management claims 500,000 tons free milling ore, capable of being handled for \$1.50 per ton, netting company \$8 per ton; all of which is preposterous; further comment is superfluous.

Equipment: includes a hoist and 2-drill air compressor.

A 3½' Huntington mill being erected, which is expected to treat 50 tons daily.

LA FORTUNA MINING CO.

MEXICO

Idle. Office: 221 Colorado Bldg., Washington, D. C. Mine office: Apartado 21, Ocotlan, Oaxaca, Mex. **Officers:** C. E. Miller, pres.; Wm. H. Brown, first v. p.; E. D. Stinson, 2nd v. p.; Amos Tyree, sec.; W. H. Brown, treas., at last accounts. **Inc.** 1906 in South Dakota. **Cap.**, \$250,000; shares \$10 par; nonassessable; outstanding, \$230,000.

Property: 30 hectares, known as the Treadwell group, about 3 miles from Ocotlan and one-half mile from the Oaxaca-Taviche branch of the Mexican Southern railway, shows a well-defined nearly vertical fissure vein of 2 to 12' width, cutting bedded andesite tuffs, greatly leached and oxidized to depth of 300'.

Development: by a 400' vertical shaft, with 700' of workings, two 100' prospect shafts and 4 tunnels of 700' aggregate length. Workings show chalcopryrite, with quartz gangue, estimated by company to average 4.5% copper and 200 grams silver per metric ton. Some ore was shipped returning 14% copper and 600 grams silver per metric ton. **Equipment:** includes a 30-h. p. boiler, hoist and a small air compressor for hammer drills.

Is a copper mine, whose silver output is a by-product only. Idle since 1912 owing to conditions in Mexico.

LA LUZ COPPER CO.**NEW MEXICO**

La Luz, Otero Co., N. Mex. **Officers:** J. C. Yoes, pres.; W. T. Fulton, v. p.; Jas. G. Barrett, sec.-mgr.; Otto Sergeant, treas.; with G. W. Wilson, directors. **Inc.** Feb. 1, 1915, in N. Mex. **Cap.**, \$250,000; shares \$1 par. Annual meeting April 1.

Property: 8 claims, 160 acres, about 4½ miles N. E. of La Luz, said to carry a vein 7' wide, averaging 6% copper with small gold and silver values. No development done, but management plans driving a tunnel.

LA MINE D'OR HURONIA, LTD.**ONTARIO**

Three Rivers, Quebec. **Officers:** Chas. Lafond, pres.; P. V. Ayotte, v. p.; A. Lebrun, sec.-treas.; E. H. York, gen. mgr.

Property: 4 claims, 177 acres, in McVittie Twp. and in Gauthier Twp., Swastika district, Ont., Can., 18 miles from Dane. **Development:** by 3 shafts, 102', 75' and 45' deep, a 300' tunnel and 125' of drifting on the 50' level. **Equipment:** includes mill and hydro-electric plant. Power is transmitted to the mine from the Goldfields mine at Larder Lake. Total gold production to date amounts to \$7,064. About 40 men employed.

LA REGINA MINING CO.**MEXICO**

Office: 2120 W. Tioga St., Philadelphia, Pa. **Mine office:** San Martin Hidalgo, Jalisco, Mex. **Officers:** Chester P. Ray, pres.; F. W. Schmidt, v. p.; A. W. Brackmeyer, sec.-treas.; M. J. Slattery, gen. mgr.; John P. Delaney, supt. **Inc.** Nov. 1, 1909. **Cap.**, \$1,000,000; shares \$1 par, as successor of Philadelphia Copper & Gold M., M. & Smelter Co. Debentures \$200,000 authorized; issued, \$62,000.

Property: 73 hectares, including the San Vicente, La Perla, La Fe, La Concha, Ajax and other mines, shows veins of 3 to 25' width, carrying auriferous and slightly argentiferous chalcopryrite. The mine has 4 tunnels, at 150' intervals, and a 465' shaft. The Ajax mine shows a 12' vein, estimated to average 4% copper, 2 oz. silver and \$1.33 gold per ton. La Estrella del Norte mine has a 260' tunnel. **Development:** property as a whole has 8 shafts, of 100' average depth, with a total of about 1,000' of workings, claimed to put in sight 125,000 tons of auriferous copper ore. Development in recent years has been confined to the gold-silver vein, said to show at depth of 115', ore averaging 2 oz. silver and 15 grams gold per ton.

Equipment: includes a steam hoist and air compressor, at the San Vicente group. The mill has a 25-ton Elspass mill, 25-ton experimental cyanide plant, Huntington mill and 3 Pachuca tanks. Idle on account of political disturbances in Mexico.

LA REINA UNION MINING & REDUCTION CO.**MEXICO**

Office: 602 Empire Bldg., Denver, Colo. **Mine Office:** San Javier, Hermosillo, Sonora, Mex. J. F. Williams, mgr, at last accounts. **Lands:** include the Mimbres mine, said to show a fissure vein carrying lenses of complex lead-copper-sulphide ore with gold and silver values. **Development:** in 1914 by shaft, cut a vein that assayed from 15 to 30 grams gold and 400 grams silver per ton. **Equipment:** includes steam and electric power, and an air compressor.

LA ROSE CONSOLIDATED MINES CO.**ONTARIO**

Office: 201 Inspector St., Montreal, Quebec. **Officers:** D. Lorne McGibbon, pres.; Shirley Ogilvie, v. p.; Edwin Hanson, v. p., with E. W. Nesbitt, Duncan Coulson, V. E. Mitchell, W. M. Dobell, R. B. Watson and W. A. Black, directors. S. J. Le Huray, sec.-treas. Inc. May 22, 1908, in Maine. **Cap.**, \$7,500,000; shares \$5 par; 419,210 shares issued. Bankers Trust Co., New York, Toronto Gen. Trusts Corp. and Montreal Trust Co., transfer agts. Guaranty Trust Co. of New York, Toronto Gen. Trusts Corp. and Montreal Trust Co., registrars. Annual meeting last Monday in April.

The report of La Rose Cons. Mines Co. for the year ended Dec. 31, 1915, shows: Total receipts, \$328,000; dividends, \$299,725; balance, \$28,275; administration expenses, \$26,428; surplus, \$1,847; previous surplus, \$7,569; total surplus, \$9,416.

The balance sheet as of Dec. 31, 1915, shows:

Assets: stock of subsidiary companies, \$7,493,135; distribution, \$1,867,877; furniture and fixtures, \$1,079; due from La Rose Mines receivable in January, 1916, \$80,000; cash in banks and on hand, \$3,267; total, \$9,445,359.

Liabilities: Capital stock, \$7,493,135; depreciation, \$1,867,877; dividends payable Jan. 20, 1915, \$74,931; profit and loss surplus, \$9,415; total, \$9,445,359.

Statement of March 31, 1916, shows a cash surplus of \$849,181 and ore in transit and ready for shipment, \$131,986. Current liabilities are \$40,935, leaving balance of \$940,732.

Results of 1915 operations compare with previous year as follows:

	Prod. oz. Silver	Net Value	Cost Prod. per oz.	Net Price per oz.	Net Profit	Dividends	Surplus
1915.	1,185,142	\$528,996	\$1.64c	\$0.88c	\$280,662	\$299,725 (4%)	\$ 957,490
1914.	1,368,247	637,555	37.2c	58.92c	217,979	749,318 (10%)	1,040,880

Profits for 1915 on each share were equivalent to 15.3c; dividends paid by company amounted to 20c per share.

Property: 6 patented claims, 359 acres, in Nipissing district, Cobalt. Ont., include the La Rose, Princess, Lawson. University and Fisher-Eplett, all practically worked out. Work was discontinued in 1914 on the Princess and Fisher-Eplett claims after extensive development work failed to locate new orebodies, but exploratory work continues on the La Rose. The new shaft was down 350' in Feb., 1916, and diamond drilling from this level to reach the Keewatin formation is in progress.

Considered a liquidating proposition unless new properties are acquired. (For geology of district see description of Hollinger Gold Mines. Ltd.)

LA ROSE MINES, LTD.**ONTARIO**

Is a subsidiary of the La Rose Cons. Mines Co., which see.

LA SAL COPPER-SILVER MINING CO.**COLORADO**

Paradox, Montrose Co., Colo. J. Ensign Fuller, pres.; John B. Overton, sec., at last accounts. Is a reorganization of Consolidated La Sal Mining & Smelting Co., which succeeded La Sal Copper Mining Co.

Property. the Cashin mine, 7 claims, patented, and 3 mill sites, 150 acres, some distance from a railway. The mine has a 1,540' tunnel, showing carbonate and sulphide ores, assaying up to 35% copper and 18 oz. silver per ton. Lands are also said to carry coal. **Equipment:** includes steam power and a Leyner air compressor. Development resumed in 1915 after long idleness.

LA SALLE COPPER CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton Co., Mich. **Officers:** Rodolphe L. Agassiz, v. p.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding with Col. Thos. L. Livermore, Benj. Joy, Courtney C. Douglass, Francis W. Hunnewell and

T. M. Perkins, directors; Ole Hallingby, supt.; Wm. Skewes and Josiah Bartell, mining captains.

Inc. Dec., 1906, in Michigan. Cap., \$10,000,000; shares \$25 par; issued, 302,977 shares. Company absorbed the Caldwell Copper Co. and controlled the Tecumseh Copper Co., through ownership of practically the entire issue, giving $1\frac{1}{2}$ shares of La Salle for 1 of Tecumseh, and bought the entire property of the Tecumseh, May 11, 1910, for \$1,648,000. Is controlled, through ownership of 152,977 shares, by the Calumet & Hecla Mining Co. The Calumet & Hecla contributed \$1,000,000 cash to the company's treasury, taking pay in stock, and agreed to loan \$750,000 additional cash, as needed. Operations for 1915 show total receipts, \$150,598; total expenses, \$166,120, leaving a deficit of \$15,522 for the year. Balance of assets Dec. 31, 1915, \$94,636. Annual meeting, second Wednesday in June.

Property: 2,360 acres, also the Gregory mill site, on Torch lake, nearly opposite the Calumet & Hecla mills. The Tecumseh and Caldwell contributed 560 acres each and 540 acres were furnished by the Calumet & Hecla, St. Mary's Mineral Land Co., Sheldon & Douglass Estate, and other interests, these lands being put into the company at a novel basis of valuation, figured upon zones of 2,500' depth on the dip of the Kearsarge bed, allowance being made for decreased land values on zones carrying the underlay at increased depths. There are 4 shafts, 2 on the Tecumseh and 2 on the Caldwell tract, with room for 3 additional shafts, to give a total of 7 shafts, at intervals of about one-third mile. The property carries the strike of the Keweenawan formation for about $2\frac{1}{2}$ miles.

Development. property has been prospected by diamond drilling, more than 30 diamond-drill holes having been bored on the Tecumseh and Caldwell tracts, a few years ago.

The first work at the Tecumseh mine was done on the Calumet conglomerate, many years ago, when a 1,000' shaft was sunk that found no payable ore. During the second era of activity, 1889-1902, a shaft was sunk 2,300' on the Osceola amygdaloid, but this bed being found practically barren of copper, work was abandoned Nov., 1902. It is probable that the old Osceola shaft will eventually be reopened, as the southern drifts of the No. 6 shaft of the Osceola, below the 4,000' level, near the Tecumseh boundary, are among the best in that mine.

La Salle No. 1 shaft, formerly known as No. 1 Tecumseh, sunk on the Kearsarge bed, has 3 compartments, 2,146' deep, and shows the Kearsarge lode to be 8' to 12' thick, but is characterized by irregularly distributed values. The workings have encountered large areas of good ore, some of it with very rich patches of coarse copper that is rather showy though the average value has been, on the whole, somewhat disappointing in the mill. Equipment includes a 250-h. p. boiler and a hoist.

La Salle No. 2 shaft, formerly known as No. 2 Tecumseh, is located about 1,700' S. of No. 1 and is of the same size; it is 1,863' deep, and shows a bed of workable thickness but not carrying much copper. The power plant has a 125-h. p. boiler, a hoist good for 2,500' depth, and a 15-drill air compressor. Buildings include a changing house. A branch of the Mineral Range railroad was built to the shaft in 1913.

No. 5 shaft, originally known as No. 1 Caldwell, and later as No. 1 La Salle, is 1 mile S. of No. 1 shaft; is 1,450' deep, shows a poorly-defined bed, with unsatisfactory copper contents, and work was discontinued Nov., 1910.

No. 6 shaft, known as No. 2 La Salle, sunk at a point 1,500' S. W. of No. 5, was abandoned, June, 1909, at depth of 882', because the lode showed little or no copper; the surface equipment was removed to No. 2 shaft.

The Kearsarge bed is comparatively thin in the Tecumseh tract, ranging from 7 to 11', with an average thickness of about 9'. It is estimated that approximately 1,000,000 tons of stamp rock were blocked out in the No. 1 Tecumseh, to the end of 1912, the greatest length of lateral opening being on the 12th level, where a stretch of about 1,000' of good stoping ground has been developed.

Development: in 1913 No. 1 shaft was unwatered down to the 17th level and stoping started in July. The big labor strike started on the 23rd of the month and the mine was closed down. Operations, started in Jan., 1914, continued until Aug., at the time of outbreak of the European war. Work was again resumed in June, 1915. Total development work amounted to 141' in 1913; 1,123' in 1914; 1,127' in 1915. At the present time daily shipments are 600 to 700 tons of rock while development work is also being pushed. Ore is treated at C. & H. mill at Lake Linden.

Year	Production:		
	Tons R'k Treated	Lbs. Cu. per Ton R'k Stpd.	Lbs. Cu. Produced
1916 (1st 6 mos.).....			632,608
1915.....	80,959	9.67	782,493
1914.....	45,509	11.88	540,731
1913.....	2,221	19.76	43,906
1912.....	0	0	0
1911.....	18,970	14.77	280,598

LA SALLE COPPER MINING & MILLING CO. NEW MEXICO

Carrizozo, Lincoln Co., N. M. Geo. C. Hopkins, v. p. Inc. in Arizona. Cap., \$1,000,000; shares \$100 par. Lands: 3 claims, 60 acres, 6 miles from Carrizozo, said to show a 12' to 15' vein of low-grade copper ore. Idle.

LA UNION CONSOLIDATED COPPER CO. MEXICO

C. B. Bell, Douglas, Ariz., owner. Property: 660 acres, in Cerro Tordillo section of the Ajo mountains, W. of Fronteras, Sonora, Mex., shows a 3' to 20' vein traceable a mile, that carries high-grade copper, gold, silver, zinc ore. Orebody is a contact deposit in lime and porphyry formation, ore occurring in shoots.

Development: by 5,000' of tunnels and shafts to depth of 500'. Shipments of 1,500 tons were made to April, 1914, averaging 15% copper, 15 oz. silver and 0.1 oz. gold. The property was worked in 1882-86, acquired by present owner in 1906, and considerable work done in 1912-13-14.

Company gave up property in 1914, and C. B. Bell plans resuming operations when peace is restored in Mexico.

LA VORE GOLD MINES CO. UTAH

St. George, Utah. Officers: Willard Snowcroft, pres.; R. G. McQuarrie, v. p.; D. H. Morris, sec.-treas., with Irvine McQuarrie and Herrick McQuarrie, directors. Inc. 1915, in Utah. Cap., \$100,000; shares 10c par; 60,000 issued.

Property: 10 claims in the Goldstrike district, Washington Co., Utah, said to show a vein 11' wide, averaging \$5 gold per ton. Developing with a small force.

LACLEDE MINING CO. IDAHO

Wallace, Ida. Officers: C. Fred Kratzer, pres.; O. W. Lewis, v. p.; Jas. A. Wayne, sec.-treas.; with T. N. Barnard and W. J. Weyer, directors. E. A. Gnaedinger, mgr. Cap., \$1,000,000; shares \$1 par; assessable at the rate of 3 mills every 3 months; 900,000 shares outstanding.

Property: lies between the Interstate-Callahan and Tamarack & Custer, in the Coeur d' Alene district., Shoshone Co., Idaho. **Development:** consists of 300' crosscut tunnel, a winze down 300' below the tunnel level,

Feb., 1916, or 600' vertically below the apex of the vein, with drifts run each way every 100'. Ore occurs irregularly and thus far is not of commercial grade.

LADD METALS CO.**IDAHO**

Company has disposed of all properties and is out of the mining and melting business. Fully described Vol. XI, Copper Handbook.

LADYSMITH COPPER MINING CO.**MONTANA**

Offices: Marquette Bldg., Chicago. Mine near Elliston, Powell Co., Mont. **Officers:** Edw. R. Roe, pres.; F. J. Schroter, sec.-treas.; preceding with W. A. Lynch, Wm. K. Steele and B. B. Switzer, directors. **Inc.** 1905, in South Dakota. **Cap.**, \$1,600,000, increased from \$400,000 in 1908; shares \$1 par.

Property: 10 claims, 12 miles N. W. of Elliston, are well timbered and carry a contact deposit between limestone and granite that is 15' in maximum width. **Development:** includes a 180' two-compartment shaft, and a 110' shaft, with about 1,500' of workings, sulphide ore occurring at depth of about 165'. Idle since June, 1910, except for diamond drill prospecting, but plans further development.

LAKE COPPER CO.**MICHIGAN**

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon Co., Mich. **Officers:** Wm. A. Paine, pres.; John H. Rice, v. p.; Robt. H. Gross, sec.-treas.; preceding with Wm. F. Fitzgerald, Reginald C. Pryor, Wm. S. Rooney, F. Ward Paine, directors. Elton W. Walker, mgr.; C. E. Weed, supt.

Inc. Nov. 27, 1905, in Mich. **Cap.**, \$2,500,000; shares \$25 par; \$5 paid, fully issued. Shares are listed on the Boston Stock Exchange. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agt. Annual meeting, third Tuesday in June.

Report for fiscal year, ending April 30, 1916, shows: total receipts, \$334,007, which includes: copper sold, \$318,581; assessments, \$7,686; miscellaneous, \$7,739. Expenditures total \$246,987, include mine expenses, \$202,896; charges for smelter, freight, marketing copper, etc., \$30,688; taxes, \$11,302; Surplus May 1, 1915, \$167,145; surplus April 30, 1916, \$254,164. In 1916 company is reported to be earning over \$3 per share annually.

Property: 2,010 acres, including 1,150 acres of mineral land, 680 acres of timber lands and 180 acres of cutover lands. The company bought 20 acres immediately E. of the shaft from St. Mary's Mineral Land Co., to provide room for a surface plant, the purchase carrying with it mineral rights to a depth of 100', thus caring for the upper portion of the Lake shaft, collar of which is almost divided by the section line. Property includes the S. E. $\frac{1}{4}$ of Sec. 29, S. E. $\frac{1}{4}$ of Sec. 30, N. W. $\frac{1}{4}$ of Sec. 32, and E. $\frac{1}{2}$ of Sec. 31, T. 51 N., R. 37 W.

The first work of the company was done on the Knowlton and Butler beds, with a little work on what formerly was supposed to be the Evergreen, principal work being on the Knowlton amygdaloid, on which there were old shafts of 170' and 300', latter having been deepened to 600' by the present company. Considerable copper was taken from the Knowlton bed, but it was thought wise to transfer work to virgin territory, at the southern end of the property, and the wisdom of this move was demonstrated by the outcome. There also is a 90' shaft on the Tresidder bed, 1,000' E. of the Knowlton, which was sunk 1865, and is said to have paid for sinking from the copper extracted. Considerable diamond drilling has been done, and the borings of the Adventure, on adjoining lands, indicate that the Lake should have several other promising amygdaloidal beds, in the same general horizon as the Lake bed now being opened.

Geology: the strike of the Lake amygdaloid in the immediate vicinity of the shaft is about N. 6° E., with dip of about 35° W. It was at first thought that the Lake bed was a fissure, but that this is not the case was proven conclusively by the disclosure of parallel strata, including a conglomerate lying about 400' thereunder. The Lake bed, which is a typical Lake Superior amygdaloidal trap flow, barring its unusual strike and dip, is exceedingly wide for a copper-bearing bed, ranging from 50 to 100'. The hanging-wall of trap is fairly well defined but the footwall is extremely irregular, there being no marked line of separation between copper rock and trap. The Lake bed appears to carry 3 well-defined shoots of enriched copper ground, raking northward with depth. An attempt was made to locate the northerly extension of the Lake bed by diamond drilling from surface, but without success, though 3 holes were bored and it is now known that the lode turns W. and passes into South Lake ground. Thirteen diamond drill holes have been bored, aggregating 1,628'. The northernmost bottom workings of the mine show a deflection to the westward, with a strike, at the extreme north, of N. 15° W., which corroborates the hypothesis of Dr. L. L. Hubbard, that the Lake bed is the third and the East lode, the fourth bed from the top in the series of 4 amygdaloidal beds cut by the drill holes of the South Lake.

There are two other lodes only 50' W. of the Lake with commercial ore. The long crosscut on the South Lake proves Dr. Hubbard's theory.

The mine is operated by a 1,500' incline shaft, ore being extracted from all levels from the 2nd to the 11th. The lode is bunchy with very rich spots and some mass copper, but the general average is about 2% which is equivalent to 25 lbs. of refined copper.

The Knowlton shaft was unwatered Aug., 1916, to mine ore from the Knowlton lode, which though narrow, shows good copper values where opened. The Butler and Evergreen lodes can be reached by an 800' crosscut from this shaft.

Development: the mine has about 30,000' of workings, a very large proportion of the drifts being in neither the footwall nor the hanging-wall, giving a rather indifferent line on the actual values in the bed. New work during last fiscal year totaled 2,177'.

Equipment: includes a 32x72" Nordberg duplex-cylinder double-conical-drum hoist, capable of lifting 10-ton loads from depth of a mile; old 6-drill and 15-drill air compressors, taken from the equipment of the old Belt mine, and a new 50-drill 2-stage cross-compound air compressor, in a steel compressor house. Mine structures include a machine shop, smithy, changing house, office and boarding house. There are 9 dwellings and a number of old houses at the Belt location. The property is served by the main line of the Copper Range railway, which passes through the old Belt location, with a 1½ mile spur to the shaft, and a siding has been built to within 500' of the shaft by the Mineral Range railway, giving the mine the advantage of competitive railway rates. About 150 men are employed.

Production: fiscal year ending April. Work resumed in May, 1915, after 2-year shutdown.

	Tons Rk. Stmpd.	Mineral Lbs.	Lbs. Cu. per Ton Rk.	Lbs. Cu. Prod.	Cost per. Lb.	Rec. per Lb.
1916(a).....	59,848	2,511,216	26.42	1,581,071	15.622(b)	20.149
1914			14.95	275,647		15.074
1913	83,109	2,153,128	15.39	1,300,562	19.5(c)	

(a) Did not produce during first 3 months. (b) Includes 1.036c charge due to resuming operations. (c) Approximately.

Production by July, 1916, reached 200,000 lbs. copper monthly, with net

earnings of \$25,000 per month. With an increased production the cost per lb. should be materially lowered.

The management is both experienced and capable, and the mine, though small, is most promising.

LAKE COPPER MINING CO., LTD.

NOVA SCOTIA

Idle. Office: care Dr. H. Mackay, New Glasgow, N. S. Mine office: Polson's Brook, Antigonishe Co., N. S. A. G. Baillie, gen. agt. Inc. Jan. 1908. Cap., \$2,500,000; shares \$1 par. Property: 6,400 acres, on Polson lake, said to show a vein 5' thick, traceable a mile and carrying auriferous and argentiferous copper ore. Mine has a 103' shaft with 554' of workings.

LAKE GEORGE DEVELOPMENT CO.

COLORADO

Office: 22 E. Columbia St., Colorado Springs, Colo. Mine office: Lake George, Park Co., Colo. Officers: O. W. Battles, pres. and mgr.; S. C. Drollinger, v. p.; A. J. Kiser, sec.-treas. and purch. agt.; preceding with M. A. Kiser and R. H. Kiser, directors. Inc. 1910, in Colorado. Cap., \$600,000; shares \$1 par, divided into 30,000 preferred and 570,000 common shares, preferred shares being issued to bondholders of this amount. Bonds bear interest at 7½%.

Property: 28 claims, 530 acres and 750 acres miscellaneous lands, partly patented, in the Lake George district, show a calcareous contact deposit between quartzite and granite. Ores contain chalcopryrite with good silver and gold values. Development: by 3 shallow shafts, deepest 80', and a 1,100' tunnel.

LAKE MILLING, SMELTING & REFINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Works office: Point Mills, Houghton Co., Mich. Officers: R. L. Agassiz, pres.; Geo. G. Endicott, sec.-treas.; Jas. McNaughton, mgr.; preceding with H. F. Fay and W. L. Frost, directors.

Inc. 1891, in Michigan. Cap., \$2,500,000; shares \$25 par; fully issued; \$5 paid in. Stock distribution is as follows: Allouez Mining Co., 36,164 shares; Centennial Copper Mining Co., 16,164 shares; Hancock Cons. Mng. Co., 10,000 shares; Isle Royale Copper Co., 18,836 shares; Superior Copper Co., 18,836 shares.

Owens 2 mills; one, called the Centennial-Allouez mill, is at Point Mills, on the shore of Portage lake, on land adjoining the Franklin mill site. The mill was built by the Arcadian Copper Co., and was bought, 1904, by the Centennial Copper Mining Co., and later transferred to the present corporation. The mill of 4,000 tons daily capacity is equipped with 6 Nordberg stamps and crushing rolls to treat oversize material. Power is furnished by a 600-h. p. Nordberg cross-compound engine, and water is supplied by a 15,000,000-gal. Nordberg pump. A new boiler house containing 8 boilers was completed in 1915. The other mill, known as Lake No. 2 mill, is at Hubbell and has 2 stamps in operation at present. Two more are to be added. A wharf, running 675' into deep water, is equipped with a modern coal hoist and coal shed.

LAKE MINE.

COLORADO

Robt. H. Sayre, Central City, Colo., mgr. Property: 5 patented claims, in Virginia mining district, Clear Creek Co., shows pyrite, chalcopryrite, grey copper, zinc and lead. Ore occurs in fissure vein running N. 80° E. with dip 65°, in granite-gneiss formation.

Development: by 2 tunnels, 600' and 2,000' long to vertical depth of 2,400', with a total of 15,500' of underground workings. Production: from Aug., 1914, to Aug., 1915, was 16,506 tons of ore, averaging \$15 per ton, yielding a gross return of \$225,000 and a net return of \$122,629. Dividend

distributed among the owners for the fiscal year ending Aug. 1, 1915, was \$21,000. Mine is worked by lessees.

LAKE SHORE MINE

ARIZONA

Address: Frank M. Leonard, mgr., 82 N. 6th Ave., Tucson, Ariz. Howard M. Snyder, supt., Casas Grande. **Property:** 7 claims, 3 patented, 115 acres, 5 miles W. of Tucson and 35 miles S. of Casas Grande, carries a contact deposit in granite and andesite. The ore channel runs N.-S. and dips 45°. The deposit carries oxidized copper ores.

Development: by 285' vertical shaft bottomed in copper sulphide ore.

Production: by former owner, B. S. Wilson, averaged 7% to 12% copper and 31.4 oz. silver per ton. Property has been examined and reported on by Frank W. Royer, A. J. Waters and Thos. H. Leggat. Property promising.

LAKE SHORE MINES, LTD.

ONTARIO

Haileybury, Ont. Harry Oakes, pres.; J. W. Morrison, sec.-mgr. **Inc.** Feb. 25, 1914, in Ontario. **Cap.**, \$1,500,000. **Property:** the Lake Shore gold mine, on Kirkland Lake, adjoins the Teck-Hughes on the east.

Development: by 300' shaft with crosscut at bottom being driven to reach the vein opened on 100' level. Vein reported to measure 42" in width at surface and 40" at 100' depth. **Equipment:** includes 3-drill compressor boilers, blacksmith shop and office buildings. About 30 men employed.

LAKE SHORE MINING CO.

MICHIGAN

Idle several years. **Office:** 990 West Kensington Road, Los Angeles, Calif. Mine near Green, Ontonagon Co., Mich. W. H. Garlick, pres. **Inc.** in Michigan. **Cap.**, \$500,000; shares \$25 par.

Property: 821 acres, patented, on the shore of Lake Superior, is reported to carry bedded deposits, between slate walls, of 5' and 12' width, showing copper oxides and chalcocite giving average assays of 2% copper, 0.5 oz. silver and 40 to 80c gold per ton. Apparently the orebody is of the secondary or Porcupine series of the Keweenawan formation, and ores may change to native copper at depth. A little prospecting has been done.

LAKE SUPERIOR & ARIZONA MNG. & SMELTING CO. ARIZONA

Office: Calumet, Mich. **Mine office:** Superior, Pinal Co., Ariz. **Officers:** John D. Cuddihy, pres.; Johnson Vivian, v. p.; A. E. Petermann, sec.; Wm. B. Anderson, treas; preceding officers, Wm. H. Thielman, Edw. Ulseth, Henry L. Baer, Frank S. Carlton, all of Calumet; W. A. Holt, Globe, Ariz., and John T. Reeder, Houghton, Mich., directors.

Inc. Sept. 30, 1902, in Arizona, as the Lake Superior & Arizona Mining Co. **Cap.**, \$200,000; shares \$1 par, and reorganized, 1904, in Arizona, with present title; **Cap.**, \$2,500,000, shares \$20 par; issued, \$1,680,000, formerly assessable, but now fully paid. Annual meeting, second Tuesday in March. A. E. Petermann, transfer agt., Calumet, Mich. First National Bank, Calumet, Mich., registrar.

Property: the Gold Eagle mine, with 11 claims, 110 acres, freehold at Superior, in the Pioneer district, 3 miles S. of the Silver King mine, 30 miles W. of Globe and 28 miles E. of Florence. Claims show thickly bedded, steeply upturned limestone, resting on quartzite, underlaid by diabase. Ore occurs following slips, or brecciation along bedding planes which in general lie within 20' of the base of the limestone. In places the ore is 4' thick, and sometimes leached iron gossan is 15' thick. This brecciation is due to fracturing or bedding faulting, and does not follow exactly the same bed.

As the vein matter is a leached iron gossan with only occasional patches and segregations of oxidized ore or residual nuclei of sulphide, hope is felt that massive sulphides will be found in depth. Though a heavy flow of

water is encountered, the sulphide zone has not yet been reached.

Development: the principal working is the Charlton tunnel, which for 2,000' follows the mineralized fracturing along the bedding plane between Devonian limestone and quartzite. This tunnel is 130' vertically below the Holt tunnel, is connected with the latter by a 165' winze on the dip of the vein and is 3,000' long, showing ore assaying up to 30% copper. At the northern end of this long tunnel, there is an incline shaft sunk along the bedding plane, at 26° inclination for 1,800' with short levels at various intervals.

Equipment: includes steam plant with 175-h. p. water-tube boiler, and 16-drill Rand 2-stage air compressor. Fuel is petroleum, and there are 5 storage tanks at the mine and 2 at Florence, each holding 2 carloads of oil.

Buildings include a power house, smithy and bunkhouse at the mine, and an office and dwelling at Florence, 28 miles distant.

Production: was 99,120 lbs. copper, 1,040 oz. silver and 188 oz. gold in 1907; none since. Work was suspended 1907, resumed 1910 by the Magma Copper Co., and again suspended 1911. Property is considered promising.

In March, 1913, the Gunn Thompson interests, who as the Magma Copper Co., had an option on the property expiring 1912, are reported to have offered to spend \$100,000 in sinking the shaft and developing and further agree to add several claims to the group, all for one-half of the company's stock, provided the L. S. & A. Co. give them title to one of the claims. Plans under way, Dec., 1915, to reorganize with idea of obtaining money for more development work.

LAKE SUPERIOR DEVELOPMENT CO.

MICHIGAN

Office: care Clyde Mackenzie, sec., Houghton, Mich. **Jos. Croze, pres.;** Jos. W. Selden, treas. **Property:** 400 acres, held under option, the N. ½ of Sec. 25, and S. ½ of S. W. ¼ of Sec. 24, T. 57 N., R. 32 W., about ½ mile E. of the Gratiot and about 1½ miles of the Ojibway. Lands are on the Keweenawan formation. Drill boring made 1910-11, gave much encouragement, and company hopes to resume operations.

LAKE SUPERIOR OPHIR MINING CO.

COLORADO

Ophir, Colo. **Inc. Sept., 1911, in Ariz. Cap., \$1,000,000;** shares \$2 par. Is reorganization of the Calumet-Telluride Mng. Co. **Property:** in Chapman gulch above Ophir, San Miguel Co., Colo., said to carry free gold ore.

Equipment: includes aerial tram, electric power and 20-stamp mill, handling about 100 tons of \$15 ore daily in 1915. Employs 30 men.

LAKE SUPERIOR SMELTING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. **Works office:** Dollar Bay, Houghton Co., Mich. **Officers:** R. L. Agassiz, pres.; C. H. Bissell, sec.-treas.; preceding with Geo. A. Flagg, F. L. Higginson, F. W. Hunnewell and Jas. MacNaughton, directors. Jas. MacNaughton, gen. mgr.; Harry B. Conant, supt.

Inc. July, 1891, in Michigan. Cap., \$1,200,000; shares \$25 par, fully paid and issued. Is controlled through ownership of 25,000 shares, by the Tamarack Mining Co., and by the Osceola Cons. Mining Co., which has 15,000 shares, and the Isle Royale Copper Co., which has 8,000 shares.

The smelter, closely connected with the plant of the Tamarack-Osceola Mfg. Co., has 11 reverberatory furnaces and 3 refining furnaces. There is a mechanical ladling and casting device having a 1,100-lb. ladle, and a casting machine with molds linked into an endless belt, dumping over sprockets into cooling tanks, whence the ingots are delivered mechanically by cleat elevators to inspection and loading platforms. About 300 men are employed.

The smelter treats ore from the Tamarack, Osceola, Isle Royale, Ahmeek and Centennial mines. The company also owns the dismantled

smelting plant at Hancock, Houghton Co., Mich.

LAKE SUPERIOR & WESTERN MINING CO.

ARIZONA

Office: 208 Glencoe Bldg., Duluth, Minn. **Officers:** A. Hagberg, pres.; A. Bjorkman, v. p.; A. Borgquist, sec.; A. Johnson, treas., with Magnus Olson, John Peterson, A. R. Norman, Ed. Falk, and A. Kolstad, directors. **Inc.** 1912, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; \$250,000 issued; assessable, subject to calls from 60c-\$1. Authorized bond issue \$300,000; \$134,000 bonds outstanding. Annual meeting 1st Tuesday in February. Is a holding company, owning a ½ interest in the Big Pine Cons. Mng. Co., which see.

Company owned the Mascot gold mine and a 100-ton cyanide plant at Crown King. After expenditure of \$250,000 on the mine and mill, ore proved to be too low-grade to pay and property was abandoned. In 1915 a consolidation was effected with the Big Pine Cons. Mng. Co., a \$500,000 corporation, on the following basis: 200,000 shares of the 500,000 shares of capital stock were issued for the Big Pine properties and 200,000 shares and \$32,150 in cash was paid the Lake Superior & Western Co. for its mill, which has been moved to the Big Pine ground.

LAKEVIEW MINING CO.

UTAH

Office: 303 Dooly Bldg., Salt Lake City and Ogden. **Mine office:** Promontory Point, Utah. **Officers:** W. A. Perkins, pres.; Sampel S. Arentz, v. p.-mgr.; L. F. Farr, sec.-treas., with C. L. Farr and Jas. Wotherspoon, directors.

Inc. March 9, 1915, in Utah. **Cap.**, \$500,000; shares 5c par, assessable; all issued to officers of the company. Annual meeting March 9th. Gross earnings for 1915 were \$135,000, all from ore sales. Operating expenses totaled \$65,000. **Dividends:** to May, 1916, amounted to 20c per share, or \$100,000.

Property: 15 claims, unpatented, 235 acres, at Promontory Point, Box Elder Co., 3 miles E. of Saline on the S. P. R. R., shows zinc-lead ore in a contact deposit between limestone foot and shale hanging-wall. The ore-body measures up to 20' in width, runs N. 35° W. and dips 35° N. E. Pay ore occurs in shoots from 1'-20' wide and from 50'-250' along the strike. Assays reported to average 32% zinc, 5% lead, 2% iron, 16% insoluble.

Development: to 1,000' below the outcrop by 5 adits, from 250'-350' long. A 6' vein assaying 18% lead with some silver has recently been opened on the South Hill ground and is now under development. Zinc ore as shipped averages 32% and lead ore 26%.

Equipment: includes 600' tram and oil-driven Chicago pneumatic compressor of 187 cu. ft. capacity.

Production: to March, 1916, totaled 126 cars averaging \$25-\$30 per ton and returning \$200,000. Output for May was 800 tons, netting \$16 per ton. A lease and bond held by the A. S. & R. Co., for \$625,000 was allowed to lapse, March, 1916. Company employs 90 men. The Western Zinc Co., operating a lease on a block of the Lakeview, shipped about 1,000 tons of ore during 1915.

The mine and management have made quite a remarkable record. Located Jan. 27, 1915, work was commenced March 9, with a small force and by December, 1915, all debts were paid, the mine was developed, equipped and shipping, a \$70,000 dividend paid to stockholders and a cash surplus remained in the treasury.

LAKEVIEW VOLUNTEER MINING CO.

UTAH

Office: Orpheum Bldg., Salt Lake City, Utah. **Officers:** Leo Nielsen, pres.; Frank Jardine, v. p.-gen. mgr.; Willard P. Funk, sec.-treas., with A. B. Maughn and Ben C. Risk, directors. **Inc.** 1916, in Utah. **Cap.**, \$50,000;

shares 5c par; assessable. Listed in Salt Lake City. In May, 1916, treasury had 450,000 shares and \$625 in cash.

Property: 3 claims in Promontory district, Box Elder Co., and 2 claims in Blacksmith Fork canyon, Cache Co.; the former have 500' of development work, including a 125' shaft, said to show zinc ore. Equipped with a hoist. The work done on the Blacksmith Fork claims is said to show copper-lead-zinc ore. Is a prospect.

LAKINA COPPER CO.

WASHINGTON-IDAHO

Office: Eagle Bldg., Spokane, Wash. **Officers:** E. A. Patrick, pres.-mgr.; E. J. Coleman, v. p.; T. E. Coleman, sec.-treas., with G. W. Dickinson, H. R. Waters, and L. N. Koonz, directors. **Cap.**, \$3,000,000; shares \$1 par; 1,750,000 shares outstanding.

Property: 2 claims, 40 acres, in Deadwood mining district., 3 miles N. E. of Lowman, Boise Co., Idaho, and 4 claims, about 25 miles N. of Twisp, Okanogan Co., Wash. The Idaho property is a free milling proposition reported to carry a fissure vein, 30' wide, traversing granite-porphry and giving assays of from \$48-\$76 per ton. Both properties are under development.

LAKINAW TAGISH CO.

ALASKA

J. L. Harper, mgr., Cymru mine, Moira Sound, via Ketchikan, Alaska. Holds bond on Cymru mine (which see) and on Portland (or Westlake King) group.

At the Cymru a 100' shaft has been sunk and the mine equipped with 3-drill compressor and gasoline hoist. A mile long tram with gasoline motor connects mine and shipping wharf; 300 tons of ore were shipped to Tacoma in July, 1916.

The Portland Group, near Mineral lake, is 1½ miles from the Cymru. It shows a 4' vein carrying silver-zinc-lead and copper values, zinc being predominant. **Development:** by 130' shaft. The ore is transported by 1,000' aerial tram to Mineral Lake, from there by scows to the Cymru; 500 tons are reported ready for shipment to Oakland, Calif. Ten men employed.

LANDLOCK BAY COPPER MINING CO.

ALASKA

Office: Valdez, Alaska. **Mine office:** Landlock, Alaska. Dr. W. A. Rystrom, pres. and mgr. **Inc.** 1907. **Cap.**, \$1,000,000; shares \$1 par; issued 750,000 shares.

Property: 7 claims, 140 acres, on a small peninsula, with tide water on both sides, has 2 tunnels on the western side, besides a shallow shaft, 500' of drifts, a winze and raises, showing chalcopryrite, sphalerite and pyrrhotite ore assaying 7½% copper. Developing at last accounts. Geology fully described, p. 97, Bull. 605, U. S. G. S.—1915.

LANYON STARR SMELTING CO.

OKLAHOMA

Office: St. Louis, Mo. Controlled by American Metal Co., Ltd., 120 Broadway, New York City. Plant at Bartlesville, Okla. **Officers:** S. Roos, pres.; M. Schott, v. p.; Wm. Simon, treas.; with E. V. Lanyon, R. E. Rombauer, directors; W. H. McMillan, sec. **Inc.** in Maine. **Cap.**, \$500,000 common and \$250,000 6% cumulative preferred; shares \$100 par. Annual report for 1915 shows: profit, \$373,641 and balance of \$261,378, after writing off 1914 deficit of \$37,887. **Dividends:** paid amounted to \$15,000 on preferred stock.

Company operates a zinc smelter of 35,000 tons annual capacity.

LAS ANIMAS PEAK GOLD MINES CO.

NEW MEXICO

Office: 1516 No. American Bldg., Chicago, Ills. **Mine office:** Hillsboro, N. Mex. **Officers:** Hon. E. W. Kirkpatrick, pres.; R. Liebman, v. p.; C. B. Van Deman, sec.-mgr.; W. A. Nason, treas.; with L. E. Marvin, W. McCarty Moore and J. H. Palmer, directors. E. B. Van Deman, supt.

Inc. 1914 in Ariz. Cap., \$1,000,000; shares \$1 par; 450,000 issued. Annual meeting 3rd Wednesday in January.

Property: 12 claims unpatented, 240 acres, 4 miles N. of Hillsboro, Sierra Co., N. Mex., shows gold-silver ore in a fissure vein, said to be 3-12' wide, striking N. and dipping 70°. Developed by several shafts to depth of 435'. A new 2-compartment shaft being sunk. Management estimated 100,000 tons of ore blocked out.

Equipment: includes 50-h. p. steam hoist, Cameron pump, compressor and 50-ton concentrating mill. A cyanide plant and electric power are to be installed in 1916.

Property was a good producer under former owners, the Philadelphia M. & M. Co., which went into bankruptcy in 1907. Litigation followed and mine remained idle until acquired by present company two years ago. Management plans extensive development work.

LAS VIGAS MINING CO.

MEXICO

Dead. Property controlled by A. McKenzie, 66 Broadway, New York. Mine at San Sostenes, Coyame, Iturbide, Chihuahua, Mex., consists of 74 hectares, said to show upturned Cretaceous sandstones and shales with interbedded copper lodes, occurring as impregnations and replacements in sandstone. Four veins last under development are reported to average 7 to 12' width, and to give average returns of 7.5% copper and 3 oz. silver per ton, mainly from disseminated bornite and chalcopyrite, with occasional oxidized ores and native copper.

Development: by shafts of 61', 98', 125' and 212', with various levels; also 3 short tunnels. Workings estimated to develop 160,000 tons of ore.

Equipment: includes steam power, a hoist, an air compressor, and a 100-ton concentrator. Buildings include an office, store and 19 dwellings. Ore was hauled, 43 miles, to Las Trancas station, by a Buffalo-Pitts traction engine. Reported under option to English parties, 1916.

LASQUETI ISLAND MINING CO., LTD. BRITISH COLUMBIA

Vancouver, B. C. **Officers:** R. A. Mather, pres.; A. D. Tennant, v. p.; John D. Mather, sec.; Geo. E. Winter, treas.; Percy Williams, mgr., at last accounts. Inc. 1910. Cap. \$500,000, shares 25 cts. par.

Property: 3 claims, 150 acres, on Lasqueti island, on the S. W. end of Texada island, on the Gulf of Georgia, 55 miles from Vancouver. **Development:** by a tunnel, on a 20' vein known as St. Joseph, having 4 paystreaks, of 6 to 24" width, said to carry ore averaging 10% copper and \$20 gold per ton. Presumably idle.

LAST CHANCE COPPER MINING CO.

MONTANA

Officers: Geo. Champagne, pres.; W. H. Nichols, sec.; Dr. T. C. Wither-
spoon, treas., Murray Hospital, Butte, Mont. Cap., \$1,200,000; shares \$1 par.

Property: 2 claims, patented, adjoining the Ben Hur mine, 4 miles north of Saltese, Missoula county, Mont. Mine is developed by shallow shafts and a 2,300' tunnel, the workings said to show a 30' vein, faulted in the tunnel, but a winze shows an 18" streak of ore said to carry about \$100 per ton in values. Company reports past shipments of about \$150,000, one car-load shipped giving returns of 13.6% copper, 394 oz. silver and \$12 gold per ton. Tunnel being driven in 1915-16 to reach the rich oreshoots from which shipments were made.

LAST CHANCE MINE.

OREGON

Owned and operated by Baker Mines Co., which see.

LAST CHANCE MINING CO.

UTAH

Owns 1 patented claim, adjoining the American Copper Co., in the Big Cottonwood district, near Alta, Salt Lake Co., Utah. Shaft, at depth of 70',

is said to show a 6" lead of silver-lead ore. Operations resumed in 1915 by F. O. Horne and Jas. Hauerbach.

LAST DOLLAR MINING & DEVELOPMENT CO. COLORADO

M. B. Rapp, pres.-gen. mgr., Cripple Creek, Colo.; F. R. Berbower, sec.-treas. Has a 2-years' lease and bond on the Last Dollar mine, 18 acres, adjoining the Portland & Modoc mines, Cripple Creek district, Teller Co., Colo. Mine is credited with a past production of \$30,000,000.

Development: by 1,517' shaft with levels at 500', 1,000', 1,200', 1,300' and 1,500'. The West vein, opened on the bottom level, is said to be 2½' wide and producing better than \$30 per ton ore in 1916. Shipments are made to the Golden Cycle mill at Colorado City. Four sets of lessees are working above the 1,300' level.

LAST HOPE MINE.

NEVADA

Owned and operated by Chas. Koegel, Chas. Huber and C. Pike. Mine adjoins the Queen Regent Mines Co. on the W., at Rand, Mineral Co., Nev., and is reported to carry an extension of the Queen Regent vein. **Development:** by 250' double-compartment shaft. **Shipments:** in 1915, said to have averaged \$80 per ton, amounted to \$30,000.

LATAH COPPER MINING CO., LTD.

IDAHO

Potlatch, Latah Co., Idaho. Idle since 1907. See Vol. XI, Copper Handbook.

LATEST OUT MINING & SMELTING CO.

IDAHO

Ralph Nichols, mgr., Gilmore, Lemhi Co., Idaho. **Property:** the Latest Out mine, at Gilmore, is a lead-silver mine, developed to depth of 800'. Shipments of 27,000 tons were made 1910-12. Worked by lessee in 1915-16. (See full description by Nichols in Trans. Am. Inst. M. E., Vol. XLVI, pp. 937-9, Lead-Silver Mines of Gilmore (Lemhi Co., Idaho).)

Ore: limonite and hematite replaced by shoots of lead minerals in fissure veins in limestone at right angles to bedding with south rake to ore-shoots. Sulphides decrease with depth. Ore on 200'-500' level assays 32% lead, 10% silica, 25% iron, 3% zinc and 12 oz. silver per ton. Oreshoots are 30'-40' wide in places.

LATOUCHE COPPER MINING CO.

ALASKA

Latouche, Latouche island, Alaska. Geo. Barrach, mgr. **Property:** 7 claims, about one-half mile north of the Bonanza mine of the Beatson Copper Co., at the northern end of Latouche island. The vein has been traced about 750', by trenches and pits, and its developed by a 750' tunnel, showing chalcopryrite, associated with pyrite and pyrrhotite, with drifts in ore of 4 to 12% copper tenor, having small gold and silver values. There is an 1,175' ground tram to a shipping wharf. Idle since 1914.

LATOUCHE ISLAND COPPER MINING CO., LTD.

ALASKA

Office: 509 Burke, Bldg., Seattle, Wash. **Mine office:** Latouche Latouche island, Alaska. **Officers:** Jas. A. Murphy, pres.; L. G. Wheeler, v. p.; A. E. Fraser, 2nd v. p.; C. P. McCormick, sec.; A. L. Cohen, treas.; preceding officers, Tenning Carlson and H. J. Jacobs, directors. **Inc. in Washington. Cap., \$5,000,000; shares \$5 par.**

Property: 42 claims, with about 4 miles of tidewater frontage, is on the N. E. shore of Latouche island, 60 miles S. of Valdez. The property has 3 practically parallel N.-S. veins, of 8 to 20' estimated average width, with dip of about 65°, somewhat faulted but proven by trenches for about 3 miles.

Development: by a shallow shaft and 4 short tunnels, claimed to have in sight approximately 200,000 tons of 5% ore, which is considered excessive. Ore carries bornite and chalcopryrite, with quartz gangue, assaying up to 25% copper, with \$1 to \$3 combined gold and silver values per ton.

Equipment: includes a small hydro-electric plant having a water wheel and a Class E Rand air compressor. Company was shipping 125 tons of ore daily at last accounts. No returns secured 1915-16.

LAURA LEE MINING & LEASING CO.

COLORADO

Office: 501 Majestic Bldg., Denver. **Officers:** Hon. Geo. W. Musser, pres.; Chas. A. Woodward, v. p.; W. R. Benzie, sec.-treas.; A. S. Pierce, gen. mgr.; with D. M. Wright and Chas. J. Hallett, directors. **Inc.** 1916 in Colo. **Cap.**, 1,500,000 shares; 10c par; fully paid and nonassessable.

Property: a 3 years' lease, with option to purchase, on the Laura Lee mine, on the southern slope of Mineral hill, Cripple Creek, owned by the Vindicator Cons. Gold Mining Co. **Development:** by 160' shaft, sunk about 15 years ago, and 2 west drifts on the vein for 200'. The shaft is being deepened and equipment installed in 1916.

A prospectus of the company contains the following typical paragraph: "Our Ore—starting from the 100' level: This is about as low as any mine can figure on stoping ground (meaning breaking the ore down from above in place of digging at much greater expense), and what have we? Ore that will assay from a few dollars a ton to as many thousands a ton, as you would want in your wildest imagination of possible wealth, and it will average enough to make every pound of it Pay Ore. The drift to the South is offering possibilities of riches that would make any prospector work without food and sleep to get to the 'big pay streak,'" etc., etc. Advertising literature and stock selling campaign very unfavorably regarded.

LAURIER MINING CO.

WASHINGTON

Office: 410 Columbia Blk., Spokane, Wash. **Mine office:** Laurier, Ferry Co., Wash. **Officers:** Dayton H. Stewart, pres.-mgr.; F. L. McNeil, v. p.; E. K. Erwin, sec.-treas.; with Grant A. Stewart and Guy P. Linville, directors. G. A. Stewart, supt. **Inc.** Oct. 22, 1908, in Wash. **Cap.**, \$1,000,000, increased later to \$1,500,000; shares \$1 par; all issued.

Property: 7 claims unpatented, about 120 acres, in the Curlew district, 9 miles from Grand Forks, B. C., and 127 miles N. W. of Spokane. Developed by 140' shaft and several tunnels, showing a vein of pyrrhotite ore said to show copper, silver and gold values.

Equipment: includes a 2,900' aerial tramway connecting the mine with a railroad siding, constructed in 1915. Plan installing electric power and seven-drill compressor in 1916. **Shipments:** commenced in 1915, were sent to the Granby smelter; about 500 tons of copper-silver ore from development work averaged 4.16-7.66% copper and 2 oz. silver, netting \$30 per ton.

LAURIUM MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton Co., Mich. **Officers:** Rodolphe L. Agassiz, v. p.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr., and Francis L. Higginson, directors; Geo. G. Endicott, asst. sec.-treas. **Inc.** in Michigan. **Cap.**, \$1,000,000; shares \$25 par; fully issued. Is controlled, through ownership, of 37,823 shares, by the Calumet & Hecla Mining Co. Has paid dividends of \$4 per share, through sale of town lots in the village of Laurium. Company ended 1915 with balance of liabilities of \$19,313. Annual meeting, second Tuesday in June.

Property: 575 acres with mineral rights, including 325 acres whose surface is also owned. Company originally owned 640 acres, lying next east of the Calumet & Hecla, but a triangular tract of about 65 acres, carrying both surface and mineral rights, was sold to the Calumet & Hecla, and about 250 acres of surface rights have been disposed of since as building lots, with reservation of mineral rights. The property carries about 1½ miles of the

strike of the Kearsarge bed, with 280 acres of underlay, giving the Laurium a chance to develop this bed to a depth of about 4,400'.

Development: the Laurium shaft, started Aug. 7, 1909, as a result of previous diamond-drill borings, is about 2,200' from the S. W. corner of Sec. 26, and about one-half mile N. of No. 1 Tecumseh shaft. The shaft is 1,661' deep, with about 7,000' of workings. The mine was closed July, 1913, at the time of the strike and has not been reopened since. When operations were suspended workings on the 12th, 14th and 15th levels were in poor ground, showing very little copper.

Equipment: includes a boiler house, engine house with a large hoist and air compressor, and a changing house.

LAWRENCE MINING & MILLING CO., LTD.

IDAHO

Office: 728 Mission St., Spokane, Wash. **Mine office:** Clarke Fork, Idaho. **Officers:** Jos. Reed, pres.-mgr.; O. A. Turnbow, v. p.; S. Hilliard, sec.-treas.; with John Reed and W. W. Wood, directors. **Cap.**, \$75,000; shares 5c par; 1,472,794 outstanding.

Property: 10 claims, about 1½ miles from Clarke Fork, said to carry gold-silver-copper-lead ore in fissure vein, up to 20' thick. **Development:** 800' tunnel. Equipped with 60-ton concentrator, pump and compressor. Property considered promising, but development hampered by lack of capital.

LAZY BOY GOLD MINES CO.

ARIZONA

Oatman, Ariz. Officers: Jas. L. McIver, pres.; W. H. Ridenour, v. p.; Geo. W. Long, sec.-treas.; with Wallace Keith and H. C. Hammond, directors. **Inc.** 1916 in Ariz. **Cap.**, 1,000,000 shares; 10c par. Stock listed on San Francisco Exchange. 300,000 shares and \$65,000 cash in treasury, March, 1916.

Property: 130 acres, includes the Lazy Boy, Red Bird, Never Rest, Jumbo, Combination, Falcon, Blue Bird and Live Boy, in the Gold Roads district, about 1¾ miles S. of Oldtrails, Mohave Co., Ariz. Two veins seen on the surface are being developed by the 2-compartment Lazy Boy shaft, 300' deep, March, 1916, and to be sunk to 500'. **Equipment:** includes 300 cu. ft. compressor, 3 jackhammer drills, 40-h. p. gasoline hoist. Is considered one of the best prospects of the camp, having actual ore already exposed.

LEAD KING MINING CO.

IDAHO

Address: E. W. Conrad, gen. mgr.-sec., Eagle Bldg., Spokane, Wash. **Inc.** 1911 as successor of the Marie Mining Co., Ltd. **Cap.**, \$1,000,000. **Assessment** of 1 mill per share levied, Nov., 1914.

Property: 13 claims, in McFarren gulch, about 1 mile south of Osburn, Idaho, said to carry 2 veins, one with outcrops of high-grade galena, the other showing outcrops of silver-copper ore. **Development:** mainly by 4 tunnels, longest 550', with open cuts and shallow shafts, showing silver-lead and gray copper ore, giving good assays. **Equipment:** includes several small cabins for mine purposes. Company dormant since 1913.

LEAD KING MINING & MILLING CO.

NEVADA

Office: Continental Natl. Bank Bldg., Salt Lake City, Utah. **Officers:** A. P. Spitko, pres.-mgr.; Geo. F. Goodwin, sec.-treas.; A. Cigneaux, supt. **Inc.** 1899. **Cap.**, 300,000 shares; 10c par; assessable; 254,500 shares issued. Stock is listed on Salt Lake Exchange.

Property: 15 claims, 8 patented, 250 acres, in Duck Creek mining district, White Pine Co., Nevada, is said to carry high-grade galena ore with small silver values, occurring in gray and blue limestone formation. **Shipments:** to date total 10 carloads, netting \$20,000. Development work resumed, April, 1916.

LEADVILLE MINING CO.**ARIZONA**

Courtland, Cochise Co., Ariz. **Officers:** Wm. Holmes, pres.-gen. mgr.; W. D. Monmonier, sec., Pearce, Ariz.; Calvin Glenn and W. A. Stilson, directors. **Inc.** 1905 in Arizona. **Cap.**, \$600,000; shares \$1 par.

Property was bonded, June, 1916, to the Needles Mining & Smelting Co. for \$600,000, with a first payment of \$10,000, final payment to be made within 12 months. Option requires that 10 men shall be continuously employed; that assessment work be done; the Maid of Sunshine shaft deepened 80', and drifts run. Present lessees continue work under same condition as before.

Property: 13 claims, 199 acres, patented, in the Turquoise district, includes the Leadville and Maid of Sunshine mines, showing contact deposits between monzonite and limestone. Ores are mainly malachite, azurite and chrysocolla, with some chalcopryrite and pyrite showing in the Maid of Sunshine mine. The orebodies, under development, carry an average of about 8% copper. Company is developing the Lower group on the 300' level. There are 5 shafts, deepest 365', and a 60' tunnel.

Equipment: includes a 250-h. p. steam plant, 2 hoists and air compressor. Company resumed active operations, Oct., 1915. **Shipments:** about 15 tons of 8% copper ore daily, and management estimates 100,000 tons ore in sight. Property considered good. A detailed report and valuation of mine was made by S. M. Greenidge, of Douglas, Ariz., 1913.

LEHI-TINTIC MINING CO.**UTAH**

Address: H. J. Fitzgerald, pres.-gen. mgr., Atlas Block, Salt Lake City, Utah. Geo. Nichols, supt. **Property:** 12 claims in the Tintic district, about 4 miles from Eureka, shows silver-lead-gold ore in fissure vein.

Development: by 1,700' tunnel. Equipped with compressor and steam power. Operated intermittently with proceeds from assessments, 18 of which had been called to April, 1916. Stock listed on Salt Lake Exchange.

LEIGHTON-WYOMING MINING CO.**WYOMING**

Idle. **Office:** 417 Seventh St., Milwaukee, Wis. **Officers:** M. H. Yewdale, pres.; Herman Pereles, v. p.; H. E. Dankoler, sec.; Spencer C. Yewdale, treas.; with A. G. Weissert, S. P. Bjorklund and C. W. Hendricks, directors. **Inc.** 1906. **Cap.**, \$1,000,000; shares \$1 par; issued, \$810,000.

Property: 2 patented claims, about 1 mile north of the Ferris-Haggerty mine in the Battle Lake district. **Development:** by a 186' tunnel and a 65' shaft. **Equipment:** includes a saw mill and a small machinery plant, bought 1909, from the Haskins mine.

LELAND MINING & DEVELOPMENT CO.**COLORADO**

Chas. Howbert, Cripple Creek, Colo., gen. mgr. **Property:** the Conundrum and Anchoria Leland mines on Gold Hill, Cripple Creek district. The Conundrum is developed by an 800' incline shaft and the Anchoria Leland mine is operated through the Gold Hill tunnel. Development work reported in progress by company and lessees in 1916.

LEMHI GOLD MINING CO.**UTAH**

Operates the property of the Virginia Cons. Mining Co., near Baker, Lemhi Co., Utah.

LENNAN ZINC & LEAD CO.**OKLAHOMA**

Operating a lease on Emma Gordon mine, Miami, Ottawa Co., Okla. An ore face 60' in height is being worked by drifting under the old workings on the 400' level. Equipped with concentrator. Producing since 1914.

LEONARD COPPER CO.**ARIZONA**

Gleeson, Cochise Co., Ariz. J. W. Bennie, Clifton, Ariz., mgr.; J. E. Penberthy, supt. Gleeson. **Inc.** 1910 by interests closely connected with the Shannon Copper Co., and property is under lease to that company.

Property: the Copper Belle mine, 8 claims, in the Turquoise or Courtland district, is opened by a vertical shaft and about 1 mile of underground workings, developing several orebodies on 3 different contacts. Ore is nearly solid pyrite, with considerable chalcopyrite and some bornite.

Equipment: includes steam plant with 2 hoists, compressor, repair shop, etc. Output 150 tons per day, loaded directly into railway cars at mine and shipped over the E. P. & S. W. railroad to Morenci.

LEONORA y HUERTA; MINAS.

MEXICO

Office: care James M. Daniel, owner and gen. mgr., Apt. 16, Aguascalientes, Mex. Mine near Villanueva, Zacatecas, Mex. **Property:** 100 acres, with 500 acres miscellaneous lands, in the Jalapa district, said to show a fissure vein in porphyry, of 10' average width, carrying galena, argentite, melaconite and azurite, with clay gangue, and about 5% copper, 10% lead, 200 oz. silver and 29 milligrams gold per ton. Mine was opened in 1820, and reopened 1883. Has shafts of 300' and 1,000', with about 1 mile of underground workings. **Equipment:** includes steam power, and a concentrator. Concentrates and smelting ores shipped, 75 miles, by pack train, to the Aguascalientes smelter, when operating. Presumably idle. No returns secured.

LEONORA MINING & MILLING CO.

UTAH

Office: 18-20 E. 1st South St., Salt Lake City, Utah. **Mine office:** Milford, Beaver Co., Utah. **Officers:** John Matson, pres.-mgr.; Willard Hansen, v. p.; C. D. Brown, sec.-treas.; preceding with J. W. Chase and Edward Rheinstrom, directors. A. C. Nebeker, mine supt. **Inc.** Dec. 19, 1903, in Utah. **Cap.**, \$100,000; shares 10c par; assessable; issued, 950,000 shares.

Property: 13 claims, in the North Star district near Milford, shows fissures in limestone carrying replacement deposits of gold, silver, zinc and lead ores. **Development:** by tunnels of 900', 500' and 300' and 7 shallow shafts of 25' to 100 depth. **Equipment:** includes electric hoist and air compressor.

Company did 1,050' of development work in 1915 and opened up some high-grade zinc ore from which shipments were made, 1916.

LEPANTO MINING CO., INC.

PHILIPPINES

Office: Manila, P. I. **Mine office:** Mancayan, Lepanto, Luzon, Philippines. **Officers:** Geo. E. Wolf, pres.; J. R. McDill, v. p.; M. F. Loewenstein, sec.; J. A. Hamilton, treas. Albert P. Wright, supt. **Inc.** Sept., 1906, in the Philippines. **Cap.**, 1,000,000 pesos; shares 100 pesos par. Company holds a franchise for a railway, from Mancayan to Bangar, on the western coast of Luzon. The copper property, but slightly developed, in the vicinity of Mancayan, was optioned to the Tellus Aktiengesellschaft, of Frankfurt-am-Main, Germany, but option was surrendered. Presumably idle. No recent returns secured.

LE ROI NO. 2, LTD.

BRITISH COLUMBIA

Secretary's address: F. A. Labouchere, 539 Salisbury House, London Wall, London, E. C., England. **Mine office:** Rossland, Trail district, B. C. **Directors:** Lord Ernest W. Hamilton, chairman; A. B. Dealtry, F. C. D. Haggard, H. W. Morrison and Major C. H. Campbell. Ernest Levy, mine mgr.; Alex. Hill & Stewart, cons. engrs.

Inc. June 1, 1900, in Great Britain. **Cap.**, £600,000; shares £5 par; fully issued and fully paid. **Dividends:** 5s in 1901; 5s in 1902; 2s in 1904; 3s in 1905; 8s in 1906; 3s in 1907; 6s in 1908; 6s in 1909; 6s in 1910; 5s in 1911; 1s in 1912; 2s in 1915. Total dividends to end of 1915 were £2 12s per share, or £312,000. For fiscal year ending Sept. 30, 1914, net profit was £6,193. The

company holds a share interest in the Cloncurry Syndicate, Ltd., and a two-thirds interest in the Van Roi Mining Co.

Property: 120 acres, including the Josie No. 1 and Annie mines, on Red mountain, also 8 claims near the old mine, 2 claims near the Velvet mine, and 5 claims in the Ymir district of British Columbia. Considerable diamond drilling has been done. The property shows a number of veins, the most important being the Josie, Annie and Hamilton.

Development: by the 1,300' Josie main shaft, and by 3 tunnels, 2 on the Josie and 1 on the Poorman claim. New underground openings made were 4,633' in 1913, 3,729' in 1914. The Josie vein is narrower than the average in the camp but has ore about twice as rich as that in the bottom workings, carrying up to 4% copper and 15 dwts. gold per long ton. Ore of the property as a whole is chalcopyrite, associated with pyrite and pyrrhotite, in a silicious gangue, with average assay of 1.64% copper, 0.87 oz. silver and 0.8 oz. gold per ton. Concentrating ore ranges 0.4 to 0.5% in copper tenor, with only about 20% of the copper saved, the extraction of assay values in gold being 56 to 60%.

Ore reserves: estimated by the management, 1913, at 150,000 long tons, including some ore shoots of considerable better than the average grade of the camp. Side line agreements with the Consolidated Mining & Smelting Co. of Canada insure freedom from possible litigation.

Equipment: includes a 150-h. p. electric hoist, a machine shop, framing shop, smithy, superintendent's dwelling, etc.

The mill, across a small gulch from the Josie shaft, is of 50 tons rated daily capacity, having Blake and Gates crushers, 2 Chilian mills, 3 Jencke sizers, and 6 Wilfley tables. An Elmore oil concentrator, fully described Vol. IV., was installed 1903, proving a technical but not a commercial success, and was superseded by Wilfley tables. Concentrators average 1% copper, .75 oz. silver and .75 oz. gold per ton.

Production: largest copper production was 3,001,027 lbs. in 1902. Recent production has been as follows:

Years (a)	Tons Ore			
	Prod.	lbs. Copper	oz. Gold	oz. Silver
1914.....	29,679	.....	.....	.....
1913.....	35,553	.....	.....	.....
1912.....	.....	507,499	14,157	12,281
1911.....	.....	864,500	22,725	19,219
1910.....	.....	970,966	26,447	24,078

(a) Fiscal year ending Sept. 30

Property considered valuable and management good.

LEROY GOLD & COPPER MINING CO.

MONTANA

Office: Wallace, Idaho. **Mine office:** Saltese, Missoula Co., Mont. **Officers:** Hon. Herman J. Rossi, pres.; G. F. Dann, v. p.; C. E. Clark, sec-treas., with Wm. Fissenger and Chas. Bollinger, directors. Lands adjoin the Monitor mine, and survey for the extension of the Monitor tunnel runs through this property. Assessment of 2 mills per share called Aug., 1915, and development work resumed after several years of idleness.

LESLIE COPPER MINING CO.

IDAHO

Office: 508 Bank St., Wallace, Idaho. **Mine office:** Mullan, Shoshone Co., Idaho. **Officers:** Wesley Everett, pres. and mgr.; A. W. McLaughlin v. p.; Hon. Herman J. Rossi, sec.-treas., with A. M. Stevens and O. E. Peppard, directors. Inc. Feb., 1899, in Idaho. **Cap.**, \$100,000; shares 10c par.

Property: 11 claims, 220 acres, adjoining the Amazon-Dixie, also a mill site and 2 water rights, lying east of Mullan. Has several fissure veins.

in porphyry, the main vein, of 12' average surface width, having a 35' shaft. **Development:** mainly by tunnels, with about a mile of underground openings. The upper workings show galena and copper ore, and a lower tunnel is to give a back of 650'. The property carries mainly silver-lead ore, of concentrating grade, with a narrow copper paystreak. **Equipment:** includes water power, an air compressor, and several mine buildings.

LEVIATHAN GOLD MINING CO.**MONTANA**

Pony, Madison Co., Mont. Property carries copper ores, with values mainly in gold. **Equipment:** includes a hydro-electric power plant, compressor, and 100-ton concentrator. No returns secured.

LEVIATHAN MINES CO.**ARIZONA**

Office: 203 Essex Bldg., St. Paul, Minn. **Mine office:** Kingman, Ariz. **Officers:** John H. Conway, pres.; A. J. Brawley, v. p.; W. C. Gould, sec.; G. H. Prudden, treas., with A. A. Nystrom, Ola Hakanson, C. E. Bernhardt, O. L. Bjorkman, Geo. F. Thompson, Jacob Kiewel and G. C. Stricker, directors. R. C. Jacobson, mgr.; I. C. Stricker, supt. **Inc.** Oct. 14, 1914, in Ariz. **Cap.**, \$500,000; shares \$1 par; 351,668 shares issued. Annual meeting 1st Tuesday in Dec.

Property: the Whale & Copper Canyon mines, 7 claims, about 120 acres, in the Copper canyon, Cedar mining district, Mohave Co., Ariz., shows copper-molybdenite-silver-lead ore in 2 quartz veins traversing an altered granite. The main orebody said to be 7' wide and proven for 3,000' in length, runs N. 8° E. and dips 80° E. Ore said to average 2-4.5% molybdenum, 2-3% copper, 2-6 oz. silver, 60c-\$1 gold.

Development: 115' shaft and 2 tunnels, 40' and 320' long. Work in 1915 consisted mainly in testing ores to determine separation of molybdenite from chalcopyrite. **Ore reserves:** estimated at 2,000 tons of ore on dumps and 25,000 tons blocked out on three sides, averaging 2-4% molybdenum and 2½% copper.

Equipment: includes 8-h. p. gasoline hoist, small Cameron pump, compressor, gas engine. Management plans sinking to 250' level and erecting a 50-ton concentration and flotation plant in 1916.

LEWIS & CLARK MINING CO.**IDAHO**

Mullan, Shoshone Co., Idaho. J. Wm. Grismer, pres. **Inc.** 1907, in Idaho. **Cap.**, \$1,250,000; shares \$1 par; 375,000 shares in treasury. **Property:** 19 claims, N. E. of the Snowstorm, has surface showing of red hematite, with silver-copper values. **Development:** consists of 120' tunnel. Management attempting to raise funds for further development.

LEWIS MINE CO.**COLORADO**

Telluride, San Miguel Co., Colo., Bulkeley Wells, mgr. Property has fissure veins with shoots of complex lead-zinc-copper ore, which was treated in 50-ton concentrating mill. Developed by 500' shaft and equipped with steam plant. Idle.

LEXINGTON-ARIZONA MINING CO.**ARIZONA**

Office 538 Merchants Natl. Bank Bldg., Los Angeles, Calif. **Mine office:** Old Trails, Ariz. **Officers:** Dr. C. H. Phinney, pres.; H. N. Fletcher, v. p.; J. A. Small, sec.; C. Durkee, treas., with R. M. Keeney, directors. **Inc.** Feb. 12, 1912, in Ariz. **Cap.**, \$1,000,000; shares \$1 par, 836,832 shares issued. Stock listed on San Francisco and Los Angeles Stock Exchanges. Annual meeting 4th Tuesday in Sept.

Property: 15 claims, 8 patented, 155 acres, at Old Trails, in the Tom Reed Gold Road district, shows fissure veins, from 6'-25' wide, running N. W.-S. E. and dipping 75° N.-N. E. Ore occurs as quartz-spar, in andesite, and is said to assay from \$2-\$14 gold per ton.

Development: by numerous shafts from 45' to 225' in depth. A 3-

compartment vertical shaft is now being sunk to 600'. **Equipment:** includes hoist, compressor and Cornish pump. Company also owns the townsite of Old Trails.

LEXINGTON GOLD MINING CO.

COLORADO

Office: 709 Colorado Bldg., Denver. **Mine office:** Manitou, Colo. **Officers:** H. J. Anstic, pres.-mgr.; N. H. Partridge, v. p.; Wm. E. Humphrey, sec.-treas., with Geo. B. Lott, directors. **Inc.** 1895, in Colo. **Cap.**, \$1,500,000; shares \$1 par; 1,330,675 shares issued. Stock listed on Colo. Springs Exchange. Colo. Title & Trust Co., Colo. Springs, registrar and transfer agts.

Property: 5 patented claims, 12.6 acres on Gold Hill, Cripple Creek district, shows gold ore in fissure veins, assaying from \$7 to \$8 per ton. Developed to depth of 350' by shafts and crosscuts. The mine is credited with an output of \$400,000 and management estimates 125,000 tons of ore blocked out Jan., 1916. Lessees have been operating the property on a royalty basis during the past few years but company plans resumption in 1916 and erection of a 100-ton cyanide mill.

LIBERTY BELL GOLD MINING CO.

COLORADO

Office: 131 State St., Boston, Mass. **Mine office:** Telluride, San Miguel Co., Colo. **Officers:** Arthur Winslow, pres.; J. J. Cairnes, v. p.; Henry L. Rand, sec.-treas., with Hermann Kuhn, Geo. R. Fearing, Jr., directors. Chas. A. Chase, gen. mgr.; H. G. McClain, supt. **Inc.** in Missouri. **Cap.**, \$700,000; shares \$5 par; \$667,755 outstanding. Stock listed on Salt Lake Exchange. **Dividends:** in 1915 amounted to 16%.

Property: the Liberty Bell mine at Telluride, shows gold and silver-bearing quartz in fissure veins from 3' to 4' wide. The main orebody runs N. W.-S. E. and dips 57° E. For geology of the district, see U. S. G. S. Geologic Folio No. 57; also Tomboy Gold Mines Co., Ltd.

Development: by 2,600' tunnel and 1,000' raise from tunnel level to abandoned upper workings. Ore is mined by open stopes on stulls or by shrinkage stoping. **Equipment:** includes hoist of 50 tons hourly capacity, electric power, 1 Leyner duplex compressor, 1 Norwalk compressor, 1.5 miles tram and a 500-ton concentrator and cyanide mill. Extraction averaged 85% and total cost per ton amounted to \$3.70 per ton in 1915. **Shipments:** in 1915, averaged 1.8 oz. silver and 0.13 oz. gold.

Production:

	Tons Ore Treated	Oz. Silver Produced	Oz. Gold Produced
1915.....	173,700	314,432	24,054
1914.....	173,840	315,919	33,150
1913.....	179,216	288,602	36,693
1912.....	175,340	313,845	48,993

LIBERTY COPPER MINING CO.

WASHINGTON

Office: Spokane, Wash. **Mine office:** Bluecreek, Wash. **Officers:** J. H. Reser, pres.; C. Oldfather, v. p.; A. Haas, sec.; S. G. Neff, treas. and gen. mgr.; R. E. McVicar, trustee. **Inc.** in Wash. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 6 claims, well watered and timbered, on Blue creek, about 1½ miles from Blue Creek station, and 6 miles N. W. of Chewelah. The main vein, developed by 4,000' of tunnels, is about 18" wide, carrying auriferous and argentiferous copper and lead ores.

Equipment: includes a Fairbanks-Morse steam hoist, 100-h. p. boiler and an air compressor. The mine has been under steady development since 1906, and made its first carload shipment March, 1909, to the Northport smelter. Management is said to plan a concentrator.

LIGHTNER GOLD MINING CO.**CALIFORNIA**

Office: 301 N. Eldorado St., Stockton, Calif. **Mine office:** Piedmont, Calif. **Officers:** C. M. Jackson, pres.; Alex. Chalmers, v. p.-mgr.; B. F. Williams, Jr., sec.-treas., with A. D. Schindler and L. J. Wagner, directors. **Inc.** Oct. 26, 1896, in Calif. **Cap.**, \$125,000; shares \$1 par; assessable; 62,287 shares outstanding. Dividends paid to date, \$550,000. Gross earnings in 1914 were \$46,012 and operating expenses totaled \$38,245. Mine was not operated during 1915. Assets, Feb., 1916, amounted to \$224,281 and liabilities to \$85,186. Annual meeting last Thursday in Oct.

Property: 1 patented claim, $4\frac{1}{3}$ acres, in Angels Camp, Calaveras Co., between the Utica and Angels quartz mines, shows a quartz fissure vein said to be 80' wide, running N. W.-S. E., with dip of 70° and assaying \$5 per ton. The mine is credited with a total production to date of \$2,000,000. Property was closed down in 1910, owing to caving of the old shaft sunk on the orebody.

Development: the mine was worked out from the 600' to the 350' level through this shaft, a 30' bed of talc cutting off the orebody between the 500' and 600' levels. Work was continued through 1911-1912 and a new 2-compartment shaft sunk. In 1914 work was again resumed and a winze sunk to the 900' level, where a crosscut run N. is said to have found the orebody in place under the talc, 30' wide and with the same dip as on the 300' level. This vein was drifted on for 120' and appears to be the top of a new orebody of same age and character as was found above the talc. Production ceased after 9 months operations in 1914 and the shaft is being sunk to below the 1,000' level.

Equipment: includes hoist, drills, electric power, compressor and 60-stamp amalgamation and concentration mill, making an extraction of 90%. Employs about 70 men and maintains an average daily output of 150 tons when working. Management estimated ore reserves at 200,000 tons above the 300' level, Feb., 1916.

LILIAN MINE.**COLORADO**

J. Clarence Hersey, mgr.; R. I. Hughes, supt. **Property:** in Iowa gulch, near Central City, Gilipin Co., Colo., developed by 550' of shafts and crosscuts; carries gold-lead and zinc ores. Worked by lessees in 1915-16 and output estimated at 250 tons per month. Oxide ore from the Lovejoy claim containing lead-gold values, is shipped to the Ohio-Colorado smelter at Salida. Zinc carbonate ore from the Lilian is sold to the Western Zinc Oxide Co.

LINCOLN GOLD & COPPER MINING CO.**GEORGIA**

Idle. Metasville, Wilkes Co., Ga. Carl Heinrich, pres. and gen. mgr.; W. Murdock Wiley, sec. **Inc.** June 11, 1906, in Oklahoma. **Cap.**, \$2,000,000; shares \$1 par; issued \$1,820,000. Paid 1 dividend, of one-half of 1%. Was practically the successor of the Seminole Mining Co., which was a sad failure. Annual meeting, first Tuesday in Aug.

Property: 901 acres, freehold, known as the Magruder or Seminole mine, just over the Wilkes Co. line, 12 miles from the Georgia Central railroad and 70 miles from Ducktown, Tenn. Shows gray sericitic schists, intruded by eruptive dikes of 2 different ages, with 4 veins in schist and between schists and eruptive rocks. They have an average strike of N. 30° E., to N. 40° E., and dip of 50° to vertical, veins averaging 3 to 14' in width, and traceable 1,200', showing ores consisting of pyrite with chalcopyrite, some bornite, cuprite and melaconite, estimated by company to average 2.5% copper, 3% lead, 1.5% zinc, 4 to 5 oz. silver and \$5 gold per ton.

The mine, opened 1852, and closed 1862, on account of the American Civil War, was reopened 1878, 1899 and 1905. **Development:** by a 225'

main shaft, a 150' air shaft and shafts of 40', 45' and 80', with about 1,500' of workings.

Equipment: includes a 175-h. p. boiler, 12-h. p. and 15-h. p. hoists and a 4-drill Rand air compressor. There are 10 buildings, including a machine shop, smithy, assay office and boarding house.

The small and ramshackle mill is equipped with a Gates centrifugal crusher, set of rolls, Twentieth Century jig, 2 Bartlett tables, elevators and revolving screens.

The toy smelter, immediately adjoining the concentrator and very close to the mine, has a 16-ton rectangular water-jacket blast furnace, and a 10-ton reverberatory furnace, making, when in operation, a matter of 15 to 20% copper tenor, carrying 20 oz. silver and 1.5 to 3 oz. gold per ton, shipped to the Maurer works of the American Smelting & Refining Co. for reduction, first-class ore and concentrates also being shipped to Maurer.

LINCOLN GROUP MINES CO.

COLORADO

Office: 1726 Broadway, Denver, Colo. **Officers:** H. A. Wimbush, pres.; Peyton Hugh, v. p.; H. G. Wimbush, treas.; R. R. Moodie, sec., with Harry J. Newton, directors. **Inc.** 1914, in Arizona.

Property: 10 claims at Idaho Springs, Clear Creek Co., Colo., said to carry streaks of ore assaying 7.8 oz. gold and 8.1 oz. silver. Developed by tunnels, crosscuts and drifts. Operated by lessees in 1916.

LINCOLN HILL MILLING & MINING CO.

NEVADA

Office: G. S. Johnson Co., Clay Peters Bldg., Reno, Nev. G. S. Johnson, pres.-mgr.; Robt. Nye, supt. **Cap.**, \$1,000,000; shares \$1 par, non-assessable; 100,000 shares in treasury.

Property: the Lincoln Hill mine on Lincoln Hill, Rochester mining district, Humboldt Co., Nev., is said to carry 35 well defined veins, averaging, \$150 per ton. **Development:** by 1,600' of tunnels, raises and winzes. **Equipment:** includes electric power, compressor, power drills, hoist, 2-stamp mill, and surface buildings. Mine, reported to have produced \$50,000 worth of ore under former owners, is still a prospect.

LINDEN GROUP.

ARIZONA

Wm. Linden, Groom Creek, Yavapai Co., Ariz., owner and mgr. **Property:** the Cottonwood and Vera groups, 7 claims, 140 acres at Groom Creek, in the Hassayampa district, shows gold-silver-copper-molybdenum ore in quartz contact vein traversing diorite-schist formation.

Development: by 50' vertical shaft and several tunnels, deepest 300'.

Shipments: in 1916, totaled 100 tons from the Cottonwood claim and averaged 17% copper with some silver and gold. Owner plans installing 50-ton Marathon mill and cyanide unit and driving a 400' tunnel in 1916.

LION HILL CONSOLIDATED MINES CO.

UTAH

Office: 50 Congress St., Boston, Mass. **Mine office:** Ophir, Utah. **Officers:** E. W. Clark, pres.; Ed. A. Fordyce, sec.-treas. **Inc.** Sept., 1910, in Maine. **Cap.**, \$1,000,000; shares \$1 par; fully paid; 431,347 issued.

Property: 640 acres in the Ophir camp, Tintic mining district, Tooele Co., reported to show high-grade silver-lead ore in fissure veins in limestone formation. **Development:** by 5,000' of shafts, tunnel and drifts. Operated by lessees, and zinc-silver-lead ore mined, 1915-16.

LITTLE BELL CONSOLIDATED MINING CO.

UTAH

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit Co., Utah. Solon Spiro, pres. and gen. mgr.; S. M. Bamberger, sec.; Joe Kemp, supt. **Inc.** 1902, in Wyoming. **Cap.**, \$1,500,000; shares \$5 par, non-assessable; fully issued. Began payment of 5c quarterly dividends, Nov. 1909, and up to and including Sept. 2, 1910, had paid 4

quarterly dividends of \$15,000 each. Shares listed on Salt Lake Stock Exchange; 20% of stock owned by Daly West Mng. Co.

Property: 30 claims, patented, in Park City district. **Development:** extensive, showing deposits of lead-silver ore.

Equipment: includes steam power, with hoist and air compressor. Electric power is taken from the Knight plant at Provo. The old 100-ton mill at the Fortuna Mining Co., at Bingham Canyon, was bought 1910, and re-erected at Park City. Worked intermittently.

LITTLE BILLY OPERATING CO.

BRITISH COLUMBIA

Van Anda, Texada island, B. C. J. C. Taylor, supt. **Property:** the Little Billy mine is said to have an orebody of 8' estimated average width, developed by a 260' shaft, with a 35' headgear. **Equipment:** includes an 80-h. p. boiler, single-drum hoist, and a 5-drill air compressor. There is a crude concentrating mill, with sorting tables, and a 500' trestle with double-track gravity tram to a shipping bunker on tidewater. The Granby Co. did some prospecting on the property in 1914. Idle 1915-16.

LITTLE BULLY HILL MINING & SMELTING CO. CALIFORNIA

Idle. Mine near Winthrop, Shasta Co., Cal. **Cap.**, \$1,000,000; shares \$1 par. **Property:** 5 claims, said to adjoin the Bully Hill mine, and to be opened by a 130' tunnel and several trenches, that show sulphide ore. Company's prospectus misleading and its operations apparently unsuccessful. No recent information secured.

LITTLE CHOPACA MINING CO.

WASHINGTON

Idle some years, except for necessary annual assessment work. Loomis, Okanogan Co., Wash.

LITTLE GIANT GOLD M. & M. CO.

COLORADO

Lawson, Colo. **Officers:** L. H. Mumbrue, pres; F. F. Chady, v. p.; H. E. Minier, sec.-treas.-mgr., with R. L. Dear, F. L. Collom, Ira Spencer and F. P. Koontz, directors. Martin T. Michel, supt. **Inc. in Colo. Cap.**, \$500,000; shares \$2 par.

Property: 58 patented claims, 350 acres, in Downieville mining district, Clear Creek Co., Colo., carries gold-silver-lead ores in quartz veins, running E. W. with dip 60°. Country rock is granite. **Development:** to depth of 900' by 2 tunnels, 3,500' and 1,000' long. **Equipment:** includes steam hoist, compressor and drills.

Mine has been worked by lessees but company plans resumption of operations and installation of 50-ton concentration and flotation mill in 1916.

The Little Giant is credited with a past production of \$4,000,000.

LITTLE GOLDIE MINE.

MONTANA

M. R. Ostronick, Twin Bridges, Mont., owner and mgr. **Property:** 3 claims, 54 acres, in Goodrich gulch, Madison Co., Mont., said to show 2-18" fissure veins, running E.-W., and assaying as high as \$114 in gold-silver-lead. Ore occurs in gneiss and limestone formation. Developed by 200' tunnel, several drifts, and raises. Equipped with compressor.

Shipments: in 1915, reported to have averaged \$80 per ton, amounted to \$30,000. Owner estimated 6,000 tons of ore blocked out, March 19, 1916.

LITTLE JOHNNIE MINE.

ARIZONA

Owned by Harrington Blauvelt, Prescott, Ariz. **Property:** in the Haysayampa district, Yavapai Co., shows a 2' fissure vein, carrying gold-bearing copper ore said to run 2 oz. gold.

LITTLE MARY MINING CO.

MISSOURI

Webb City, Jasper Co., Mo. **Cap.**, \$100,000. Operates a lease on 40 acres of mineral land, owned by D. S. Weaver, in S. 6, T. 29, R. 32. Developed by 3 shafts to depth of 175'. **Equipment:** includes 500-ton concen-

trating mill, pumps, 3 drills, 2 hoists, steam power and Ingersoll compressor. Employs 25 men. No record of production received.

LITTLE MIAMI COPPER MINES CO.**ARIZONA**

Letters returned from 15 Broad St., New York. Idle and presumably out of funds. See Vol. X and XI, Copper Handbook, for further details.

LITTLE NORTH FORK COPPER M. & M. CO., LTD.**IDAHO**

Officers: T. R. Mason, president; Archie McDonald, sec.; John Locke, treas. Jas. H. Hoskins, supt. **Inc. Sept., 1903, in Idaho. Cap., \$1,500,000; shares \$1 par, assessable; 1 mill per share called Sept., 1914.**

Property: 10 claims, known as the Handspike Mine, on Little Copper creek, near Little North Fork, 12 miles from a railroad. Claims lie above the Horst-Powell holdings.

Development: by the 232' No. 1 upper tunnel, showing ore assaying up to 28.8% copper, 1 oz. silver and \$1.20 gold per ton, and the No. 2 lower tunnel of 1,500' showing a 12 to 18" paystreak of argentiferous copper ore that averages \$8 to \$30 per ton. Property claimed to have \$200,000 worth of copper ore in sight.

In 1914 Jerome Day took an option on the property, which was not exercised and management is reported to have resumed development work, 1916.

LLUVIA DEL ORO MINING CO.**MEXICO**

Is a close corporation, owned and controlled by B. F. Yoakum, John Scullin of St. Louis, Mo., and the estate of Jas. Campbell. Fred G. Farish, mgr. **Property:** in the Andres del Rio Mtns., Chihuahua, Mex., consists of the Lluvia del Oro gold mine, a mill, cyanide plant and hydro-electric plant.

L. & N. GROUP.**ARIZONA**

Owned by Christopher Martin, et al. **Property:** 7 claims, about 7,500' along the Gila county belt, in the Sunflower mining district, Maricopa Co., Ariz., shows stringers of quartz and cinnabar. Development work and prospecting in progress. A furnace with 1 retort was built in 1914 and 2 flasks of quicksilver were shipped March, 1915. Geology fully described U. S. G. S. Bull. 620-F. (1915).

LOGGER MINING CO.**UTAH**

Officers: J. A. Maxfield, pres.; R. D. Maxfield, v. p.-gen. mgr.; J. W. McKinney, sec.; C. S. Tingey, treas., with Mrs. K. F. Scott, directors. **Inc. July, 1915. Cap., 500,000 shares; 1c each. Stock listed on Salt Lake Exchange.**

Property: the Logger mine in Big Cottonwood canyon, adjoining the Maxfield mine, shows a 1' fissure vein, developed by a 230' adit and a winze now being sunk on the vein from the 200' point. Assays said to return \$16.47 gold, 13.4 oz. silver and 11% copper.

LOGOS MINES CO.**ARIZONA**

Mine near Mayer, Yavapai Co., Ariz. Henry W. Thacker v. p. and treas., 815 W. 8th St., Los Angeles, Calif. **Inc. June, 1906, in Arizona. Cap., \$1,000,000; shares \$10 par. Property:** 46 claims, partly patented, 900 acres, and 320 acres of miscellaneous lands, in the Big Bug district, 8 miles S. E. of Mayer. **Development:** by a 180' shaft, and a 190' tunnel, with 2,000' of workings, besides considerable surface work. **Equipment:** includes a 40-h. p. gasoline hoist and 2-drill air compressor. Developing in a small way at last accounts.

LOMBARDY MINING & MILLING CO.**IDAHO**

Kellogg, Shoshone Co., Idaho. **Officers:** Peter Albinola, pres. and gen. mgr.; Hon. Herman J. Rosi, v. p.; Edw. Albinola, sec.-treas. **Inc.,**

1898, in Idaho. **Cap.**, \$1,000,000; shares \$1 par. Annual meeting, fourth Thursday in April.

Property: 15 claims, shows a bedded vein, estimated to average 27' wide with shale footwall and quartzite hanging and traced for 800'. Ore is said to carry variable values in copper, up to 47% lead and 33 oz. silver per ton. **Development:** by tunnels of 360' and 900', with about 1,500' of workings. Idle, except for annual assessment work.

LONDON ARIZONA CONSOLIDATED COPPER CO. ARIZONA

Office: 723 Title Insurance Bldg., Los Angeles, Calif. **Mine office:** Chilito, Gila Co., Ariz. **Officers:** Chas. E. Finney, pres.; Herbert L. McNair, v. p.; Edw. W. Brooks, v. p.; Robert J. Simpson, sec.-treas., with F. B. Pugh, B. P. Cheney, D. Karl Kurtz, John E. Coffin, and E. L. Finney, directors. Edward W. Brooks, cons. engr. and geologist. Harry Scott, supt.

Inc. Sept 18, 1913, in Maine, as a merger of the London Arizona, London Range, London Shamrock and Ball Copper companies. **Cap.**, \$12,000,000; shares \$5 par, fully paid and nonassessable; 920,500 shares outstanding. **Bonds:** \$303,000 6% outstanding. Commercial Trust & Savings Bank, Los Angeles, trustee. Citizens Trust & Savings Bank, Los Angeles, registrar. Annual meeting first Tuesday in Oct. Company started out with a treasury fund of \$500,000.

Property: 132 claims, 2,300 acres, in the Banner mining district, (Ray quadrangle), 5 miles N. of Hayden. Claims form a compact group covering an extensive, well mineralized area. **Geology:** the tract shows a series of 1,500' of well-bedded limestone, quartzite and shales resting on a laccolithic mass of diabase; these rocks are broken, faulted and later intruded by dikes and sheets or diorite porphyry, presumably the offshoots of an underlying batholithic mass of granite material. The ore occurs in contact metamorphic deposits and replacements, especially in the limestone. Much of the ore consists of garnet (andradite, the lime and iron species) intergrown with specular hematite, copper sulphides and a variety of iron-magnesian lime silicate minerals. The copper ore occurs largely in "blanket" deposits, but also in fissures and vertical contacts. The main ore outcrop is 10 to 30' wide and about three-fourths of a mile long, lying between beds of limestone and quartzite.

Silver-lead ores do not occur in the contact deposits, but are found in limestone along dike contacts where contact alteration is not noticeable. Some 2,000 tons of lead carbonate ore shipped, 1913, averaged 28% lead, 40c gold and 3'oz. silver per ton.

Development: includes the 300' Curtain shaft, 182' Arizona, 190' Red Bird and 90' O'Carroll shafts, the 200' Roberts tunnel and 250' Johnson tunnel, total underground development amounting to 2,500'. The Roberts tunnel is developing what appears to be a large body of copper sulphides, carrying from 3-6% copper. Shipments of copper carbonates being made to Hayden smelter carry 5-8% copper, 1-5 oz. silver and from 20-40c gold.

Management plans development work on a comprehensive scale. The company has a strong directorate, an experienced management and promises to become an important producer.

LONDON-ARIZONA COPPER CO. ARIZONA

Office: 723 Title Insurance Bldg., Los Angeles, Calif. **Officers:** Chas. E. Finney, pres.; Chas. S. Gleed, v. p.; Robt. J. Simpson, sec.-treas.; Edw. W. Brooks, cons. engr.; preceding with B. P. Cheney, H. L. McNair, Jos. Ball and E. E. Hellyer, directors.

Inc. April 12, 1907, in Arizona. **Cap.**, \$10,000,000; shares \$10 par; issued, 600,000 shares. Debentures, \$152,000 at 6%. Company merged with Lon-

don Range, London Shamrock and Ball Copper companies as the London-Arizona Consolidated Copper Co., a Maine corporation, in Sept., 1913, and now holds 763,054 shares of the capital stock of the new company.

LONDON MINING & REDUCTION CO. COLORADO

Controlled by the Story, Jewett and Packard estates. **Mine office:** Alma, Park Co., Colo. Chas. Aicher, mgr. **Property:** the London mine on London mountain, 7 miles W. of Alma, and about the same distance from Leadville, opened in 1875, is an old-time producer of gold-lead-silver ore.

The ore deposits are replacements of blue limestone at its contact with eruptives or are true fissure veins in quartz porphyry. The main London vein, 3-12' wide, runs N. 37° W., with dip 65° W. The gangue is pure quartz with small amounts of calc-spar and barite. Assays reported to average from 1.4-3.3 oz. gold, 1.3-2.9 oz. silver, 4% lead. This vein is credited with all but 10% of the total production of the mine to date and is the only one deserving of further exploration and development.

Development: by 2 adits, one 300' below the other, opening the London vein for 2,980' and exposing backs of 150' to 650'. Mine was operated by lessees in 1914-15, but company resumed operations in 1916 and plans driving a new tunnel below the old workings and the installation of electric power.

LONE ELM MINING & DEVELOPMENT CO. MISSOURI

Holds a lease on 240 acres of Granby M. & S. Co.'s land and 80 acres of Picher Lead Co.'s land, N. of Joplin, Mo. Company unwatered the ground, sub-leases its holdings in small tracts and operates a 150-ton custom mill.

LONE STAR CONSOLIDATED COPPER CO. ARIZONA

Officers: Hon. Wm. H. Powers, pres.; Duncan MacVichie, 407 New-house Bldg., Salt Lake City, v. p.; Henry H. Folsom, sec.; A. G. Smith, treas.; S. S. Campbell, gen. mgr. Chas. B. Spaulding, supt. **Inc.** Aug. 6, 1906, in Maine. **Cap.**, \$5,000,000; shares \$10 par, practically as successor of Maravilla Copper Co.

Company controls the Mineral Mountain Copper Co., through ownership of a two-thirds share interest, and controls, through majority stock ownership, the Chase Creek Copper Co.

Property: 32 claims, includes the Little Clara mine, developed by tunnel and shaft, and the Lone Star mine, in the Gila mountains, 10 miles N. of Solomonville, having a 900' shaft, said to show a 5' vein of sulphide ore carrying 8 to 10% copper, with fair silver values and a little gold. The shaft also shows stringers of ore giving assays of 5 to 20% copper. Air compressor and drills installed 1915, and operations to be resumed.

LONE STAR CONS. MNG. CO. NEVADA-CALIFORNIA

Goldfield, Nev. **Officers:** W. W. Waterson, pres.; M. Q. Waterson, v. p.-treas.; J. S. Henderson, sec., with Carroll Henderson and Chas. S. Sprague, directors. J. K. Turner, cons. engr., J. M. Healy, supt. **Inc.** April 17, 1912, in Nevada. **Cap.**, \$2,500,000; shares \$1 par; assessable; 1,859,-650 shares outstanding. John S. Cook & Co., Goldfield, registrar. **Stock** listed on Salt Lake and San Francisco Exchanges. Two assessments, total 3c, called in 1915. Annual meeting last Wednesday in April.

Property: 16 patented claims in Goldfield mining district, Esmeralda Co., Nev., and 7 unpatented claims in Indian mining district, Mono Co., Calif. **Development:** the Goldfield property is developed by two 200' vertical shafts and 500' of drifts and crosscuts on the 250' level of the Nelligan shaft. Operations suspended July, 1915. No commercial ore developed as yet, though some medium grade ore was found.

LONE STAR COPPER MINING CO.**WASHINGTON**

Officers: Oscar De Camp, pres.; Wm. S. Thyng, sec. and engr., and R. C. Rimertsen, directors. **Inc.** April, 1910, in Washington, practically as a reconstruction of the Copper Hill Mining & Milling Co. **Cap.**, \$1,500,000; shares \$1 par. Owns sundry claims, including the Copper Hill mine near Newport, Stevens Co., Wash., developed by several shallow shafts and tunnels. Mine has an 18' vein, carrying chalcopyrite, disseminated in pyrrhotite. There is no machinery. Idle several years, except for annual assessment work.

LONGACRE-CHAPMAN MINING CO.**MISSOURI**

Inc. in Missouri. **Cap.**, \$56,250. Company operates a lease on 10 acres of mineral land owned by the Reliance Mng. Co. in Sec. 8, T. 29, R. 32, Jasper Co., Mo. Developed by 2 shafts to depth of 185'. **Equipment:** includes 200-ton concentrator, pumps, 2 air-drills, steam power, Carterville crusher, and compressor. Employs 25 men. Production figures not available.

LOOKOUT COPPER CO.**ARIZONA**

Office: Prescott, Ariz. **New York office:** Room 514, 49 Wall St. F. M. Murphy, pres. **Property:** the Lookout group, 15 copper claims; Mark Twain group, 6 silver-lead claims; Davis group, 8 gold-silver-copper claims, in the State Creek Mining district, Yavapai Co., Ariz.; Bodie group, 21 silver-lead claims, and the Wild Bill and Texas claims, in the Hassayampa mining district, Yavapai Co., Ariz.

Development: a 100' shaft was sunk on the Lookout property with short levels at 45, 60 and 100'; 800' north of the shaft are other workings, consisting of a crosscut to the vein and two drifts north and south with a 60' winze and raise to the surface from the north drift. At the mouth of the raise a gallows frame was erected and a hoisting plant installed. An excellent wagon road about $3\frac{1}{4}$ miles long connects the mines with the main road leading to the Davis mines.

On the Mark Twain group very little development work was done, although the mine had been worked in a small way at a profit, before acquired by the Lookout Co. The Mark Twain, Blue Dick and several other promising properties should be consolidated, insuring, under good management, a profitable mining enterprise.

The Davis group is one of the old mines of the district. From the surface and shallow workings much high-grade ore was shipped in the early days. The principal development work was by two tunnels about 200' apart in elevation, showing good ore; the high-grade ore carries considerable copper, though principal values are in gold and silver.

On the Bodie group of mines a good deal of development work was done on the patented claims. A shaft was sunk some 340', with levels at 55, 85, 170, 230, and 335', all said to show ore. The 3-compartment vertical shaft was started at a central point. Work was stopped on all the Lookout properties in 1910.

Surveys were completed for an ore road from the Walker end of the Poland tunnel, through the Senator district to Lookout camp. A branch was also surveyed from this line to the Bodie. The road measures 13.6 miles from the tunnel to Lookout and 8 miles to Bodie, with a maximum grade of 4%. It was intended to build a 30" gauge road with good roadbed and heavy rails, and operate it by steam. Two miles of railroad purchased from the Metals Milling Co. constituted the first 2 miles of the Lookout ore road. This contemplated road would furnish cheap transportation and tap a country that should produce large amounts of ore.

Extensive development work is planned for 1916-17. Part of the company's property is now being operated under lease.

LOON BROOK MINING CO., LTD.**NOVA SCOTIA**

Office: 1 Leys Ave., Letchworth, Herts, Eng. **Mine office:** Montague, N. S. E. Romilly Smith, mgr. Operating a gold property and 10-stamp mill with cyanide unit in Montague district, N. S. **Production:** for year ending Sept. 30, 1914, was 118 tons of ore, which yielded 400 oz. gold.

LOON LAKE COPPER CO.**WASHINGTON**

Office: 602 Columbia Bldg., Spokane, Wash. **Officers:** Judge Geo. Turner, pres.; A. W. Kemp, v. p.; Frank Crane, sec.-treas.; Evan Morgan, managing director, with S. W. Miller, Andrew Laidlaw, E. K. Erwin, directors. **Inc.** 1915. **Cap.**, \$375,000; shares 25c par.

Property: the Kemp-Komar and O. K. mines, 150 acres on Grouse creek, 6 miles N. of Loon Lake, Stevens Co., on the Great Northern R. R., said to carry a well-defined fissure vein, 20' wide, running E.-W., which gave returns of from 24-30% copper when formerly worked.

Development: by 200' incline shaft, now being sunk to 500'; a 300' tunnel and 300' of drifts driven east from the old shaft toward a new shaft, 40' deep, Feb., 1916. **Equipment:** includes hoist and pump. **Property** resumed shipments, 1916, after 15 years' idleness.

LORETTO COPPER MINING CO.**CALIFORNIA**

Main office: Tonopah, Nev. **Mine office:** Big Pine, Inyo Co., Calif. John G. Kirchen, mgr.; John Cole, supt. Is controlled through stock ownership by Chas M. Schwab and the Gail Borden estate. **Property:** about 750 acres, east of Bishop, has a 40' vein, carrying ore said to average 4% copper and about \$3 gold per ton.

Development: by 1,700' main shaft, said to be in commercial ore, and 2 crosscut tunnels to the N. E., 1 of 90' length said to have cut a 74' vein. Improvements include a smithy and several small mine buildings. **Developing** and planning to install a 100-h. p. electric hoist and build a railroad to Coaldale, the nearest R. R. point.

LOS ANGELES GEM CO.**ARIZONA**

Office: Los Angeles, Calif. **Mine office:** Kingman, Mohave Co., Ariz. E. E. Peck, pres. and gen. mgr.; C. W. Morrell, sec.-treas. **Property:** includes a variscite mine in Esmeraldo Co., Nev., but the principal property is the George Washington group of 6 claims in Mineral Park, near Kingman. This property carries a vein of 18 to 24" width, developed by a 143' upper tunnel and a 370' lower tunnel, said to show ore assaying up to 4% copper, 200 oz. silver and \$4 gold per ton. The company mined turquoise from the claims for some years, before developing copper. **Equipment:** includes gasoline hoist.

LOS CERRÓS COPPER CO.**CUBA**

Idle. Office: Blackstone Bldg., Cleveland, Ohio. **Officers:** W. I. Boardman, pres.; W. C. Watkins, v. p.; Sherman C. Dalbey, sec.; W. L. Rees, treas.; Col. D. H. Pond, gen. mgr. **Inc.** Aug. 12, 1905, in Arizona. **Cap.**, \$500,000; shares \$100 par.

Property: 2 claims, 100 acres, also 1,500 miscellaneous lands, near Fomento, Prov. de Sta. Clara, Cuba, opened by 3 shallow shafts and 5 tunnels, longest 250', showing ore assaying 10% copper, 20 to 25% zinc, 20% sulphur and 30% silica, with gold and silver values. Zinc apparently decreases at depth. The vein has a 12 to 15' gossan outcrop along its strike. **Property** is an antigua last operated in 1750. The ore though mostly low-grade and zinciferous can be concentrated and property is considered worthy of further development under competent direction.

LOS PLATANOS MINING CO.**MEXICO**

Mine office: Choix, Fuerte, Sinaloa, Mex. **Officers:** A. M. McDermott, pres. and gen. mgr.; C. F. Iredell, v. p.; J. L. Davidson, sec., with

R. E. Small and W. W. Thomas, directors. E. B. Hosford, mine supt. Inc. Dec., 1909, in Arizona. **Cap.**, \$1,200,000; shares \$10 par, nonassessable; issued, \$280,000. Operates through Cia. Exploradora de Los Platanos, S. A., inc. in Mexico. Merchants' Trust Co., Los Angeles, transfer agt. Annual meeting, first Monday in October.

Property: 96 acres, bought of Choix Cons. Mining Co., Ltd., 3 miles from Choix, and 40 miles from Fuerte, the nearest rail point. The eastern extension of the Kansas City, Mexico & Orient railway is planned to pass within 10 miles of mine.

Property shows diorite, cut by dikes of andesite, crossed by shear zones, of 30 to 100' estimated width with length of 2,500'. These zones carry ore shoots connected with a system of cross-fractures. The upper portion of one vein shows flakes of native copper, near surface, succeeded by a leached zone. The other vein is entirely leached near surface, except for occasional copper strains, and small bunches of ore. Ore is estimated by management to average 7% copper, 1.5 to 2 oz. silver and 60c to \$1.50 gold per ton.

Development: includes 1,500' of workings, estimated by the management to show 12,000 tons of ore. Records of 1,093 tons of ore shipped show average returns of 21.8% copper and 5.5 oz. silver per metric ton. The discard from these shipments, about 7,500 tons, is estimated to average 4% copper and 1.5 oz. silver per ton. **Equipment:** includes a hoist, and several other buildings. Idle several years owing to unsettled conditions in Mexico.

LOST CABIN MINING CO.

WYOMING

A. B. Elnick, pres., Lysite, Fremont Co., Wyo. A. O. Heyer, sec.; D. Schoening, treas. **Cap.**, \$150,000. **Property:** the Lost Cabin group, in the Boyeson section, is said to carry the Summit vein. Gold, silver and copper ore occurs in quartz veins. Since 1909 assessment work only has been done.

LOST PACKER MINING CO.

IDAHO

Office: 564 E. First South St., Salt Lake City, Utah. **Mine and works office:** Ivers, Custer Co., Idaho. **Officers:** Jas. Ivers, pres.; J. T. Finlen, v. p.; Henry Welsh, sec.-treas., with J. Frank Judge and H. A. McCornick, directors. J. P. Boyle, mgr. Inc. 1903, in Utah. **Cap.**, \$150,000; shares \$1 par, all issued. Company declared a dividend of 25c a share, Oct., 1913. Gross earnings, 1914-15, were \$27,500; \$20,000 from ore sales, netting \$12,500 for the year's operations.

Property: 34 claims, 4 patented, in the Loon Creek district, 112 miles west of Mackay, the nearest rail point, the mine being seriously handicapped by inadequate transportation facilities. The mine and smelter are located high in the mountains, only accessible by steep and dangerous trail and hampered by such deep snows that the smelter can only be run a short time.

Development: by drift tunnels, No. 1 having a back of 450', No. 2 a back of 700', and No. 9 a back of 870', latter showing rich ore, and planned to have a back of 2,000', ultimately. Tunnels are drifts on a vein of 2 to 7' average width, with maximum width of 15 to 18', carrying ore said to average 9 to 16% copper, and 2-8 oz. gold per ton, with a paystreak of 2" to 5" width, proven to average about 2' for a distance of 500', and depth of 400'. Mine is developed to 1,000' level.

Company employs 80 men at the mines and 400 horses are required to handle supplies and output.

Equipment: about \$225,000 has been expended on surface improvements and equipment, including the smelter, but excluding the 50-ton oil

flotation concentrator, built in 1915. The property has water power, with an electric light plant, assay office and necessary mine buildings.

The smelter has a 100-ton water-jacket blast furnace, making matte of about 45% copper, 25 oz. silver and 8 to 10 oz. gold per ton, with slags running only about 0.2% copper. The smelter ran 24¼ days in the summer of 1913, smelting 1,800 tons of ore, and producing 380 tons of matte. Total production to end of 1915 was \$800,000. Management estimates 20,000 tons of ore in old stopes expected to net \$4.97 per crude ton.

The property, though very difficult of access, and having many features unfavorable to operations, is promising. See U. S. G. S. Bull. 530G.

LOST PACKER MINING & SMELTING CO.

IDAHO

Office: 34 West 33rd St., New York. Mine near Ivers, Custer Co., Idaho. John T. Clarke, treas. and managing director. **Inc.** 1907, in Wyoming. **Cap.**, \$3,000,000; shares \$5 par, as a holding company, to gradually acquire the outstanding stock of the Lost Packer and other mining companies.

LOST RANCH & TUNNELSITE MINE.

MONTANA

Harvey Sullivan, Brenner, Beaverhead Co., Mont., owner. **Property:** 7 claims in the Bloody Dick section. 5 miles from Brenner, shows gold, silver, lead, copper ore in veins. Developed by 420' tunnel, to depth of 170'.

LOST TREASURE MINING CO.

ARIZONA

Gold Road, Mohave Co., Ariz. **Officers:** Geo. W. Long, pres.; J. F. McConnell, v. p.; J. L. McIver, sec.-treas.; J. E. Strumquist and L. J. Hammell, directors. **Inc.** 1915 in Ariz. **Cap.**, \$150,000; shares 10c par.

Property: the Gold Ore Extension Nos. 1 and 6, 120 acres, at Gold Road, adjoining the Gold Ore on the N. and W., and claimed to carry the extension of the Gold Ore vein. A 700' vertical shaft is now being sunk. The mine is one of the many new prospects in the Tom Reed district yet to be proved.

LOUIS d' OR GOLD MINING CO.

ARIZONA

Address: P. O. Box 995, Miami, Ariz. **Office:** 339 Monadnock Block, Chicago, Ills. **Officers:** L. Ogden Wadleigh, pres.; Geo. P. Baldwin, v. p.; J. A. Glenn, treas.; G. O. Swarts, sec., with Carlos S. Andrews, Willis H. Smith, Theo. A. Steller and Dr. L. W. Whitmer, directors.

Inc. July, 1912, in Ariz. **Cap.**, \$3,000,000, increased July, 1915, from \$2,000,000; 1,234,450 issued; 300,000 shares offered for sale by Baldwin Syndicate, April, 1916, at 25c per share. Company is practically a reconstruction of the Lost Gulch United Mines Co., and is controlled by Baldwin Syndicate of Chicago.

Property: 17 claims, partly fractional, 292 acres, in 2 contiguous groups, about 2 miles north of the mouth of Lost gulch, and 3 miles from a railway. Claims show monzonite-porphry, diorite and granite, carrying 4 fissure veins, of which 3, of 4' estimated average width, are more or less developed, the mines as a whole having about 7,000' of workings.

The **Badger** mine has a vein of 3 to 6' width, developed by a 145' shaft, somewhat wet, carrying ore said to average about \$7 per ton in values, with occasional shoots of \$17 to \$30 per ton, and a 400' tunnel showing a vein of 3 to 6' width, averaging about \$7 per ton. Equipment includes a 15-h. p. gasoline hoist, good for 400' depth.

The **Bonanza** mine has a 1,050' tunnel. The **Cedar Tree** mine carries mainly argentiferous and auriferous galena, with a little copper and zinc. The **Tiger** or main vein is entirely auriferous, is developed by a 350' tunnel to 110', and is said to carry values of from \$3 to \$90 per ton. All ores are sulphide.

Shipments: of surface ore averaged 6 oz. silver and 1 oz. gold, with lead and silver. Development by winze sunk from the tunnel on the vein.

Equipment: the mill, of wood, completed Feb., 1910, has 10 stamps, a 6x10" Gates crusher, 2 Wilfley tables, 2 Frue vanners and a Pierce amalgamator; power equipment includes two 80-h. p. water-tube boilers and a 150-h. p. Corliss engine, 40 h. p. steam plant and compressor, installed 1915. Management expects to install cyanide plant and to sink a 2-compartment shaft from surface.

LOUISIANA CONSOLIDATED MINING CO.

NEVADA

Offices: Room 2851, No. 120 Broadway, New York, and Mt. Montgomery, via Mina, Esmeralda Co., Nev. **Officers:** Walter E. Trent, pres.; T. F. Bonneau, v. p.; L. A. Dessar, sec.-treas.; with Capt. A. B. Wolvin and H. C. Cutler, directors. H. C. Cutler, cons. engr., Reno, Nev. Inc. May 17, 1912, in Nev. **Cap.**, 1,000,000 shares; 10c par; outstanding 600,000; 200,000 shares set aside for bond conversion. Registrar & Transfer Co., New York, transfer agt. and registrar. Listed on New York Curb and San Francisco Exchange. Annual meeting, Dec. 10th.

Bonds: authorized, not issued, \$40,000, 1st mortgage, 7%, dated May 1, 1916, due May 1, 1921; redeemable in 5 years or before at option of company at 115; convertible into stock at 20 cts. per share. Balance sheet of May 1, 1916, shows assets, \$268,200, which includes: property, \$100,000; treasury stock, \$40,000; treasury bonds, \$40,000; improvements, \$80,000; developments, \$5,000; cash, \$3,200. Liabilities show: capital stock, \$100,000; bonds, \$40,000; surplus, \$128,200.

Property: 3 claims and a fraction, 65 acres, including the Louisiana, or Tip Top mine, at Mt. Montgomery, Oneota district, 5 miles from the S. P. Narrow Gauge R. R., running from Mina, Nev., to Keeler, Calif. Also has an option on the Brownie mine, 5 claims, 100 acres, 1,500' W. of the Louisiana. Property formerly belonged to the old Thorndyke-Bley Mining Co., now dead.

Ore: gold-silver occurs in N.-S. veins, dipping 60° E., with auesite footwall and rhyolite hanging-wall. Company's claims cover 4,500' along strike of veins; two veins in each mine, the footwall vein, 6' wide, and hanging-wall vein, 2½' wide. In the Louisiana veins are 5' apart, but at times come together, forming ore widths of 12' to 16'. Veins are 20' apart in the Brownie mine.

Development: tunnels, with 1,000' of underground workings. In the Louisiana mine most of ore above 120' level has been mined; a 100' winze and 60' drift below tunnel level said to show \$7 to \$9 ore. Management claims Louisiana mine should produce 10,000 to 20,000 tons of ore for each 100' in depth, with a profit of \$3 to \$4 per ton; and the Brownie mine 25,000 tons of ore for each 100' in depth. Brownie ore said to average \$7 to \$9 per ton. **Ore reserves:** claims 5,000 tons blocked out and 10,000 tons partially developed ore.

Louisiana is said to have produced \$120,000, of which 75% was in gold; 25% in silver; all from above 120' level.

Equipment: includes 10-stamp mill, cyanide and bullion refinery plants, capacity 75 tons per day; steam plant using fuel oil; 75-k. w. generator and electric hoist. Water is obtained from 2 springs, 2 miles from the mill.

Plans developing to the 420' level and starting the mill in 1916.

LOUISIANA DEVELOPMENT CO.

CALIFORNIA

Office: 606 Electric Bldg., Cleveland, O. **Property:** the Louisiana quartz mine, 4 claims, 50 acres, 2 miles N. W. of Tuolumne, Tuolumne Co., Calif., said to carry an 18" vein in granodiorite, running N. 15° E., with dip 70° S. E. Ore occurs as free gold with pyrrhotite, sphalerite and galena.

Developed by 520' shaft with N. and S. drifts of several hundred feet. Operated by lessees in 1916.

LOWER LEVEL MINING CO.

MISSOURI

Sarcoxie, Mo. Is a reorganization of the Bearcat Mining Co. **Directors:** J. W. Boyd, J. J. Stephenson, Geo. Spiva and Sam Tamblyn. **Property:** the Cameron mine on J. W. Boyd land, at Sarcoxie, 20 miles E. of Joplin, Jasper Co., Mo., is a zinc producer. Developed by 278' and 200' shafts. **Equipment:** includes compressor, boilers and 400-ton mill. Company plans deep development work.

LOWER MAMMOTH MINING CO.

UTAH

Office: 515 Dooly Bldg., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. **Officers:** John Dern, pres.; J. C. Dick, v. p.-gen. mgr.; A. Reeves, sec.; W. S. McCornick, treas.; with F. D. Kimball, M. P. Braffet and Geo. H. Dern, directors. Wm. Fouyer, supt.

Inc. July 3, 1896, in Utah. **Cap.,** \$150,000, increased 1906 to \$190,000, again increased 1907 to \$250,000, and again increased 1911 to \$1,000,000; shares \$1 par; assessable. **Dividends:** to Jan. 1, 1916, \$67,000; total assessments levied, \$127,500. Paid last dividend of 1c, Dec. 15, 1915. Last assessments were in 1914, $\frac{1}{2}$ c and 1c per share. In treasury Jan., 1916, \$5,578. Shares listed on Salt Lake Stock Exchange. Annual meeting, second Monday in January.

Property: 6 claims, 50 acres, patented, adjoining the Mammoth and Grand Central mines, carrying a continuation of the Mammoth orebody. **Development:** by 700' tunnel, and 2,000' three-compartment shaft. The extensive workings show large bodies of low-grade ore, decreasing in values with depth. The oxidized zone extends to depth of at least 1,800', ores to this depth including lead carbonates, ruby silver and native silver. The copper ore occurs mainly on the footwall of the Mammoth vein, and is overlaid by silver-lead ore of smelting grade, the segregation of the copper and lead ores being remarkably complete. The lower workings in the sulphide zone show auriferous and argentiferous galena, chalcopyrite and pyrite, coming in at a depth of 1,800' to 2,000'. Recent development consists of a drift on the 700' to cut the orebody, followed by a raise from the 1,000' level.

Equipment: includes 2 electric hoists, 1 of 165-h. p., with double drum, good for a half-mile depth, and an electric air compressor. Buildings include a carpenter shop, smithy, assay office and superintendent's dwelling.

Operations were suspended March, 1907, and resumed May, 1908, and in 1914 the mine shipped 1,595 tons of ore, which realized \$9,996. Production in 1916 is from the 1,500 and 1,700' levels. Management considered good and property promising, notwithstanding the rather poor record of the past. Company claims to have a 200,000-ton orebody, averaging 13% zinc, between the 1,500' and 1,800' levels. Lessees and company are working the mine. Output for 1915 realized \$54,848.

LOWLAND TUNNEL WATER & TRANSPORTATION CO. UTAH

Office: 819 Newhouse Bldg., Salt Lake City. Mine office: Starr, Utah. **Officers:** E. P. Jennings, pres.; Louis Fugal, v. p.-mgr.; C. L. Whitney, sec.-treas.; with Geo. F. Wasson and D. H. Livingston, directors. **Inc.** Nov., 1912, in Utah. **Cap.,** 1,000,000 shares; 1 ct. par; nonassessable; 350,000 issued.

Property: 36 unpatented claims, 700 acres, in Nebo mining district, Juab Co., Utah, said to carry gold-silver-lead-copper-zinc-iron ore. Formation is quartzite, lime and granite. Ore occurs as a contact deposit and in fissure veins, running N.-S. with dip of from 40-90°.

Company is driving a 10,000' drainage and transportation tunnel into the Mt. Nebo mineral belt to serve 11 companies operating in that district and to develop its own mineralized ground. The tunnel was in 500', Jan. 31, 1916.

LUCANIA TUNNEL & MINES CO.**COLORADO**

Mortgage foreclosed in 1914 by Pennsylvania Mining, Power & Reduction Co., which see.

LUCIA MINING CO.**MEXICO**

Office: 15 William St., New York. Mine office: Pánuco de Coronado, San Juan del Rio, Durango, Mex. H. M. Hubbard, v. p.; Myra B. Martin, sec.-treas. Inc. 1900 in West Virginia. Cap., \$25,000; shares \$5 par. This company is controlled by the San Luis Mining Co. and its property is described under that title.

LUCILE GOLD & COPPER MINING CO.**CALIFORNIA**

Office: 303 Lankershim Bldg., Los Angeles, Calif. Mine near Kelso, Calif. Officers: Dr. S. K. Walsworth, pres.; Frank L. Pitney, v. p.; F. R. Pitney, sec., treas. and mgr.; with C. V. Boyd, directors. Inc. Nov., 1906, in Arizona. Cap., \$1,000,000; shares \$1 par; 900,000 shares outstanding. Annual meeting, 3rd Tuesday in April. Management reports \$650 expended on assessment work in 1915.

Property: 5 claims, unpatented, 100 acres, on the western slope of the Providence mountains, 11 miles from Kelso. Ore: gold-silver-copper, with iron sulphide, occurs in fissure veins in granite-porphry, said to be 25' wide, and to assay 69% iron, \$4.50 gold, \$1.50 silver and 6% copper per ton. Development: 220' tunnel and 100' shaft. Mine has no equipment. 50,000 tons of ore reported on the dumps, May, 1916. Company is awaiting the erection of a smelter.

LUCKY ABE MINING CO.**MISSOURI**

Webb City, Mo. Inc. in Missouri. Cap., \$10,000. Operates a lease on 40 acres of mineral land owned by the Joplin-Pittsburgh Land Co. in S. 14, T. 27, R. 33, Joplin, Jasper Co., Mo. Development: by 15 shafts, averaging 116' deep. Equipped with pumps, boilers, air-drills, steam-power and hoists. Employs 45 men. Production figures not available.

LUCKY BART GROUP**OREGON**

J. H. Beeman, Gold Hill, Jackson Co., Ore., owner and mgr. Property: 11 claims, partly patented, 220 acres in Sardina mining district, near Gold Hill, said to carry 5 known veins, averaging 2' in width. Ore is free milling, running from \$5-\$100 and said to average \$50 per ton. Developed by 2,000' tunnel to depth of 190'. Equipment: includes 40-h. p. steam plant, 5-stamp concentrating mill. Concentrates said to average from 3-5 oz. gold and silver. Mine has been operated more or less regularly since 1893.

LUCKY BOY CONSOLIDATED MINING CO.**NEVADA**

Address: care J. H. Miller, Hawthorne, Nevada. Officers: Jesse Knight, pres.; John H. Miller, v. p.-gen. mgr.; W. Lester Mangum, sec. Company controlled by the Knight Investment Co. Total dividends paid to date, \$425,000.

Property: the Lucky Boy mine, under the town of Lucky Boy, about 5 miles from Hawthorne, shows silver-gold-lead-copper ore in a vein in limestone near granite. Ore contains galena and tetrahedrite with quartz and some calcite, in lenses and shoots, in a vein which runs N. 80°-85° E. and dips 65°-75° S. Geology fully described in U. S. G. S. Bull. 594, p. 153.

Development: by 1,000' Hubbard shaft with drifts E. and W. at 100' intervals and by a deeper drainage tunnel, 6,200' long. Equipment: includes air compressor, electric motors, machine drills and useless 10-stamp mill.

The big oreshoot, which produced \$800,000 in 8 months and half as much more in the next year, has been mined out except where narrow. No stoping ore was cut in the lower tunnel, but there is much unworked ground in the mine and much virgin territory in the property. Lessees now working at 6 or 7 places are extracting 2 to 3 carloads of ore a month, which

yields a substantial profit to the company. Reported under option to New York interests, July, 1916.

LUCKY BOY GOLD MINING CO.

IDAHO

Office: Empire Bldg., Boise. **Mine office:** Idaho City, Idaho. **Officers:** Frank E. Johnesse, pres.-mgr.; E. W. Barry, v. p.; Fred V. Tinker, sec.-treas.-supt.; with T. L. Rippey and John G. Huber, directors. **Inc.** Sept. 30, 1914, in Idaho. **Cap.**, \$500,000; shares \$1 par; 125,000 shares outstanding.

Property: 7 claims, 120 acres, in Gambrinus mining district, Boise county, said to show a shear zone, 3'-40' wide, of granitic porphyry, carrying some quartz streaks and considerable soft talc. The orebody runs E.-W. and dips about 60°. Ore is free gold and said to average \$4.78 per ton.

Development: by 300' shaft and 840' tunnel to depth of 360'. **Equipment:** includes 25-h. p. hoist, Newark 12"x14" compressor, steam power, 10-stamp mill of 25 tons daily capacity. Management plans installing electric power, 100-h. p. crude oil engine direct connected to 55-k. w. electric generator, Chilean or tube mill and electric hoist.

Ore reserves: estimated Feb., 1916, 130,000 tons of ore. Credited with production of \$130,000 under former owners. Present management competent and property considered promising.

LUCKY BOY MINING & MILLING CO.

ARIZONA

Office: 677 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** -Oatman, Ariz. **Officers:** Geo. E. Fairhead, pres.; N. A. D'Arcy, v. p.; W. S. Tarbell, sec.-treas. **Inc.** 1915 in Ariz. **Cap.**, 1,000,000 shares; 10c par. Stock listed on San Francisco and Los Angeles Exchanges.

Property: 200 acres in the Tom Reed district, adjoining the Telluride on the S. and the Tom Reed on the S. W., said to show gold ore occurring in stringers of quartz and calcite. A shaft on the Friday claim, down 300' in April, 1916, is being sunk to 500'.

Equipment: includes 25-h. p. hoist, 200-cu. ft. air compressor, 35-h. p. engine, compressor and Jackhammer drills, installed 1915. Property considered promising.

LUCKY BOY MINING & MILLING CO.

UTAH

E. E. Lowry, pres.; Ira Griffiths, sec.-treas. **Inc.** April 20, 1916. **Cap.**, \$50,000; shares 10c par; assessable; 25,000 shares outstanding. Listed in Salt Lake City. **Property:** 6 claims in Clear Creek mining district, Box Elder Co., Utah, said to show copper-silver-gold ore.

LUCKY CALUMET COPPER MINING CO., LTD.

IDAHO

Office: Wallace, Idaho. **Mine office:** Mullan, Shoshone Co., Idaho. **Officers:** John H. Nordquist, pres. and gen. mgr.; Chas. H. Solberg, v. p.; Otto A. Olsson, sec.-treas., Eagle Block, Wallace, Idaho; with A. J. Olson, directors; Al. J. Grills, supt. **Inc.** Oct., 1906, in Idaho. **Cap.**, \$1,500,000; shares \$1 par; assessable. Last assessment 5 mills per share, levied in 1914.

Property: 10 claims, patented, 181 acres, on Snowstorm hill, between the Independent and Snowstorm mines, and about 5 miles N. E. of Mullan. Property shows 2 fissure veins of 10 to 50' width, in quartzite. **Development:** by 3 tunnels. The upper one, of 1,700' length, has a quarter-mile of drifts and crosscuts, which develop what is supposed to be the extension of the Snowstorm vein, showing low-grade ore carrying disseminated carbonates and bornite of 2 to 3% estimated copper tenor. The lower tunnel, a crosscut, from the head of Gentle Annie gulch, is 3,600' long and has opened up a good body of ore, presumably the National, at depth of 1,200'. Property is worked intermittently with proceeds of annual assessments, but information is hard to obtain from this as well as all other Nordquist companies.

Equipment: includes electric power, with 2 motors, and a 5-drill air compressor.

LUCKY DEPOSIT MINING CO.**NEVADA**

Officers: Simon Davis, pres.; Heber M. Wells, v. p.; Pearl Jack, sec.; L. G. Hardy, treas.-mgr.; with E. C. Ashton and J. P. Cahoon, directors. **Inc.** March 1, 1914, in Utah. **Property:** at Aurum, White Pine Co., Nev., developed by 175' crosscut tunnel cut along a porphyry dike said to measure 200' across. The tunnel is being driven to reach depth of 300'.

LUCKY FIVE MINING CO.**WISCONSIN**

Mr. McKinley, supt., Dodgeville, Wisc. Operates a lease on Davis and Thomas lands, in Dodgeville district, near Cuba City, Grant Co., Wisc., and is the largest producer of high-grade lead-zinc concentrates in the district. Developed by 100' shaft. **Equipment:** includes steam plant and 50-ton concentrator. Shipments made to the Collinsville smelter, under lease to the Picher Lead Co.

LUCKY FRIDAY MINING CO.**IDAHO**

Wallace, Idaho. **Officers:** Franklin Pfirman, pres.; Jas. A. Wayne, sec.; J. H. Wade, mgr. Is a reorganization (1914) of the Lucky Friday Mines Co. **Cap.**, \$1,500,000; shares \$1 par; assessable; 170,000 shares in treasury.

Property: 4 claims, adjoining the Hunter mine on the south. **Development:** by 90' shaft; 625' upper crosscut tunnel and 700' lower crosscut tunnel, developing a 10' vein, with 4' paystreak giving assays up to 3.5% copper, 29% lead and 89 oz. silver per ton.

Equipment: includes electric drilling plant, trackage and ore cars. Development work resumed in 1915 and lower tunnel being driven 100' further to reach the main ledge.

LUCKY GEORGE MINING CO.**MISSOURI**

M. L. Hughes, pres.-gen. mgr., Joplin, Mo. Company operates a lease on 15 acres lead-zinc bearing land at Belle Center, 3 miles N. W. of Joplin, Jasper Co., Mo. Developed by 2 shafts and several drifts. A 150-ton concentrator was to be started up early in 1916.

LUCKY GOLD & COPPER MINING CO.**ARIZONA**

Letters to J. D. Ferree, pres.-treas., Phoenix, Ariz., returned unclaimed, 1916. A. F. Mahin, v. p. **Inc.** 1904 in Ariz. **Cap.**, \$300,000, increased 1911 to \$500,000; shares \$1 par; 400,000 shares issued at last accounts. Authorized bond issue \$50,000; \$10,000 outstanding.

Property: 9 claims, 180 acres, in Riverside district, Pinal Co., Ariz., 3 miles S. of the A. E. R. R. Developed by several shallow shafts and drifts, said to show ore giving assays of 1-17% copper, \$1.60-\$2.39 gold, \$1.36 silver per ton. Presumably idle since 1914.

LUCKY GROUP.**NEW MEXICO**

M. D. Gaylord, mgr., Brice, via Oro Grande, Otero Co., N. M. **Property:** the Lucky, May, Copper King and Lincoln claims in Jarilla district said to carry malachite ore a few inches to 3' thick in bedding planes and along seams and cross fractures. The ore averages 7% copper. A chimney of ore 50' wide is said to carry \$4 to \$11 per ton in gold, largely free.

Development: by tunnel, exposing several orebodies at 300' depth. In Sept., 1913, an experimental plant of the Dawson patent process was installed at the mine and a tramway was constructed, 1914.

Production: at the rate of 50 tons per day carrying 2 to 5% copper and \$3.50 to \$10 gold with a bonus of \$2 for iron and lime. J. R. and H. D. Darroch reported to have bought a half interest in the mine. Employs 15 men.

LUCKY JIM ZINC MINES, LTD.**BRITISH COLUMBIA**

Office: 213 Belmont Bldg., Victoria, B. C. A. G. Larsen, trustee; G.

Weaver Loper, mgr.; A. J. Becker, supt. **Cap.**, \$2,500,000; shares \$1 par; authorized bond issue \$150,000, bearing 7%. Stock listed on Spokane Exchange.

Property: the Lucky Jim Mine at Zincton, B. C., developed by 3,600' of tunnels, drifts, raises and crosscuts. Two promising shoots of zinc ore are developed on No. 5 level. **Shipments:** 780 tons of crude ore in 1913 averaged 46.37% zinc.

Operations were interrupted by lack of funds in the Autumn of 1914 and efforts made to foreclose on the first mortgage of \$62,000, but the court appointed a trustee to reopen the mine and operations were resumed in 1915. Ore is shipped to the Roseberry mill on Slocan lake, owned by the Monitor Mining Co.

LUCKY SAM MINING CO.

ARIZONA

Office: 678 I. W. Hellman Bldg., Los Angeles, Calif. **Officers:** W. S. Tarbell, pres.; G. M. Gilbert, v. p.; Geo. E. Fairhead, sec.-treas.; L. C. Randall, supt. **Inc.** 1915 in Ariz. **Cap.**, \$100,000; shares 10c par.

Property: 12 claims, 235 acres, in the Tom Reed district, Mohave Co., Ariz., carries 2 main parallel veins, 4-6' wide. Developed by 2 shafts, deepest 163', in May, 1916. A prospect.

LUCKY SIX MINING CO.

WISCONSIN

J. N. Vial, mgr., Mifflin, Wis. Property in Mifflin district, Iowa Co., Wisc., developed by two shafts. Produced about 2,305 tons of zinc concentrates in 1914.

LUCKY SWEDE GOLD & COPPER MINING CO.

IDAHO

Office: 625 Cedar St., Wallace, Idaho. **Officers:** Morris Pearson, pres.-gen. mgr.; Otto A. Olsson, sec.-treas.; L. F. Macejowski, Harry Pearson and Ida Pearson, directors. **Inc.** May, 1909. **Cap.**, \$1,000,000; shares \$1 par; assessable; last assessment 3 mills per share, delinquent Sept., 1913; 300,000 shares issued to end of 1914. Company planned 1914 to give away stock to those agreeing to pay a 1-mill assessment per share every 60 days to provide necessary funds for development work.

Property: 14 claims in the St. Joe district, S. E. of Mullan, near the C. M. & St. P. R. R., shows 3 veins with surface ores giving good assays in copper and gold. **Development:** by tunnel with about 600' of workings. Company's last assessment provided funds for a new 1,500' tunnel to start near the railway line and cut a copper vein expected to be reached at depth of 1,000'. **Equipment:** includes compressor, installed 1913, and a Pelton wheel.

LUCKY TIGER-COMBINATION GOLD MNG. CO.

MEXICO

Office: 1012 Baltimore Ave., Kansas City, Mo. Mine office: Esqueda, Sonora, Mex. **Officers:** John Kelly, pres.; E. C. Sooy, v. p.; O. V. Dodge, sec.; H. Vanderslice, treas.; with E. D. Fisher, D. J. Haft, Wm. Huttig, W. H. McCrum, W. A. Moses, J. Z. Miller, Jr., Trigg Garner, A. E. Mosier and N. J. Simonds, directors. L. R. Budrow, gen. mgr.; R. T. Mishler, asst. gen. mgr.

Inc. March 16, 1903, in Ariz. **Cap.**, 800,000 shares; \$10 par; 715,337 shares issued. Annual meeting, 3rd Monday in March. Company owns the entire capital stock of the Tigre Mining Co., S. A.

Combined balance sheet for 1914 of the Lucky Tiger Combination Copper Mining Co. and the Tigre Mining Co., S. A., shows total assets \$9,807,762, which includes mining property \$6,061,040; plant, machinery, equipment, \$488,147; product on hand and in transit, \$255,853; cash, \$77,411; liabilities include capital stock, \$7,153,370; bonds and interest, \$1,285; current liabilities, \$91,751. Total receipts for the year's operations were \$1,510,721, including

\$1,503,610 from ore sales; total expenditures were \$764,285; depreciation of property, plant and equipment, \$129,374; net profits, \$604,612.

Dividends: paid since organization of the company:

Year—	Number	Amount
1915.....	.....	\$493,582.53
1914.....	58-68	715,337.00
1913.....	46-57	450,662.31
1912.....	40-45	336,208.39
1911.....	30-39	357,601.10
1910.....	18-29	429,000.00
1909.....	6-17	409,500.00
1908.....	1-5	71,500.00

Total\$3,263,391.33

Property: the El Tigre mine, 6 claims, 622 acres, at El Tigre. Montezuma district, Sonora, Mex., shows gold-silver-lead-copper ore in fissure veins traversing rhyolite. Ore is a silicious sulphide occurring in vein 25' wide, proven for 4,000' in length, and running N.-S. with average dip of 65°. Developed by 1,000' incline shaft and 5,000' tunnel, with about 10 miles of underground workings. Ore is mined mostly by overhand shrinkage.

Equipment: includes electric power, 25-h. p. electric hoist, 250-ton concentrating mill and cyanide plant. Reported extraction in 1914 was 93.8%, concentrates averaging 2.3 oz. gold, 520 oz. silver, 2.3% copper, 10.8% lead. **Production:** 83,000 tons in 1912; 90,000 tons in 1913; 88,000 tons in 1914. Ore averages 30 oz. silver, 0.8% zinc.

Company has been able to continue operations and shipments more or less regularly, notwithstanding disturbed conditions in Mexico during the past years.

LUCKY TIGER MINING CO.

MISSOURI

Neck City, Mo. Inc. in Missouri. **Cap.**, \$20,000. Operates a lease on mineral land owned by Penn Zinc Co., in Sec. 8, T. 29, R. 32, between Alba and Neck City, Jasper Co., Mo. **Developed** by 2 shafts to depth of 220'. **Equipment:** includes 250-ton concentrating plant, pump, 3 air drills, steam power, Blake crusher and Norwalk air compressor. Employs 30 men. Producing mainly from the 220' level.

LUDWIG MINE.

NEVADA

Owned by Nevada Douglas Copper Co., at Yerington, Lyon Co., Nev.

LUEMA MINING CO.

COLORADO

Leadville, Colo. Warren F. Page, mgr. **Property:** the Valley and Forest Rose mines, on Prospect Mtn., developed by a 450' shaft and 2,000' tunnel, said to show silver-bearing copper and lead ores. On the 1,500' point in the bore, drill holes down to 200' have proved valuable orebodies and management plans sinking interior shaft on the course of the drills. Has electric power, hoist and all necessary machinery. Surface buildings, destroyed by fire in 1914, were rebuilt the following year.

LUNING GOLD MINES SYNDICATE.

NEVADA

See R. B. Todd Mines Co.

LUNING-IDAHO MINING CO.

NEVADA

Office: 203 Nixon Bldg., Reno, Nev. Mine office: Luning, Mineral Co., Nev. **Officers:** Robt. B. Todd, pres. and gen. mgr.; Max Hahn, v. p.; S. W. Todd, sec.-treas.; with W. A. McPhee and Prof. E. P. Heald, directors. Inc. April 29, 1910, in Nevada. **Cap.**, \$1,500,000; shares \$1 par; issued \$900,000.

Property: 13 claims, 275 acres, in the Santa Fe mining district, shows several fissure veins in quartzite, said to carry 5½% copper, 2 oz. silver and

about 60c gold per ton. **Development:** by about 600' of underground workings to depth of 150'.

Management plans continuing Hahn tunnel 1916 and sinking a working shaft on one of the orebodies showing at surface.

LUPFER MINING CO.**MONTANA**

Whitefish, Flathead Co., Mont. **Officers:** George Hoffman, pres.-mgr.; Mike Sullivan, v. p.; Pete Hoffman, sec.; with E. Boettcher and John Roeder, directors. **Inc.** 1906 in Montana. **Cap.**, 500,000 shares; par value 15c; 250,000 issued.

Property: 160 acres, about 14 miles W. of Whitefish. Developed by 150' shaft, showing a well defined vein of copper ore, 3' wide in porphyry and limestone, said to assay 2% copper, 3 oz. silver with a trace of gold. Has a small steam hoist and air compressor. Idle since 1911 owing to lack of funds.

LYCOMING CO.**MINNESOTA**

Office: 708 Lonsdale Bldg., Duluth, Minn. Was a securities-holding company. Inactive and no assets.

LYNN BIG SIX MINING CO.**NEVADA**

W. W. Ruby, supt., Goldville, via Carlin, Nev. Henry Harker, pres., Taylorsville, Utah. J. H. Marshall, mgr., Cont. Nat'l Bank Bldg., Salt Lake City, Utah.

Property: a gold mine, with a 4' vein said to carry a 20" streak of ore averaging \$150 per ton smelter return. The rest of the vein is said to assay \$46 per ton. A second vein, the West, shows mill ore. **Development:** 200' shaft with drifts at 100 and 200'. Shipments average 3 cars a month.

LYON COPPER CO.**ARIZONA**

Reorganized as Arizona Merger Gold & Copper Co., which see.

MACNAMARA MINING & MILLING CO.**NEVADA**

Offices: 565 Mills Bldg., San Francisco, and Tonopah, Nev. **Officers:** J. L. Joseph, pres.; Mark Wulfsohn, v. p.; E. W. Elliott, sec.-treas.; J. W. Sherwin, supt. **Inc.** 1914 in Calif., as a reorganization of the MacNamara Mining Co. **Cap.**, \$1,500,000; shares \$1 par; assessable. Transfer office and registrar: 565 Mills Bldg. Listed on San Francisco Exchange.

The MacNamara Mining Co. completed a mill on its property, Dec. 1912, and in 1913 treated 28,000 tons of \$8.41 ore at a loss. The management got into bad repute with the stockholders because no statements of operations were given out and stockholders were at a loss to know what had become of the money in the treasury. To provide working capital the company was reorganized under its present title and the stock was put upon an assessable basis. Two assessments of 3c per share each have been levied. The property of the MacNamara Mining Co. was sold to the new company for 1,340,076 shares of the latter's capital stock.

Property: 2 patented claims, 12 acres, at Tonopah, said to show gold-silver ore in quartz vein in andesite. **Development:** 800' shaft.

In 1914 the property was operated for 8 months; the mill treated 15,776 tons of \$11.08 ore, with 93.3% recovery. **Production:** was 10,544 tons of \$7.04 ore; costs for 7 months were \$10.34 per ton. The shutdown was attributed to lack of development, shortage of money, and low price of silver. Property was not operated in 1915.

In Feb., 1916, arrangements were made with the West End Cons. Mining Co. by which the MacNamara Company could develop on its side of the property line a body of ore which the West End has exposed in its stopping operations near the line; work to be done through West End workings, to avoid the necessity of MacNamara driving a 500' crosscut. Shipments

were made during March to the West End mill at the rate of about 50 tons per week. Ore is said to average \$30 to \$40 per ton. **Equipment:** includes electric hoist, 100-h. p., and compressor.

At last accounts the company was planning to start its own 75-ton 10-stamp mill and cyanide plant. There is said to be a considerable tonnage of low-grade ore remaining in the mine which can be worked at a profit at present high price of silver.

MAD MULE MINING CO.

CALIFORNIA

Owns the Mad Mule mine, formerly known as the Banghart, 5 miles N. W. of Stella, in the Shasta mining district. In 1914 a tunnel was being driven to cut the ore at greater depth. T. W. Briggs, supt., in 1914. Mine is fully described in U. S. G. S. Bull. 540, pp. 40, 42, 52-54. See also State Mineralogist's Report 1915, Mines & Min. Res. of Shasta Co., p. 47.

MADDEN SCRATCH GRAVEL MINES CO.

MONTANA

Helena, Mont. **Officers:** Jas. Madden, pres.; Peter Scharenbroich, v. p.; Wm. Muth, sec.-treas.; above, with Theo. Sarter, L. P. Wells and E. Edwards, directors. **Inc.** March 16, 1916, in Mont. **Cap.**, \$300,000; shares \$1 par; outstanding \$170,000. Annual meeting, third Monday in June.

Property: 3 patented claims, 50 acres, known as the Jacquemin group, in the Scratch Gravel Hills, 8 miles from Helena, said to show gold ore in fissure veins in granite. The claims are said to have been worked in a haphazard manner by Jacquemin. **Development:** 160' incline shaft, and 340' tunnel. Present management intends to develop the property.

MADERA ENTERPRISE MINES & LAND CO.

CALIFORNIA

Grub Gulch, Madera Co., Calif. **Officers:** Lou K. Johnson, pres.-gen. mgr.; A. L. Emberson, sec.-treas.; S. R. Johnson, mgr. **Inc.** in 1914. **Cap.**, \$500,000; shares \$1 par. A close corporation. **Property:** 550 acres patented, including the John W. Cates mine, 3 miles N. E. of Grub Gulch. **Ore:** gold quartz in fissure vein in schist and slate. Vein runs N. 35° E.; dip 80° N. E. It was discovered in 1881 and worked for a short time, during which it is said to have yielded over \$108,000 from ore averaging \$13.13 per ton. It was then idle until April, 1913.

Development: by 4 tunnels, longest 365', drifts and winzes, totaling 1,500' of underground workings. **Equipment:** 10-stamp, 25-ton mill built by present owners, air compressor and engine. Water from the Fresno river furnishes power, except in the dry season, when a gasoline engine is used; there are 1½ miles of ditch and flume. Employs 10 men.

MADERA MINING CO.

ARIZONA

Machinery has been removed and property is idle. No funds. **Address:** 178 Main Ave., Passaic, N. J. See Copper Handbook, Vol. XI.

MAGGIE MURPHY COPPER CO.

WYOMING

Office: care Chas. S. Ashley, pres., New Bedford, Mass. Mine near Douglas, Converse Co., Wyo. **Inc.** Aug., 1904, in Wyoming. **Cap.**, \$1,000,000; shares \$1 par.

Property: 12 claims, 180 acres, and a 60-acre mill site in Horseshoe canyon, in the Laramie Peak district. Claims show granite, with gneiss and schists, carrying 7 veins between gneiss and mica-schist, one of which ranges 30 to 60' in width and shows covellite, bornite and chalcopryrite, with pyrrhotite ores assaying 1 to 6% copper, 2 to 9 oz. silver and 40 cts. to \$4.50 gold per ton.

Development: includes 114' shaft and various shallow workings. Company has kept up necessary annual assessment work, but has done no development.

MAGISTRAL-AMECA COPPER CO.

MEXICO

Office: 201 Hibernian Bldg., Los Angeles, Cal. Mine office: Ameca,

Jalisco, Mex. **Officers:** H. L. Percy, pres.; Fred M. Lyon, v. p.; Geo. C. B. Robinson, sec.-treas.; Jas. P. Harvey, gen. mgr., and H. N. Manington, directors; Percy A. Babb, cons. engr. Inc. May 20, 1909, in Arizona. **Cap.:** \$1,500,000; shares \$1 par; nonassessable; issued, 1,255,300 shares. Holds direct title to lands through Magistral-Ameca Copper Co., S. A., inc. in Mexico. Annual meeting, second Wednesday in November.

Property bought of Las Moras Copper Mining Co. for \$100,000 by Messrs. Patrick Clark, Jas. P. Harvey, H. L. Percy and Fred M. Lyon, Mr. Clark selling his quarter interest to his associates for \$55,000.

Property: .74 pertenencias, 185 acres, known as the Mina Magistral, on the Hacienda Hegira, 8 miles S. W. of Ameca, has veins in diorite that are cut by porphyry dikes. The veins occur on dike contacts and show outcrops of silicified rock with quartz stringers and hematite. The vein varies from 4 to 25' in thickness and carries lenticular orebodies connected by mere films of quartz or fissures with wall rock impregnated with chalcopyrite. The Magistral ore shoot occurs where 3 veins intersect. The ore carries copper sulphides and averages from 4 to 7% in copper with about \$2 in combined gold and silver values.

Development: by 321' shaft, planned to be deepened to 350', and by tunnels with about 1 mile of openings, March, 1913, developing copper ground for width of 5 to 50', said to assay 4 to 8% copper. The Magistral was worked many years ago for bluestone, used by neighboring mines in the process of treating silver-lead ores.

Equipment: includes two 80-h. p. high-pressure boilers and a 150-h. p. tandem compound engine, with hoist good for 500', at the Magistral. The mines are connected with Ameca by a good wagon road, 8 miles long, with a 1½% grade, built with the idea of using it for railway tracks in the future. About 100 men are employed.

The concentrator was rebuilt, 1914, but owing to disturbed conditions in Mexico, operations have been greatly interfered with.

MAGISTRAL, S. A.; NEGOCIACION MINERA DEL MEXICO

Office and mine: Aptdo 22, Zacatecas, Zacatecas, Mex. Dudley H. Norris, pres.; Chas. O. Gilbert, mgr. Company, a close corporation, is said to have paid for improvements from net earnings. Owns the Refugio de Magistral and San Roberto mines.

The San Roberto mine, about 300' deep, has iron ore carrying small values in copper, silver and gold, used for fluxing, and also has a little high-grade silver and silver-lead ore.

The Magistral mine carries chalcopyrite and galena, and ore is produced returning about 6% copper and up to 200 grams silver per metric ton. **Development:** by a 900' tunnel and 2 shafts, 1 of 400' depth, the second, with 3 compartments, is to be sunk 1,500'.

Equipment: includes a 40-h. p. gasoline and 150-h. p. steam hoist, boiler plant, compressor, etc.

The reduction plant, at Magistral siding, on the Mexican Central line, connected with the mine by a narrow-gauge railway, includes a 50-ton sampling mill and a 200-ton smelter. Slags are highly silicious, and matte is sent for conversion to the Torreon smelter. Works treat about 2,000 tons of ore monthly, including a considerable amount of custom ore. About 150 men employed. No recent returns secured. Property probably idle owing to Mexican revolution.

MAGMA COPPER CO.

ARIZONA

Office: 14 Wall St., New York. **Mine office:** Superior, Pinal Co., Ariz. **Officers:** W. H. Aldridge, pres.; F. W. Holmes, v. p.; H. E. Dodge, sec.-treas.; preceding, with John F. Alvord, C. A. Corliss and H. F. J. Knobloch.

directors. W. C. Browning, gen. mgr.; E. H. Lundquist, mine supt.; J. A. Garrett, mill supt. Inc. June, 1910, in Maine. Cap., \$1,500,000; shares \$5 par; issued, \$1,200,000. Transfer agent, Guaranty Trust Co., New York. Registrar, Bankers Trust Co., New York.

Balance Sheet:

Assets—						
	Property & Plant	M. A. R.R. Stock	Cash & Copper	Other Current	Supplies	Total
1915....	\$928,186	\$200,000	\$443,068	\$46,855	\$35,166	\$1,653,275
Liabilities—						
	Capital Stock	Current	Surplus	Total		
1915.....	\$1,200,000	\$47,478	\$405,797	\$1,653,275		

Income Account:

	Metal Sales	Total Income	Total Expenses	Oper. Profit	Deprec.	For'd
1915...	\$1,040,896	\$1,041,235	\$370,348	\$670,886	\$59,157	\$611,729

Earnings for first half 1916 were \$575,226.

Quarterly dividends of 50c per share began Sept. 30, 1915.

Property: the Silver Queen mine, with 22 claims, 346 acres and 133 acres in mill sites and other locations in the Pioneer district. The known ore-bodies of the mine occur in a strong fault fissure filled with porphyry and cutting diabase, quartzite and limestone. The ore is mainly chalcocite.

Development: mine has been partially prospected and developed to the 1,200' level by the old 800' shaft and a new 1,200' three-compartment shaft. Development work in 1915 totaled 5,619', of which 855' was shaft sinking. Total underground workings Jan. 1, 1916, 17,583'. The vein has been developed on the 500', 650', 725', 800', 1,000' and 1,200' levels. On the 1,000' level an orebody had been drifted on, to Feb. 1, 1915, for 275'. It averaged 4.8' in width and assayed 14.34% copper and 13.12 oz. silver. On the 1,200' level 800' of work has been done. Maximum width of vein, where opened on this level, 50', of commercial ore 23'.

In addition to the copper orebody there is a footwall orebody of lower grade copper and between the two lies a large shoot of zinc ore. For 800' the vein dips north about 65°; from the 800' to 1,000' level it is perpendicular, and from the 1,000' to 1,200' level it dips about 65° S. Development work has been preceded and accompanied by diamond drilling. On the 1,000' level the gold content, about \$1.60 per ton, is four times as great as on the upper levels, and zinc was first found here. The zinc lenses contain about 20 oz. silver and 5% lead.

Ore Reserves: estimated Jan. 1, 1916, as 90,000 tons assaying 6.65% copper, 6.75 oz. silver and .029 oz. gold per ton. This included: reasonably assured ore, 87,000 tons, 6.72% copper; ore in third class dumps, 3,000 tons, 4.85% copper. In addition there are 10,000 tons of lead-zinc probable ore, assaying 14% zinc, 4% lead and 10 oz. silver per ton.

Equipment: is electrical throughout, but includes a 160-h. p. steam hoist, now driven by compressed air, 2 air compressors, one of 1,500, the other of 900 cu. ft. capacity, driven by a 225-h. p. motor and 3 vertical Aldrich pumps, each driven by a 75-h. p. motor.

In Aug., 1914, the company completed a concentration and oil flotation mill, having a monthly capacity of 4,500 tons. Uses General Naval Stores oil. Mine and mill are connected by a 2,600' aerial tram. The Callow flotation process is used in the mill and treats the tailing from the finishing tables. Recovery was 86.765%. Ore and concentrates are shipped to the

plant of the A. S. & R. Co. at Hayden, Ariz. A new 100-ton zinc concentrator has recently been completed.

The company owns substantially all the shares of the Magma Arizona Railroad Co., completed in 1915, a 30.4-mile narrow gauge road from Superior to Webster, a station on the Arizona Eastern R. R.

A 15-mile electric power line with steel towers was built by the company from its property to the Inspiration mine, at Miami, where it connects with the power line from Roosevelt Dam. The company has a contract for several years with the U. S. Reclamation Service for electric power, at an approximate cost of \$49 per h. p. year.

Production: for 1915 was 6,046,459 lbs. copper and \$208,658 gold and silver. Total ore mined to Dec. 31, 1915, was 89,841 tons, containing 7.30% copper, 8.39 oz. silver and \$0.60 gold per ton. Output for 1915 is as follows:

		Ore Milled		Ratio			
Tons Mined	Cost per Ton	% Copper	% Silver	Conc.	% Rec.	Lbs. Cop. per Prod.	Cost per Lb.
(a) 46,691	\$4.54	5.21	6.04	3.69 to 1	86.76	6,046,459	6.82c

Average price received was 17.91 cts. per lb.

(a) Crude sorted ore amounted to 3,756 tons, carrying 18.44% copper and 20 oz. silver. Ore obtained from dump and milled, 12,528 tons, averaged 4.62% copper and 5 oz. silver per ton.

55,463 tons of ore averaging 5.21% copper and 6.04 oz. silver were milled, producing 15,039 tons concentrates carrying 16.67% copper, 19.05 oz. silver and \$2.18 per ton gold. The mine also produced 900 tons carbonate ore averaging 8.20% copper, 4.55 oz. silver per ton and \$1.20 gold.

Production for 6 months, 1916, totaled 3,937,237 lbs. copper.

Reported that negotiations are under way by which Magma may acquire parts of the Lake Superior & Ariz. Mng. & Sm. Co. property.

MAJESTIC COPPER CO.

ARIZONA

Office: First National Bank Bldg., Kansas City, Mo. **Mine office:** Oracle, Pinal Co., Ariz. **Officers:** E. A. Hosier, pres.; W. A. Neiswanger, v. p.; E. T. Wilder, sec.-treas. **Inc.** as Inspiration Mining Co., but sold its property, in the Globe district, to the Inspiration Copper Co., and changed its name, March, 1909, to present title, to avoid misunderstandings. **Cap.**, \$3,000,000; shares \$1 par; \$2,707,000 outstanding; bonds authorized, \$25,000; \$14,350 outstanding.

Property: 6 claims near Oracle, on which assessment work is done. Company received from the sale of the Inspiration mine about \$1,500,000.

MAJESTIC COPPER MINING & SMELTING CO.

UTAH

Office: 79 Milk St., Boston, Mass. John M. Dick, president. To all practical intents and purposes this company was succeeded, 1904, by Majestic Copper Co., which was succeeded, 1908, by Majestic Mines Co. Majestic Copper M. & S. Co., however, remains in existence, though practically the entire stock issue, and a large majority of the bonds, are owned by the Majestic Mines Co. The company became bankrupt, 1904, but paid 100 cts. on the dollar. Very fully described Vol. IV, Copper Handbook.

MAJESTIC MINES CO.

UTAH

Office: 342 Exchange Bldg., Boston, Mass. **Mine office:** Milford, Beaver Co., Utah. **Officers:** John M. Dick, pres.; H. M. Inman, v. p.; D. J. Flanders, sec.-treas.; J. A. Bailey, G. F. Kellogg, John Muller, R. H. Phillips, E. M. Southworth and John Freeland, directors; Alex. D. Moffat, mine mgr. **Inc.** May 18, 1908, in Maine, practically as successor of Majestic Copper Co. and Majestic Copper Mining & Smelting Co. **Cap.**, \$5,000,000; shares \$5 par; assessable; issued, 808,795 shares.

Stocks of both companies were exchanged share for share for stock of the Majestic Mines Co. on payment of 15 cts. a share; bonds of the Majestic Copper Mining & Smelting Co. were exchanged for stock of the Majestic Mines Co., giving 900 shares of new stock for each \$1,000 bond.

The result of the reorganization has been as follows: all floating indebtedness of the operating company has been liquidated; \$868,500 of the \$1,000,000 outstanding bonds have been purchased and are now owned by the Majestic Mines Co.—practically 87%—which gives the Majestic Mines Co. control of the situation. Assessments of present company have been as follows: 15 cts. in 1908; 5 cts. in June, 1910; 10 cts. in April, 1911. Shares listed on Salt Lake Stock Exchange, Boston and New York curbs. Federal Trust Co., transfer agent; State Street Trust Co., registrar, Boston, Mass. Annual meeting, 3rd Tuesday in March.

Property: 120 claims, 2,450 acres, in 8 groups, also an 80-acre smelter site, and 800 acres miscellaneous lands. The groups, located in 5 different districts of Beaver county, are the O. K., Old Hickory, Harrington-Hickory, Vicksburg, Hoosier Boy, Southern States, Larkspur, Copperfield and Treasurer, said to have about 100 orebodies, carrying copper, gold, silver, platinum, lead, cobalt, bismuth, vanadium and uranium. The company has platted the town site of Lewisville, where the smelter was located, and the property is served by the S. P., L. A. & S. L. R. R.

Development: claims are under active development, 1916; there are 18 shafts, 100 to 600' deep, with a total of 6 miles of underground workings. The Old Hickory and O. K. mines yield copper ores, the others silver-lead ores.

The principal work of the present company is on the Old Hickory group of 9 claims, from which shipments are being made at the rate of about 33 tons ore daily. Smelter returns on this ore are given as 3.46% copper, 1.7 oz. silver and 39.7% iron.

The **O. K. mine**, 7 claims, formerly the principal producer, has a 500' three-compartment shaft, with a vein up to 20' in width, development being mainly on the 300' and 400' levels. This mine has over 500,000 tons of low-grade ore blocked out, in what apparently is a stockwerk, up to 250' in width, carrying stringers of high-grade ore. The O. K. mine was idle 1915, but will be under lease in 1916.

The **Harrington-Hickory** group of 27 claims, partly fractional, shows numerous fissure veins, intersected by cross veins, both approximately vertical, and, in addition, has a series of bedded veins, presumably following bedding planes, dipping at 30 to 35°, giving 3 separate intersecting systems of orebodies. Development is by a 600' two-compartment vertical main working shaft, with drifts on the 500' level, where there is a body of high-grade ore, assays from which have given 1% copper, 37 to 55% lead, 18 to 22 oz. silver, and about \$1 gold per ton.

The **Vicksburg** group of 4 claims, a lead-silver mine, formerly worked for gold, has 3 practically vertical fissures, of 2 to 20' width, with mineralized cross-fissures, developed by a 200' 2-compartment working shaft, a 150' incline shaft and numerous shallow shafts and pits. It is said that high-grade ore has been encountered at a depth of 150' in this mine. Worked by lessee and 20% royalty paid to company on gross proceeds.

The **Hoosier Boy**, a silver-lead mine, about 3 miles from the Horn Silver mine, is now under development.

Equipment: includes 6 gasoline and 1 steam hoist. Electric power, for lighting and pumping, is taken from the Beaver River Power Co.

Mines closed down from Aug., 1914, to May, 1915, but operations now being pushed rapidly.

MAJOR EVANS MINING CO.**UTAH**

Office: 440 Boston Bldg., Salt Lake City, Utah. C. B. Felt, pres.; R. Leo Bird, sec. **Inc.** 1915 in Utah. **Cap.**, \$100,000; shares 10c par; assessable; treasury, 440,000 shares. Listed in Salt Lake City.

Property: 42 claims in American Fork mining district, said to show copper-lead-silver ore. Is a prospect.

MAJOR MINING & MILLING CO.**ARIZONA**

Absorbed 1916 by Sheldon Mng. Co.

Fred Bowler, Phoenix, Ariz., supt. In 1915 company acquired the Eureka mine, Walker district, also several groups of claims, including the Sheldon group, and leased the 20-stamp mill and 8,000' tunnel of the Poland Mining Co., connecting the Big Bug and Lynx Creek basins. Company planned to do extensive development work and at last accounts had made several shipments of gold-silver ore.

MALONEY-BLUE LEAD COPPER MG. & SM. CO. SOUTH DAKOTA

Sheridan, Pennington Co., S. D. Company out of funds, and property idle. Claims show copper ore in limited amount, but property is believed to be without merit as a copper producer, despite extensive workings. See Vol. XI, Copper Handbook. Letters neither answered nor returned.

MAMMOTH COLLINS MINE.**ARIZONA**

c/o Young Bros., Shultz, Arizona. See Great Western Copper Co.

MAMMOTH CONS. MINING CO.**CALIFORNIA**

Office: 312 Sellwood Bldg., Duluth, Minn. Mine near Bakersfield, Hamilton Co., Calif. **Officers:** R. P. Burgan, Pittsburgh, Pa., pres.; J. W. Norton, Duluth, v. p.; Wm. D. Underhill, treas.; preceding, with B. Silberstein and A. F. Becker, directors; H. E. Grieser, sec.; Frank Enzensperger, supt. and purch. agt. **Inc.** June 9, 1910, in Minn. **Cap.**, \$800,000; shares \$1 par; nonassessable; 465,000 issued. Annual meeting, 2nd Tuesday in January.

Property: 22 claims, 100 acres, 20 miles from the railroad, is said to show silver-gold ore in quartz. Undeveloped in 1913, but planned driving tunnel to reach orebody. Letters neither answered nor returned, 1916. Property not favorably regarded.

MAMMOTH COPPER MINING CO.**UTAH**

Office: 219 Judge Bldg., Salt Lake City, Utah. Edward Bardsley, pres.; B. D. Lyon, sec.-treas. **Inc.** in Utah. **Cap.**, \$10,000; issued, \$6,000; shares 1 ct. par; assessable. Listed in Salt Lake City. Owns 240 acres in Millard Co., 15 miles from Milford, said to show a vein of copper ore in monzonite. Development is surficial only, and property is a prospect.

MAMMOTH COPPER MINING CO. OF MAINE.**CALIFORNIA**

Is a subsidiary of the U. S. Smelting, Ref. & Mng. Co., 55 State St., Boston, Mass. Mine office: Kennett, Shasta Co., Calif. A. P. Anderson, gen. mgr.; C. W. Metcalfe, mgr.; R. E. Hanley, supt., Mammoth mine; J. H. Kervin, supt., Mammoth smelter; D. G. Stuart, cashier.

Inc. Aug. 2, 1904, in Me. **Cap.**, \$2,500,000; shares \$25 par; 60,000 issued, all owned by U. S. S. R. & M. Co.

Property: the Mammoth group which is the principal property, comprises 1,117 acres, patented, and 434 acres, unpatented, 3 miles N. W. of Kennett, on the Shasta route of the S. P. R. R. The orebodies consist of a series of long, flat lying lenses, occurring irregularly in a rhyolitic zone of pre-Devonian age, ore occurring mainly as replacements of porphyry in fissure and shear zones. Occasionally quartz phenocrysts are distinguishable, but usually little or no trace remains of the original rock. Ore as mined averages 4% copper and \$2 in gold and silver.

Development: consists of 5 tunnels, No. 5, the lowest serving as haulage tunnel. It is 10' wide, 8' high and supplied with 3' gauge track, 56-lb.

rail and electric haulage. The current production of 2,500 to 4,000 tons of ore daily comes from between the 600 and 2,100' levels, the 600 yielding a few cars of 17% ore each month.

Equipment: compressor plant with 4,960 cu. ft. capacity per min., supplies air for drills and two 175-h. p. motor generators supply electric motors with direct current. There is a full surface equipment and quarters for 600 men. Precipitating tanks are located below the tunnel to catch mine water and recover from it its contained copper in the shape of copper cement which is reduced at company's smelter into blister copper.

Production: was 251,907 tons copper and 44,766 tons zinc ore in 1915. Mining costs averaged \$1.56 per ton and exploration and development costs \$0.59 per ton.

In addition to the Mammoth mine proper, the company owns the following properties:

Friday Lowden group: 150 acres patented, 188 acres, unpatented, adjoining the Mammoth on the south, was acquired in 1915. Crosscut tunnel being driven is expected to cut the Mammoth ore zone 400' below No. 5 tunnel at 4,000' in. Was 1,500' long, May, 1916.

Spread Eagle group: 22 claims, 163 acres unpatented, 15 miles S. W. of Kennett, was bought in 1913. Shows large bodies of pyrite carrying low copper values. Exploration work being carried on and although no ore has yet been found, indications said to be favorable.

Stowell group: 10 claims, 188 acres, 128 patented, $\frac{1}{2}$ mile W. of the Spread Eagle group, was bought in 1916 was \$78,000. Exploration work has yielded a reserve of 48,100 tons of 3.71% copper ore carrying \$1.50 in gold and silver per ton. Transportation facilities will be provided and ore shipped to the smelter at Kennett.

Sheridan group: 45.7 acres, patented, belonging to the Balaklala Central Mng. Co., in which the Mammoth Co. owns 60% interest, is undeveloped, though surface indications are favorable.

Anderson group: 15 claims, 260 acres, unpatented, 4 miles N. of Kennett, was located 1914. Group covers an ore bearing zone and is being prospected. No ore of commercial grade has yet been found.

Butters section: 2,719 acres, patented, 2 miles N. of Kennett, in the Shasta county. copper belt, adjoins the Mammoth and Anderson groups. Is being prospected.

Little Mammoth group: 57 acres, patented, in the Old Diggins mining district, Shasta county, 6 miles N. of Redding and 6 miles S. of Kennett, was acquired to supply silicious ore for the Kennett smelter. Mine was formerly producer of gold bearing quartz, but ore now in sight is too low-grade to pay. Idle.

Buchanan Mine: 57 acres, patented, 7 miles from Raymond, Madera county, Calif., purchased 1909, contained a small vein of ore running high in copper, gold and silver. Ore was extracted and shipped and mine closed down.

Company also owns 195 acres, patented smelter site, $\frac{1}{2}$ mile N. of Kennett; 184 acres, patented town site and 657 acres additional tracts.

The Mammoth Co. also owns the Taylor iron mine, 14 miles from Nevada City, Nevada Co., Calif., comprising mineral rights to the Robinson and Sanford ranches. Orebody estimated to contain 188,047 tons of 1.65% copper ore carrying small gold-silver values and 47% sulphur. Ore is a heavy iron pyrite, low in silica, valuable for sulphuric acid manufacture. Property lacks railroad facilities.

The Mammoth Copper Mining Co. owns and operates a copper smelter at Kennett. The plant has 5 furnaces, 3 of which are in operation. The

plant has a capacity of 450,000 tons of charge per year. The smelter is equipped with a converter plant from which the blister copper is shipped to the refinery of the United States Metals Refining Co. at Chrome. Besides drills, etc., with complete electrical equipment.

the usual auxiliaries, the smelter is supplied with a large baghouse, the purpose of which is to render the emissions of the smelter harmless to agricultural interests. By reason of this baghouse it is the only one of the smelters in Shasta county which is permitted to operate; such permission having been obtained by a decree of the United States Court. As a by-product of the baghouse a fine dust is obtained which carries high values in various metals, and steps are being taken to recover the values, which it is expected will add materially to the revenues of the company. The smelter treats the whole output of the operating mines and is easily accessible from any of the mining territory in Shasta county which the company is exploring. The smelter is also treating custom copper ores originating in northern California and silicious ore from California, Nevada and Oregon. There are frequently found in the Mammoth group of mines copper bearing ore bodies that carry high percentages of zinc. The smelter is equipped with a sorting plant for these ores which turns out a high-grade zinc product. The smelter is equipped with a power plant, machine shop, boiler shops, round house, etc., to allow an uninterrupted and economical operation.

The ore is brought from the Mammoth Mines to the smelter by the company's system of transportation operating in 3 sections: 1st. It is drawn from the mine chutes into narrow gauge railroad cars and taken over a 2-mile electric railroad, equipped with two 25-ton locomotives, six 25-ton gondola cars and nine 10-ton flat cars, to a set of ore-bins. 2nd. From these bins the ore is taken down a steep inclined gravity railroad in skips to another set of bins. The gravity railroad has a length of 4,000' and a drop in this distance of 1,700'. The skips have a capacity of over 23 tons of ore and travel at a speed of 2,000' a minute. 3rd. From these lower bins the ore is taken to the smelter over a steam railroad operated with three 40-ton locomotives and 22 standard steel railroad cars. The capacity of the transportation system is ample for 1,500 tons of ore per day.

An electrolytic zinc plant to cost \$350,000 is to be built on Backbone creek a mile above the smelter, using same process as that in operation at Winthrop by the Bully Hill Copper Co. The new plant has 25,000 tons of baghouse dust to start with, that carries 23% zinc beside gold, silver, cadmium, bismuth and antimony.

Company employs about 1,200 men and the new construction work will require 50 more.

MAMMOTH MINING CO.

UTAH

Office: 409 Hooper Bldg., Salt Lake City, Utah. **Mine office:** Mammoth, Juab Co., Utah. **Officers:** Samuel McIntyre, pres. and gen. mgr.; Samuel McIntyre, Jr., v. p. and supt.; Col. R. M. Wilkinson, sec. **Inc.** 1881, in Utah. **Cap.,** \$10,000,000; shares \$25 par. Reincorporated Dec. 5, 1906, in Nevada. **Cap.,** \$1,000,000; shares \$2.50 par. Controls the Cleveland Mining Co., through ownership of 70% of capital stock.

Dividends: to end of 1915 were \$2,340,000, last one of 5c declared May, 1916. As a result of 9 years' litigation, a judgment in favor of the Grand Central Mining Co. was rendered, 1910, against the Mammoth Mining Co., and necessitated the levying of a 10c assessment, 1910, the first in the history of the company. Annual meeting, first Tuesday in February.

Property: 19 claims, in Tintic district. Mine opened about 1870, is developed extensively and has a 2,300' main shaft, the deepest in the Tintic

camp. Irregular shoots and chimneys of lead and copper ores occur, values being mainly in silver and lead.

Equipment: includes complete plant, installed 1910, 30-stamp mill and all necessary buildings. Produced about 20,000 tons, 1915. Shipping tailings from old dumps, 1916. Mine considered valuable.

MAMMOTH NO. 2 MINING & MILLING CO.

UTAH

Office: 409 Hooper Bldg., Salt Lake City, Utah. Mine at Mammoth, Juab Co., Utah. **Officers:** Wm. H. McIntyre, pres.; Samuel McIntyre, v. p. and treas.; Isaac Jennings, sec. **Inc.** 1900, in Utah. **Cap.**, \$300,000; shares \$1 par. assessable; fully issued. **Property:** 2 claims, patented, adjoining the Mammoth Mining Co., shows lead and copper ores. Idle several years.

MANGAS DEVELOPMENT CO.

NEW MEXICO

Office: Silver City, N. M. **Mine office:** Tyrone, Grant Co., N. M. **Officers:** Hon. Norman W. Haire, pres. and gen. mgr.; Jos. E. Saint, v. p.; M. W. Porterfield, sec. **Inc.** Oct. 2, 1909, in New Mexico. **Cap.**, \$500,000; shares \$5 par, of which 50,000 shares were issued, fully paid, in part payment for property, and 50,000 shares, half paid, rendered full paid by a \$2.50 assessment, levied 1910. First National Bank, Calumet, registrar. Annual meeting, second Tuesday in March.

All options have been surrendered and company owns only the Porterfield-Robinson and Midway Groups, which lie near the Chemung and Savanna mines, on the N. E. slope of the Burro mountains, 12 miles S. W. of Silver City.

The Porterfield-Robinson group of 22 claims, 353 acres, lies near the extreme S. W. edge of the favorable area of the district, the northern part being the more promising, showing iron stains, with some copper stains, and slip zones.

The Midway group of 15 claims, 10 fractional, 254 acres, carries the N. W. continuation of the ore zone of the Chemung Copper Co., and also lies near the Burro Mountain mine, with conditions markedly similar to those existing on these adjoining properties, on which large quantities of ore have been developed.

The orebodies are a combination of stockwerk and impregnation deposits, carrying values mainly along a series of small intersecting veinlets, with occasional masses of solid chalcopyrite up to several inches in size, but ore occurring mainly as minute particles of chalcocite, in veinlets, and as films on gangue rock. See Geology of the Burro Mts. Copper District by R. E. Somers, Bull. Am. Inst. Min. Eng., May, 1915, p. 957.

MANHATTAN BIG FOUR MINING CO.

NEVADA

Harry B. Ruhl, sec., Goldfield, Nev. L. K. Koontz, pres.; J. H. Thatcher, v. p.; C. Wilson, treas., with W. G. Saunders, directors. **Inc.** 1906, in Nevada. **Cap.**, \$1,000,000; outstanding, \$784,000; shares \$1 par. Listed on San Francisco Stock Exchange.

Property: 60 patented claims at Manhattan, Nye Co., Nev. **Development:** to 500' level by shafts. High-grade ore was extracted by early lessees and the ore remaining is exceedingly low-grade. About the only way to treat it profitably would be to mine the entire Big Four hill by steam shovels and even this method is uncertain. At last accounts Mushett and Wittenberg were trying to find the extension of the high-grade orebody.

Owens 100-ton mill, closed down 1913.

MANHATTAN COPPER MINING & MILLING CO.

NEVADA

Pioche, Lincoln Co., Nev. Company succeeded the Manhattan Gold & Copper Mining Co. and is owned by the Cons. Nevada-Utah Corporation, successor of the Nevada-Utah Mines & Smelters Corporation.

Property: 7 claims, one in the Ely mining district, developed by 120' shaft, showing manganese, iron, silver, lead ore. The other 6 claims are at Stampede Gap in the Highland district of Pioche and show small veins of silver-lead and copper ore. Developed by 130' shaft.

MANHATTAN DEVELOPMENT CO.**ARIZONA-MEXICO**

Office: Postoffice Blk., Houghton, Mich. A. O. Koppes, supt.; J. H. Rice, pres.; W. G. Rice, sec.-treas. Inc. March, 1905, in Arizona. **Cap.**, \$200,000; shares \$10 par; \$5.50 paid in.

Property: 37 claims, 600 acres, owned in fee, in the California district, near Paradise, Cochise Co., Ariz., carries upwards of 2 miles of the outcrop of a mineralized zone lying W. and N. of the holdings of the Chiracahua Development Co. **Development:** by several shallow shafts, deepest 80', and a 450' crosscut tunnel, latter showing leached ore and a little high-grade ore, with indications of permanent values at greater depth.

In 1913, company purchased the Arnold Mining Co. property, near Santa Cruz, Sonora, for \$88,000. This property is developed by a 300' shaft and has shipped 12% ore to the Camanea smelter. The company's previous operations have been mainly in the Yaqui region of Sonora.

MANHATTAN DEXTER MINING CO.**NEVADA**

Manhattan, Nev. **Officers:** A. G. Raycraft, pres.; C. F. W. Henberg, v. p.; Percival Nash, sec.-treas. Inc. in South Dakota. **Cap.**, \$1,500,000; shares \$1 par. Stock listed on San Francisco Exchange. **Property:** 1 patented claim, at Manhattan, Nye Co., Nev., operated intermittently by lessees in 1915-16.

MANHATTAN EXPLORATION CO.**MEXICO**

Office: 52 Broadway, New York. Mine at Hermosillo, Sonora, Mex. **Officers:** John M. Bishop, pres., Washington, D. C.; A. H. McCarthy, v. p.; T. Addison Bell, sec.-treas.; preceding with Gen. Jas. S. Clarkston and Wm. Tierney, directors. Inc. Feb. 6, 1909, in Maine. **Cap.**, \$2,000,000 shares \$100 par; \$1,806,000 outstanding. Company is a close corporation.

Property: 18 titled properties near La Dura in the Yaqui River district, central Sonora. Two of the properties, the Promontorios, silver-lead and the Mesita, copper-silver-lead ore, had just reached the shipping stage when the Mexican revolution stopped all operations, May, 1912. Company expects to resume operations as soon as country is once more safe.

MANHATTAN MINE.**NEW MEXICO**

Operated by R. J. Doyle and associates. **Property:** 10 patented claims, 200 acres, near Pinos Altos, Grant Co., N. Mex. **Ore:** containing gold, silver and copper, occurs in a fissure vein in diorite-porphry, 18" to 5' wide, strike N. 15° E.; dip almost vertical. Average assay said to be \$20 per ton. **Development:** 900' tunnel and 200' shaft below tunnel level. Claims to have shipped 1,200 tons of \$20 ore in 1915 and to have received \$26,000 from ore sales.

Preliminary development was undertaken by churn drills, with holes put down at 200' intervals. Drilling was suspended, 1910, but in 1911 an exploratory shaft was started on the eastern side of the Tulloch group, in high-grade carbonate ore, and reached sulphides at comparatively shallow depth. The Midway group when taken over, had 2 shallow shafts and a few pits, showing a little carbonate and silicate ore on the dumps.

Insufficient funds limited company's development plans, but management is good and property has a fair chance of developing into a large mine. Reorganization being planned, 1916.

MANILA MINING & MILLING CO.**WASHINGTON**

Keller, Ferry Co., Wash. **Property:** the Manila mine, 4 claims, with 20-acre reservoir and mill site, well timbered, in the San Poil district, 7

miles from the Columbia river and 4 miles W. of Ferry, the nearest rail station. The Manila mine is on the summit of a mountain and shows a large deposit of disseminated chalcopyrite ore, traceable 1,000'.

Development: by tunnels, the oldest 100' below the apex, another 150' lower. Said to be diamond drilling, 1916. Mine was under option for \$60,000 to the Keller Indiana Co., now bankrupt, which put up a smelter in 1906, but failed to develop mine and property supposedly reverted to Farr Bros. Has 20,000' saw mill.

MANITOU HILL COPPER CO.

ARIZONA

Office: care W. H. Brown, sec., 110 S. Third St., St. Joseph, Mo. **Mine office:** Globe, Gila Co., Ariz. **A. T. Hammons,** pres. and mgr. **Inc.** 1911. **Cap.,** \$1,250,000; shares \$1 par. Company is a reorganization of the Pinto Creek Mining & Smelting Co., and by consolidation later acquired the property of the Five Points Copper Mining Co.

Property: 70 claims, at the head of Pinto creek, about 10 miles S. W. of Miami, shows pre-Cambrian schists cut by granite and granite porphyry. Ore is low-grade.

The Pinto Creek group is developed by the 570' Yo Tambien shaft, showing a fair body of sulphide ore, the 70' Manitou shaft, and 8 tunnels, longest 2,200', with upwards of a mile of workings.

The Five Points group, some distance down the valley, is developed by the 150' Solace incline shaft, and the 350' Crackerjim shaft, sunk 1,500' apart. Property shows malachite near surface with some chalcocite at shallow depth.

Equipment: includes small steam plant and hoist at the Five Points mine, 6-h. p. gasoline hoist, 6-drill air compressor, and 250-ton concentrator at the Pinto Creek mine. Assessment work done, 1914. Company endeavoring to raise \$25,000 for sinking shaft to prove ore in commercial quantities.

MANSFIELD MINING & SMELTING CO.

ARIZONA

Office: 303 Midland Bldg., Kansas City, Mo. **Mine office.** Patagonia, Santa Cruz Co., Ariz. **Officers:** Frank D. Reasor, pres.; H. A. Sutermeister, v. p.; C. E. Sweet, sec.; Chas. L. Cookson, treas.; preceded with Harry J. Richards, A. W. Safford, and A. E. White, directors.

Inc. May 26, 1906, in Arizona. **Cap.,** \$8,000,000; shares \$1 par, nonassessable; issued \$7,156,905. Bonds, \$100,000 authorized, at 6%, all outstanding. Annual meeting second Monday in January. Company owns no mining property, but in the reorganization proceedings, 1914, acquired stock interests in the Ruby Copper Co. and Southern Arizona Mining Co. See Vols. VIII and XI, Copper Handbook, for early history.

MARBLE BAY MINE.

BRITISH COLUMBIA

Owned by Tacoma Steel Co.

MARIA MINING CO.

MEXICO

Office: 516 Providence Bldg., Duluth, Minn. **Officers:** Joseph Backno, pres., Virginia, Minn.; Jas. A. Butchart, sec.-treas., with Thos. F. Brady, Martin Trewhella, and Thos. A. Armstrong, directors. **Cap.,** \$500,000; shares \$1 par.

Property: the Carmen mine, in Arizpe mining district, Sonora. **Ore:** silver, gold, in veins in andesite and rhyolite. **Development:** by shaft; greatest depth 350', with 3,000' of underground workings. Has been idle since the revolution started, but reported March, 1916, that operations would be resumed.

MARICOPA MINES CO.

ARIZONA & NEVADA

Office: B. of L. E. Bldg., Cleveland, Ohio. **Earl G. Hill,** agt., Austin,

Nev. **Mine offices:** Morrystown, Maricopa Co., Ariz., and Austin, Lander Co., Nev. In process of reorganization, March, 1916.

Property: 33 claims, 611 acres, along the north contact of the Austin mineral belt. Principal property, 17 claims, at Austin, Nevada, shows four fissure veins in quartzite, ranging from 3' to 20' in width, traceable 1,400', and said to carry average values of about 4% copper, 50 oz. silver and \$2.80 gold per ton.

Development: by 4 shafts, deepest 800', and 5 tunnels, 2 longest being 2,000' and 830', with total underground openings of about 12,000'.

The Prosperity group, 16 claims, in the Wickenburg district, Arizona, shows granite and limestone, the ore occurring in fissure veins in porphyry. There are 6 known veins of 8 to 30' average widths, developed by numerous shafts, with about 1,800' of workings. Ore is mainly chalcocite, claimed by the management to carry average values of 9% copper, 11 oz. silver and \$11 gold.

Equipment: includes 2 small steam hoists and an air compressor at the Arizona property and a 75-h. p. gasoline hoist, 2 air compressors, machine shop, and necessary mine buildings on the Nevada property.

The 100-ton concentrator, in New York canyon, near Austin, has a Blake crusher, 2 rolls, 9 Card tables, 6 slime tables and a small cyanide plant.

New management reported to plan extensive work at Austin, extending main tunnel eastward toward Patriot, a crosscut tunnel 450' to cut three veins, and a drift on the Patriot in virgin territory. Sixteen men will be employed.

MARIE MINING CO.

ARIZONA

Breckenridge, Colo. Is a reorganization of the O'Reilly Gold Mining Co. Inc. 1915, in Arizona. **Cap.**, \$1,500,000. Owned by Haverhill, Mass., capitalists. **Property:** 51 acres on North Star Mtn., 10 miles S. of Breckenridge, Colo., said to show Witch Hazel and other veins of gold ore. **Development:** by 763' adit, expected to cut vein at 1,100', at depth of 1,000' below apex.

MARION MINES & MILLS CO.

COLORADO

Office: 850 Equitable Bldg., Denver, Colo. **Mine office:** Rye, Colo. **Officers:** Henry E. McElwain, pres.; John H. McElwain, v. p.; Jos. Gredlartz, sec.-treas.; preceding with John S. McElwain, Frank H. Bulkley and Clarence A. Brandenburg, Denver, directors. **Cap.**, \$300,000, increased from \$200,000, fully paid by \$100,005 cash, balance in property. Outstanding debts, Feb., 1916, \$96,262.

Property: the Greenhorn group, 19 claims, includes the Sam Davis claim, 10 acres, patented, 154 acres held by location, 11 acres under lease and bond and 7 acres mill site, a total of 185 acres mineral land in the Hardscrabble district, Custer county, Colo.

Development: by tunnel showing a vein of zinciferous copper and lead ore with small gold and silver values. Has water power, compressor and 100-ton concentrating mill. Erected a 100-ton flotation plant to treat tailings, 1915. Is a small producer.

MARIPOSA COMMERCIAL & MINING CO.

CALIFORNIA

Office: Alaska Commercial Bldg., San Francisco, Calif. Owns several mining properties near Mariposa, Mariposa Co., Calif.

The Green Gulch quartz mine, 1 patented claim, in Secs. 12 and 13, on the Mariposa Grant, 12 miles from Bagby; shows a 3' vein in slate. **Ore:** gold. **Development:** 300' shaft, and 550' tunnel, total underground workings about 2,500'. Equipped with hoist and compressor. At last accounts was being worked by lessees.

The Guadalupe quartz mine, Sec. 32, Mariposa Grant, 17 miles from Bagby, shows an 18" vein in granite; worked by lessees.

The Mariposa quartz mine, 1 patented claim, in Sec. 23, 16 miles from Bagby, formerly a large producer, is idle. In 1914 a roasting furnace and cyanide plant was being built to treat concentrates at the mine.

In Dec., 1915, suit was brought against the company by G. W. Langan for \$1,500,000, involving title to Mt. Bullion property, the Mariposa mine, and the town site of Ophir, alleging that company failed to fulfill contract to sell the properties after agreements to this effect had been arranged and the first payment made.

MARJORIE-STEWART MINING CO.

MISSOURI

Plater Bros., Joplin, Mo., owners. **Property:** a 20-acre lease on Raymond land at Porto Rico, Jasper Co., Mo. **Ore:** lead, zinc, in sheet ground formation at a depth of 165', assays 3 to 4% zinc. **Equipment:** includes 250-ton mill, completed 1915. At end of 1915 the property was producing steadily.

MARS CONSOLIDATED CO.

ARIZONA

Address: care F. J. Webber, Colorado Springs, Colo. Company is the successor of the Heckley Gold & Copper Mining Co. **Property:** 13 claims, in 3 groups, on Copper hill, in the Black Rock district, 6 miles N. E. of Wickenburg, Maricopa Co., Arizona, shows 3 veins of 6', 10' and 25' claimed average width, developed by a 268' tunnel, said to carry ore assaying up to 28% copper. Letters unanswered. Probably idle.

MARSH MINES CONS. CO.

IDAHO

Reorganized July, 1916, as Marsh Mines Consolidated Co. All stock will be exchanged for stock of the new company share for share. In addition, for each three shares of Marsh, a stockholder may subscribe for one share of new stock at 15c a share. One of the chief reasons given by the Board for shutting down the mines was that litigation with the Federal Mining & Smelting Co. threatened. The latter company owns mining properties to the south and west of Marsh, and at the time the mine was shut down and for some time previous, Marsh had been mining certain orebodies which extended underneath the surface of the Federal Mining & Smelting Co. ground. Marsh contends that it is the rightful owner of these orebodies under the apex laws. The operations were at a depth of 900' below the main tunnel level and approximately 1,300' below the surface. An exact examination of the rights of the Marsh Co. under these conditions cannot be determined without a great deal of exploration work and survey. The Federal Co. threatened Marsh with an injunction and with a suit for damages for removing the ore. This controversy has been settled. Since the annual meeting the following results have been accomplished by the new trustees:

1. Of the \$28,000 indebtedness outstanding on June 1st, \$20,000 have been placed with Duluth interests friendly to the company and will be carried until July, 1917, on the payment of interest only.

2. Under the agreement with the Federal Mining & Smelting Co., Marsh is given a lease for a period of 10 years on the Mono, Russell and O'Neil mining claims of the Tiger-Poorman group, which include the vein in controversy. This agreement provides for a complete settlement of all claims for alleged trespass.

3. Marsh is the owner of 75% of the capital stock of the Green Mountain Mining Co., the owner of 5 lode mining claims, all patented and adjoining Marsh ground. Negotiations to have these claims deeded to the Marsh Co. and the outstanding 25% stock interest delivered in exchange for treasury stock of the new company are pending.

4 Exploration work on the "Got-em-now" vein, exposed in the Gertie tunnel, which traverses the Marsh property, has been commenced. This vein was cut 512' from the portal of the Gertie tunnel and at a depth of 350' to 400' from the surface. It is a promising fissure vein. In the event that ore is encountered, it can be quickly mined by utilizing the present working shaft of Marsh now 900' deep and splendidly equipped to handle a large output.

Office: 601 Empire State Bldg., Spokane, Wash. **Mine office:** Wallace, Idaho. **Officers:** W. M. Lee, pres.; Edw. Pohlman, v. p.; W. T. Smith, treas.; Jos. McCarthy, sec.; W. Earl Greenough, mgr.; preceding are the directors. Is the successor of Marsh Mining Co., which was inc. 1909 in Washington. **Cap.**, \$1,500,000, increased to \$2,000,000 at time of reorganization in June, 1916; shares \$1 par. Stock of the old company convertible share for share for stock in the new company, and the unissued capital, 550,000 shares, offered for subscription. Company owns 310,000 shares **Queen Mountain Mining Co.** stock, controlling the company. Annual meeting June 13. Stock listed on Spokane Exchange and New York Curb. Assessments 1911-1915 aggregate \$150,000. Ore receipts \$507,977; 30,000 shares treasury stock sold 1916 at 30c. Deficit Jan. 1, 1916, \$75,332, reduced March 1, 1916, to \$32,000.

Property: 7 claims, about 100 acres in O'Neil gulch, N. E. of Burke and adjoining the Tiger Poorman mines. Claims show simple fissure veins in quartzite. The vein is 2' wide in the upper 175' tunnel, averaging 5' on the 5th level. It carries silver-lead ore with zinc in shoots, the orebody thus far developed being 300' long and 4½' wide. The shoot is short, limited by a fault, and must be developed in depth to get tonnage.

Development: includes a main working tunnel and 940' shaft with levels at 399, 550, 687 and 904'. Tunnel cuts the vein at 625' and a drift follows it for 475'. The vein runs north 70° west and dips 78° south. According to late reports, the ore on the 900' level is 200' long and contains but 75% as much ore per foot as level above, showing 1,300 sq. ft. stoping area averaging 4.3% lead, 4.3% zinc and 2.9 oz. silver per ton.

Equipment: includes 1,150' Ingersoll-Rand and 690' Franklin compressors, 300-h. p. Nordberg electric hoist, 40-h. p. Lidgerwood and two Ottumwa hoists, Gould and Cameron pumps, Ingersoll, Waugh & Wood drills, etc., with complete electrical equipment.

Company leases and operates the California or Pittsburg mill in Nine Mile canyon, 2½ miles from Wallace. Freight on Northern Pacific costs 15c a ton. The mill, remodeled at cost of \$34,000 in 1915, handles 150 to 225 tons daily, saving 90% of the lead and 85% of the silver. It contains 2 sets of 14"x30" rolls, 7"x10' tube mill, trommel lines, 4 Wood screens, 7 new concentrating tables, Pachuca agitator, Callow flotation cells, two 24"x10' Dorr thickeners, etc.

Ore is shipped to the International Smelting Co. at Tooele, Utah, under contract to April, 1917.

Production: 1914 was 2,931 tons ore and concentrates of \$61.01 gross value p. t. In 1915, 3,993 tons, averaging \$67.05 gross, or \$39.97 net value, smelter deductions being \$10.49 and freight and treatment charges \$20.59 per ton. Shipments averaged 44.83% lead and 23 oz. silver and realized 5.024c per lb. for lead and 50c per oz. for silver. Net returns from ore shipments have been as follows: 1911, \$30,313; 1912, \$114,648; 1913, \$139,429; 1914, \$81,944; 1915, \$143,640. The Marsh mine and mill were closed down about June 1 after operating a little more than 4 months in 1916, and producing 17,828 tons ore, which yielded 1,699 tons concentrates; net smelter returns said to be \$96,399.

The poor showing and pessimistic outlook of the manager's report is

probably due to disappointment over the showing on the 900' or 6th level. As expenditures of \$122,348 for capital account made in 1914-15 balanced ore sales, the property has really done fairly well, and if the orebody extends downward the mine will be profitable from now on.

MARSHALL & RUSSELL GOLD M. M. & T. CO. COLORADO

Idle. Office: 347 West Broad St., Columbus, Ohio. **Mine office:** Empire, Clear Creek Co., Colo. W. A. Miller, pres.; O. N. Marihugh, sec. and gen. mgr., at last accounts. **Inc. May, 1901, in Colorado. Cap., \$8,000,000; shares \$1 par, nonassessable; issued, \$7,000,000.**

Property: reported as 120 claims, with a 50-acre mill site. **Development:** by a 5,300' tunnel, planned to be driven for 12,000', piercing Miller, Covode and Red Elephant mountains. The tunnel shows veins with auriferous and argentiferous copper ores. **Equipment:** includes water power and 300-ton ore bins.

Property leased by directors for 100 years, but validity of lease is being questioned by some of the stockholders; legal proceedings were instituted in 1914.

MARY McKINNEY MINING COMPANY. COLORADO

Address: Colorado Springs and Cripple Creek, Colo. **Officers:** Chas. Castello, pres.; Daniel Thatcher, v. p.; John L. Nichols, sec.-treas.; preceding with John T. Hawkins and W. H. Spurgeon, directors. Dave Buckles, supt., Anaconda, (Cripple Creek) Colo.

Inc. 1892, in Colo., renewed March, 1912. Cap., \$1,500,000; shares \$1 par; outstanding February, 1916, \$1,309,252. Transfer office: 306 Exchange Bank Bldg., Colorado Springs. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, second Monday in February. Listed on Colorado Springs Exchange.

Treasurer's statement for 1915 shows: receipts practically all from ore sales, \$261,102; expenses and treatment charges, \$233,585; net income, \$27,517; compared with \$56,334 in 1914 and \$116,956 in 1912. Cash on hand end of 1915, \$92,132. All taxes paid and no liabilities. **Dividends:** to 1916, \$1,169,306; last dividend paid July 25, 1914, \$26,185.

Property: several claims, 144 acres patented, on west slope of Raven Hill, at Cripple Creek. First claim was discovered in 1891. In 1906, the property of the Anaconda Gold Mining Co. was purchased. **Ore;** gold, in LeClair and Mary McKinney quartz veins in phonolite. Ores carry tellurides in flourite, quartz and altered wall rock. (For geology of the Cripple Creek district, see U. S. G. S., Prof. Paper No. 54.)

Development: shafts to the 1,100' level; shaft being sunk to the 12th level. Total underground workings, about 13 miles. In 1915, 4,939' of new work was done, compared with 3,949' in 1914. Reported in May, 1916, to have cut an ore shoot on the 12th level, supposed to be the extension of the one cut on the 11th level in 1915.

Equipment: includes two plants, one with steam hoist, the other with 100-h. p. electric hoist, 200-h. p. electric compressor, boiler plant, machine shop, etc.

Company employs 40 men. There is also considerable work done by lessees; in 1915, 37% of output was result of leasing operations.

Production: gross to end of 1915, was 8,375,942. Output in recent years has been: 8,245 tons of ore in 1914; gross value \$214,657; in 1915, 11,408 tons, gross value, \$258,530.

Property is well managed. While yearly net income has been on the wane the last few years, the prospects of opening new ore reserves on the lower levels look good. A new ore shoot was discovered July, 1916, on the deepest (12th) level south, where a 10" streak of \$250 ore was found.

MARY MURPHY GOLD MINING CO.**COLORADO**

Offices: 420 Boston Bldg., Denver, and Romley, Chaffee Co., Colo.
Officers: Chas. C. Parson, pres.; Geo. E. Collins, v. p. and gen. mgr.; H. W. Robinson, sec.; John W. Hudston, treas., with Louis F. Eppich, directors.
 C. H. Swanton, mine supt.; H. L. King, mill supt.

Inc. May 20, 1909, in Colorado. **Cap.**, \$1,850,000; shares \$5 par; Jan. 1, 1916, outstanding \$1,790,500. Bonds authorized \$350,000; outstanding \$227,000. Majority of stock and bonds are said to be held in England. Stock transferred at company's office. Continental Trust Co., Denver, registrar. Annual meeting second Monday in March.

Comparative general balance sheet, year ending Dec. 31.

Assets	1915	1914	Liabilities	1915	1914
Prop. & Equip.	\$2,007,223	\$2,037,069	Cap. stock....	\$1,850,000	\$1,850,000
Prepaid Ins....	28,401	20,851	Bonds.....	227,000	231,000
Current assets	255,943	61,067	Current Liabil.	38,157	32,403
			Reserves (a)..	110,544	.....
Total.....	\$2,291,567	\$2,118,987	Surplus.....	65,866	5,584
			Total.....	\$2,291,567	\$2,118,987

(a) for examination, purchase and development of new properties.

Comparative income statement, year ending Dec. 31.

	1915	1914	1913
Net smelter returns.....	\$640,149	\$398,520	\$395,757
Miscel. earnings.....	6,749	5,189	3,901
	\$646,898	\$403,709	\$399,658
Total expenses.....	365,702	353,821	327,230
Profit	\$281,196	\$ 49,888	\$ 72,428
Deprec., interest, discounts.....	60,781	28,784	70,043
Net credit to profit and loss.....	\$220,415	\$ 21,104	\$ 2,385

Dividends: two of 7c per share each, paid in 1915. There was set aside in 1915, \$95,000 for acquisition of new property.

History: the Mary Murphy mine, discovered 1874, was not extensively worked until acquired by a St. Louis company in 1880. The yearly output 1880-1885 averaged about \$300,000 net from ores sold to smelters. The gross value was about three times as much. One third of the gross value of the ore was received by the mine, the remaining two-thirds being absorbed by smelting and refining charges, and by railway freight.

The first mill was erected in about 1886. Subsequently the property was leased and operated with varying success until about 1906. The lessees built mills at Romley and St. Elmo, and a smelter at Buena Vista. All of these plants were destroyed or dismantled, and the mine practically abandoned in 1906.

In 1909 the Mary Murphy G. M. Co. was organized; in 1910 active development work was commenced, and sufficient new ore opened up to justify the erection of a mill in 1912.

Property: 42 claims, mostly patented, 350 acres in Chalk Creek district, Chaffee county. **Ore:** contains gold, zinc, lead, silver and copper, in order of value, in a complex network or system of nearly vertical fissure veins in quartz-monzonite; the Mary Murphy is the main vein. Veins vary in width from 6" to 12', and contain shoots and irregular lenses of ore. Average assay of milling ore: 0.2 oz. gold; 2.7 oz. silver; 4.4% lead; 7.9% zinc; 0.5% copper. Owing to the erratic occurrence of the orebodies no estimate of ore reserves is possible.

Development: by tunnels with a shaft connecting the tunnel levels; length of principal tunnels, No. 7, 750'; No. 14, 1,500'; Golf, 4,350'. Total

underground workings about 7 miles; greatest depth of workings, 1,975' vertical from surface. In 1915 new work totaled 7,248' at an average cost of \$7.22 per foot. Shrinkage stoping is used.

Equipment: includes small hoist, 3 air compressors, 2 aerial tramways, and 175-ton concentrating mill. Steam power is used.

In the mill wet concentration is used followed by flotation of slime, using General Naval Stores oil; there is a 25-ton electrostatic separation plant for the zinc-iron middlings.

Production: in 1913, 14,428 oz. gold; 2,233,037 lbs. zinc; 3,321,313 lbs. lead; 146,606 oz. silver; 152,000 lbs. copper. Figures for 1914 and 1915 are not available.

Recent costs have been:

	Tons			Tram-		
	Milled	Mng.	Mlg.	ways	Gen'l.	Total
1915.....	55,880	\$3.20	\$1.99	\$0.12	\$0.25	\$5.56
1914.....	48,526	3.08	1.96	0.13	0.21	5.38
1913.....	34,271	3.45	2.04	0.24	0.30	6.03

Note: mining costs are distributed over a slightly larger tonnage than tons milled.

The Mary Murphy mine has seen its best days. At the beginning of 1916 available ore was considered sufficient to keep the mill operating for 6 months or a year as the tonnage opened up in 1915 did not make up for amount extracted. In view of these conditions the company created a reserve fund, which in 1915 amounted to about one-half the net profit; to be expended in the acquisition of new mining property, with the object of prolonging the life of the company after the exhaustion of the Mary Murphy mine.

MARY NEVIN GOLD MINING COMPANY. COLORADO

Cripple Creek, Colorado. **Officers:** W. G. Danford, pres.; R. S. Ellison, v. p. and sec.; H. J. Gehm, treas. **Cap.,** \$1,500,000; shares \$1 par. In treasury, Jan. 1, 1916, 38,000 shares. Listed on Colorado Springs Stock Exchange.

Property: the Mary Nevin and Hibernia patented claims, 10 acres, on Rosebud Hill. **Development:** by a 385' shaft on the Hibernia claim and a 200' shaft on the Mary Nevin claim; some drifting has been done. **Property** is under lease and is being operated through the Henry Adney shaft.

MARYANA MINING & LEASING CO. COLORADO

Cripple Creek, Colorado. W. A. Matlock, mgr. Inc. in 1914. In 1915 company had a lease on the Mary McKinney mine from the 8th level down.

MARYSVILLE GOLD MINING CO. MONTANA

Marysville, Mont. Is a proposition fathered by M. L. Hewitt, of Helena, Mont., assisted by Maurice Eisenberg, backed by Seligman & Co., 61 Broadway, New York. **Property:** 30 claims, near Marysville, which will be developed through the Spokane tunnel. Is not favorably regarded.

MASCOT COPPER CO. ARIZONA

Office: Harris Trust Bldg., Chicago. **Mine offices:** Dos Cabezas, R. V. Dixon, A. J. Baldwin, J. A. Street, J. W. Phillips and H. H. Evans, directors. T. N. McCauley, mgr.; J. W. Prout, Jr., supt.

Inc. July, 1907, in Arizona. **Cap.,** \$15,000,000; shares \$10 par; nonassessable. Outstanding 1,000,000 shares.

Property: 48 claims, 20 patented, 1,100 acres, about 300 acres being classed as mineral lands, in the Dos Cabezas district. Company also owns a town site near Dos Cabezas, and miscellaneous lands, including 3 placer claims, total holdings over 1,100 acres.

Property shows limestone near a granitic area, intruded by diorite dikes and quartz porphyry with a covering of rhyolite, on part of the ground.

The limestone shows in the lower hills on the south. Granite constitutes the two pillars known as Dos Cabezos.

The ore occurs largely in lenses in contact deposits between altered lime and porphyry and generally within a mineralized zone of from 300' to 400' in width. Ores carry chalcopyrite in a gangue of contact minerals with 3 to 20% copper, the average being 5%, and small gold-silver values.

Development: by the 450' Oregon shaft, and 2 tunnels, longest the 1,800' Consolidated tunnel, connecting with the shaft at the 4th level. Total underground openings aggregate 25,000', and ore in sight is estimated at about 500,000 tons. About 20,000' of diamond drilling has been done in various parts of the property. **Ore reserves:** said to be 500,000 tons, averaging 5% copper.

Equipment: includes a 250-h. p. distillate engine, a 12-drill air compressor, machine shop, electric lighting plant, smithy, telephone system and boarding house, with about 80 buildings. About 125 men are employed. In June, 1915, the company finished building the Mascot & Western R. R., a 15-mile line connecting the town of Mascot with the S. Pac. R. R. at Wilcox, Arizona, and at last reports was making shipments to El Paso.

The mine management is good and property is reliably reported as promising, though the company's advertising was lurid and its campaign of stock selling was regarded unfavorably in past years.

MASCOT MINING CO.

ARIZONA

Last address: 1318 Majestic Bldg., Detroit, Mich. Company not favorably regarded. See Copper Handbook, Vol. XI, for full description of properties. Letters neither answered nor returned.

MASCOT MINING & MILLING CO.

IDAHO

Offices: 212 Brooks Arcade, Salt Lake City, Utah, and Hailey, Idaho. **Officers:** Chas. Peter, pres.; John W. Choate, v. p.; J. M. Stevens, v. c. treas.; M. Barnett, asst. sec.; with W. R. Calvert and Paul Valtinke, directors. A. Rammelmeyer, supt.

Inc. March 6, 1915, in Idaho. **Cap.**, \$1,000,000; shares \$1 par; outstanding \$650,000. Annual meeting 1st Monday after 1st Tuesday in Oct.

Property: 8 claims, 4 patented, 150 acres, at Peter, near Hailey, in Warm Springs Creek mining district, Blaine Co., Idaho, said to show gold, silver and lead ore. **Development:** 110' vertical shaft and 400' tunnel. Management states that development work will be pushed in 1916, and a hoist and mill added to the equipment.

MASCOTA COPPER CO.

MEXICO

Office: 513 Germania Life Bldg., St. Paul, Minn. **Mine office:** Ameca, Jalisco, Mex. **Officers:** Chris D. O'Brien, Sr., pres.; J. M. Bowler, v. p.; Byron J. Mosier, sec.-treas.; Chris. D. O'Brien Jr., gen. mgr., at last accounts. **Inc.** June, 1908, in Arizona, as successor of Independence Mining & Smelting Co. **Cap.**, \$1,500,000; shares \$1 par.

Lands: 46 hectares, said to include an antigua mine, in the Guachinango division of the Mascota district, 24 miles from the Mexican Central line. The claims show an 8' fissure vein in porphyry, said to be traceable about 2,000' and proven to depth of 486'. The ore is reported to average 5% copper, 7 oz. silver and 6 grams gold per ton.

Development: includes 300' shaft and 375' tunnel, with 4,825' of workings, estimated to show 40,000 tons of ore, with 28,000 tons blocked out for stoping. **Equipment:** includes 50-h. p. steam plant, with 3-drill Sullivan air compressor, a 25-ton wooden stamp mill, with 10 Allis-Chalmers gravity stamps, and a small concentrator, equipped with 2 Overstrom tables, a vanner, 4 slime tables and a sizer. No recent information received. Probably closed down.

MASON VALLEY EXTENSION MINING CO. NEVADA

Idle. **Office:** 420 Boston Bldg., Salt Lake City, Utah. **Mine address:** Mason, Lyon Co., Nev. **Officers:** C. W. Reese, pres.; A. G. Gutheil, v. p. and gen. mgr., Price, Utah. G. M. Sullivan, sec.-treas.; preceding with R. S. Wimmer and J. H. Reese, directors. **Inc.** 1907, in Utah. **Cap.**, \$100,000; shares 10c par, assessable; issued \$80,000. Annual meeting, second Monday in May.

Property: 14 claims, patented, 180 acres, shows limestone, porphyry and granite, carrying fissure veins and contact deposits between limestone and porphyry. Developed by shafts and tunnels with about 1,000' of workings.

MASON VALLEY MINES CO. NEVADA

Office: 14 Wall St., New York. **Mine office:** Thompson, Lyon Co., Nev. **Officers:** W. H. Aldridge, pres.; Frank W. Holmes, v. p.; H. F. J. Knobloch, sec.; Henry E. Dodge, treas.; preceding with John F. Alvord, W. Mont Ferry, L. Timmerman, David E. Thomas and H. A. Gray, directors.

Inc. Jan. 4, 1907, in Maine. **Cap.**, \$2,500,000; shares \$5 par; increased March 14, 1910, from \$1,000,000, shares \$1 par; issued \$778,750. Bonded debt is \$869,500 in authorized \$1,000,000 first mortgage, 10-year, 6% gold bonds in \$500 bonds convertible previous to April, 1915, into stock on the basis of \$10 per share and redeemable on 31 days' notice at 102½ and accrued interest.

The mortgage contains a sinking fund provision, by which the company is required to pay to the trustee within 60 days after Jan. 1, each year, beginning 1912, 20c for each net dry ton of ore treated during the year preceding, with a provision whereby the sinking fund payments may be reduced proportionately, as outstanding bonds are retired. The directors were authorized by vote of shareholders, March 14, 1910, to issue any part of the unissued stock for acquisition of additional property.

Guaranty Trust Co., New York, and United States Trust Co., Boston, registrars. Bankers Trust Co., New York, and Boston Safe Deposit & Trust Co., transfer agts. Shares listed on Boston Stock Exchange.

Annual report of Dec. 31, 1914, gave cash on hand \$43,285, and total current assets \$310,831, with current liabilities \$43,106. The report shows a deficit of \$40,275 for 1914, which deducted from the surplus leaves a net credit to that account of \$307,186.21. Charges to Profit and Loss Account for 1914 include:

Depreciation	\$61,033
Int. on bonds and floating indebtedness.....	71,130
Expenditure on properties optioned, 1914 and relinquished..	43,801
Development of company's mine.....	26,791

Property: 7 claims, patented, 140 acres, and a fractional claim of 10 acres, known as the Spragg mine, lying south of the Bluestone and about 1½ miles west of Mason. Company also owns a smelter and 1,320-acre smelter site near the railway; also 320 acres of ranch lands. Claims show the strong outcrop of a contact deposit between limestone and andesite, partly covered by rhyolitic tuffs. The latter rocks are comparatively soft and have been eroded into steep escarpments and sharp gulches. Ore is of contact metamorphic character, being in altered limestone of 30' average width. Surface ore shows malachite with a little cuprite, succeeded, at about 100' depth, by cupriferous pyrite, largely massive, with copper in the form of chalcopyrite. The mine is said to have some ore averaging 10% copper, but the average tenor is about 3.5% copper. An average analysis shows 16 to 17% iron, 16 to 18% lime, 12% sulphur and 38% silica.

Development: has been done by means of crosscut tunnels driven from

the surface to the ore bearing zone. Drifts have been run N. and S. following the general course of the orebodies. Crosscuts have been extended E. and W. from the main drifts. The workings reach a depth of about 550'. The mine has been worked by the shrinkage stope system and good results have been obtained by this method.

The mine has developed a very considerable tonnage of low-grade carbonate and sulphide ores, with a smaller quantity of high-grade ores. Actual development work was begun March, 1907, and workings aggregated 23,107' on Dec. 31, 1914.

A 6,250' tramway, with drop of 600', of 100 tons hourly capacity, connects the mine with the Nevada Copper Belt railway, which line connects with the company's smelter 16 miles distant.

The smelter, built at a cost of approximately \$600,000, is about 2½ miles from Wabuska, on the Southern Pacific railway and about 16 miles from the mine. The plant consists of a sampling mill for custom ores, extensive storage bins, a blast-furnace building, with two furnaces of 1,800 tons daily capacity, a sintering plant, power house, machine shop, plate shop, smithy and carpenter shop. Two stands of 12' converters of the Great Falls type, were installed, 1913.

The smelter was blown in Jan. 16, 1912, and one furnace was in continuous operation to Oct. 20, 1914; during that period 290,586 tons of ore from the company's mine and 321,288 tons of custom ore were smelted from which there were produced 39,787,987 lbs. copper, 22,392 oz. gold and 392,304 oz. silver.

Custom smelting has been a feature of the company's operations and these shipments were almost entirely discontinued in August and September, 1914. Economic conditions made it inadvisable to operate upon Mason Valley ore alone and the plant was closed down in October, 1914. Still idle, 1916.

MASS CONSOLIDATED MINING CO.

MICHIGAN

Office: 79 Milk St., Boston, Mass. **Mine office:** Mass, Ontonagon Co., Mich. **Officers:** John W. Linnell, pres.; Theo. O. Nicholson, v. p.; Wilfred A. Bancroft, sec.-treas.; Elton W. Walker, supt.; preceding with Francis L. Maguire, Wm. F. Fitzgerald, Jas. B. Hill, D. Allison Carrick and Fred J. Schultheis, directors. E. Fenner Douglass, mill supt.; A. P. Bennetts, mg. capt.; Jos. Bice, master mechanic.

Inc. 1899 in Michigan. **Cap.**, \$2,500,000; shares \$25 par; issued, 97,317 shares; paid in \$23; \$8 paid on organization, balance in 10 installments; assessment \$2, levied May, 1911; \$1 in April, 1915. In treasury, Jan. 1, 1916, \$213,361. Company has paid off \$27,000 notes out of 1915 profit and now has no debts except current bills. Old Colony Trust Co., Boston, transfer agt. Gross earnings, 1914-15, \$852,338; operating expenses, \$684,864. An initial dividend of \$1 a share was paid Aug. 15, 1916.

Property: about 5,500 acres, lying in a very irregular but fairly compact tract, in Secs. 33, 34 and 35, T. 51 N., R. 38 W., in Secs. 4, 5, 6, 7, 8, 9 and 16, T. 50 N., R. 38 W., and in Sec. 1, T. 50 N., R. 39 W., holdings being bounded on the N. by the Union, Adventure and farm lands, on the E. by the Adventure and Toltec, and on the S. by various small holdings, and on the W. by the Flint Steel, Adventure and St. Mary's Mineral Land Co. Holdings include 4 old mines, the Ridge, Evergreen, Mass and Ogima, also 2 old prospects, the Merrimac and Hazard, joint production of which, under previous managements, was 11,131,023 lbs. fine copper. These 5 properties are described, in detail, in Vol. II, Copper Handbook.

The Mass tract carries 6 of the 7 cupriferous amygdaloidal beds of the Evergreen belt, these varying greatly in width from point to point but aver-

aging about 10', with a sharp bend in their strike, which varies from N. 32° E., on the north, to N. 37° E. at the southern boundary. The dip of the beds varies from 38° at the Ridge to 47° at the old Mass mine. The copper-bearing beds of the Evergreen belt on the lands of the Mass Consolidated are as follows, from north to south:

1. Knowlton. Carries heavy copper and stamp rock.
2. Mass. Lies 140' south of the Knowlton, and carries a little heavy copper and stamp rock.
3. North Butler. Lies about 75' south of the Mass bed, is wide and fairly mineralized in places.
4. Butler. Lies about 200' south of the North Butler, is 12' to 35' wide, carrying mainly stamp copper with occasional masses.
5. Ogima. Lies about 100' south of the Butler. Carries mainly stamp copper with some barrel-work, being 5' to 10' wide and showing some good ground.
6. Evergreen or Ridge. Lies about 250' south of the Ogima and is one of the best beds of the property, ranging 4 to 40' in width and usually being richest where widest. Is very bunched but shows some excellent stopes yielding heavy copper and stamp-rock of good grade.

7. New Mass. This bed which is the lowest of the series of the Evergreen belt and brings the number of cupriferous beds to 7, corresponding with the number in the adjoining Adventure property, lies about 120' under the Evergreen bed and was opened by crosscuts from "A" shaft on the 15th and 18th levels. The bed averages about 12' in width carrying considerable epidote and is very showy, but the copper is exceedingly fine, most of it being of a flaky nature, very deceptive to the eye. A mill test of the rock from this bed, 1909, gave a recovery of only 18 lbs. of mineral per ton.

Development: the Mass has openings on all its copper-bearing beds, and rock is hoisted through the nearest shaft, workings on each level being connected by crosscuts. The Mass carries the outcrop of the copper-bearing beds of the Evergreen belt for about 1½ miles. Shafts "A" and "B" are connected on the Butler lode down to and including the 10th level. The mine as a whole is notably rich in mass copper and carries silver values, but the ground is exceedingly bunched, ranging from very rich to absolutely barren. Considerable rock selection is made underground, bringing the average contents of stamp rock to about 16 lbs. per ton. About 50% of the rock broken is hoisted and about 25% of the recovery is in mass copper.

"A" shaft, 1,757' deep, with two compartments, sunk on the Evergreen bed has been abandoned.

"B" shaft, 875' S. W. of "A" has 3 compartments, and is bottomed at 1,857'. Levels are at variable intervals; those at considerable intervals permit a large saving in drifting through poor ground and sub-levels can be run where needed.

"C" shaft, 2,148' S. W. of "B" and bottomed on the 13th level, at the beginning of 1913, is the old Ogima shaft, sunk on the Butler bed, but the Evergreen bed is opened by a 400' crosscut on the 5th level. Some high-grade ground was opened in the 3rd, 5th, 7th and 9th levels west on the Butler bed during 1912. The company has concentrated work upon the Butler though work was also done on the Ogima and Knowlton beds, tributary to "C" shaft, in 1910, results on the whole being promising.

"D" shaft, 150' deep, is idle.

Considerable diamond drilling has been done south from the Evergreen bed into the horizon traversed by the so-called Adventure lodes, cut by diamond drills on the Adventure property, and also north of the Knowlton bed. Diamond drilling was done, 1910, in the N. E. ¼ of Sec. 5, to test

amygdaloidal and conglomerate strata outcropping at that point, which is quite a distance under the hypothetical horizon of the so-called Adventure lodes, with distance to the eastern sandstone undetermined.

The shaft rock house at "B" is equipped with a steam hammer, Blake crusher and a 12x24" Nordberg engine; "C" shaft has a steel shaft rock house; both have been equipped with devices permitting automatic handling of rock.

The central power house has a 24x48" Allis-Chalmers duplex hoist good for one-half mile depth. The power plant includes a 50-drill Rand 2-stage cross-compound air compressor, a 75-k. w. dynamo for electric light, and two 250-h. p. Stirling water-tube boilers.

In addition to the usual mine buildings, there are about 60 good dwellings. The company also has a town site, Mass City, which is the terminus of the Mineral Range railroad, and a station on the C., M. & St. P. railway; the village having a considerable population, with a number of hotels and business houses.

The Mass mill is at Keweenaw bay, on an arm of Lake Superior, at the junction of the Mineral Range and Duluth, South Shore & Atlantic railways, 16 miles S. of Houghton and 34 miles N. E. of the mine. Equipment includes 2 Nordberg stamps, 1,350 tons daily capacity.

The mill boiler house contains one 350-h. p. and two 200-h. p. Stirling water-tube boilers. Ashes and cinders are washed into the lake through a launder.

The pump house has a 16,000,000-gal. Nordberg vertical pump, connected with a tunnel running 300' under the bed of the bay to the intake.

Cost of mining was 14c per lb. in 1914 and 14.35c in 1915.

Ore reserves: 2,000,000 tons, Jan., 1916.

Production: begun 1899, with an output of 42,800 lbs. fine copper, gradually increased to 2,576,447 lbs. in 1903, decreasing thereafter, through loss of the Evergreen bed. Recent production has been as follows: 2,007,950 lbs. fine copper in 1905; 2,106,677 lbs. in 1906; 2,078,677 lbs. in 1907; 1,766,930 lbs. in 1908; 1,723,436 lbs. in 1909; 1,321,885 lbs. in 1910; 1,326,898 lbs. in 1911; 2,045,006 lbs. in 1912; 1,213,545 lbs. in 1913; 2,955,952 lbs. in 1914; 4,638,452 lbs. in 1915.

Rock being mined in 1916 averages 15 lbs. copper per ton, and production is about 450,000 lbs. monthly compared with 390,000 lbs. in 1915.

The Mass Consolidated has had every sort of misfortune that befalls mines, but, through the acquisition of the Evergreen Bluff property, has been placed in better mining position than ever before. The experience of 14 years has given a thorough knowledge of the vagaries and possibilities of the 7 cupriferous beds of the Evergreen belt; though bunchy, two of the number are of real promise, the Evergreen and Butler. It is probable that other beds can be worked occasionally, but the future of the mine rests on the Evergreen and Butler beds. There also is the possibility of locating and developing other and richer beds to the southward of the main workings, in the horizon of the Lake and Adventure beds. Earnings for 1916 will approximate \$450,000, or about 50% yearly on the current price of stock. Company is reported, July, 1916, to have \$350,000 cash in the treasury, which with further earnings will enable the management to open a new shaft and continue exploration of the property. The management is both progressive and experienced.

MASSEY STATION MINING CO., LTD.

ONTARIO

Office: 25 St. Vincent St., Toronto, Ont. Mine near Massey, Ont.
Officers: Wallace, Nesbitt, pres.; S. H. P. Pell, v. p.; Britton Osler, sec.; preceding, with Robt. Means Thompson and Miss I. M. Innes, directors.

Inc. April 24, 1901, in Ontario. **Cap.**, \$300,000; shares \$100 par; nonassessable; fully issued. Company is said to have expended about \$300,000 on development and equipment.

Property: 840 acres, crown granted, including 480 acres timber land, in Salter township, Sudbury district, about 3 miles from a railway. Lands show schist and quartzite carrying lenticular orebodies in E.-W. zones with 75° dip. There are 3 parallel lenses, 2 developed averaging 10' in width in an ore zone traceable about a mile. Ore carries finely disseminated chalcocite and gray copper ores in quartzose gangue changing in depth to bornite and that in turn to chalcopyrite, estimated by management to average 3 to 5% copper and \$1 to \$2 gold per ton, with about 50,000 tons in sight.

Development: by a 600' shaft and 150' tunnel. **Equipment:** includes a 200-h. p. steam and electric plant, with 2 Lidgerwood hoists, a 6-drill compressor and 15 buildings.

The ore not being adapted to wet concentration, owing to excessive sliming, a 50-ton experimental mill was built, using the Elmore vacuum oil flotation process, with Blake and centrifugal crushers and 3 Jenckes and Wilfley tables. Property closed down in 1909 owing to failure of mill to make expenses.

MATAHAMBRE MINE.

CUBA

Manuel Luciano Diaz, owner, Apartado 1795, Havana, Cuba. C. L. Constant & Co., 42 New St., New York, engineers. Shipping point, port Santa Lucia. The mine is located in the western end of the island in Pinar del Rio Province.

Production began in Dec., 1913, and by April, 1914, company had shipped over 8,000 tons ore, averaging 18% copper and 1.5 oz. silver per ton. In 1914 nearly 6,000,000 lbs. copper were shipped. In 1915 production was about 40,000 tons of 12% ore. Developed to 300' depth, and employs about 300 men.

Plans building a concentrator to treat second-class ore.

MATHESON LEAD CO.

NEW YORK

Is a subsidiary of the National Lead Co. **Office:** 11 Broadway, New York. Works at Long Island City, N. Y. **Officers:** W. J. Matheson, pres.; R. P. Rowe, v. p.; E. J. Cornish, treas.; with W. W. Lawrence, R. A. Shaw, directors; M. D. Cole, treas. **Inc.** in New York. **Cap.**, \$1,000,000; shares \$1 par. Entire stock issue owned by the National Lead Co. Authorized bond issue, \$1,000,000, 5% bonds, due April 1, 1929. Operates a 10,000-ton plant for the manufacture of white leads and oxides.

MAVERICK COPPER CO.

ARIZONA

Florence, Pinal Co., Ariz. Geo. Lobb and Eugene Woodbury, managers. **Property:** known as the Iron Spring mine, shows a strong outcrop, carrying finely disseminated chalcocite, estimated to average 3% copper. **Development:** by a shallow shaft and a number of prospect pits and shafts. Annual assessment work only has been done since 1910, when the Copper Queen Co. relinquished its \$100,000 bond on the group.

MAXFIELD MINE.

UTAH

Operated by Boston Development Co.

MAY DAY MINING & MILLING CO.

UTAH

J. C. Dick, gen. mgr., P. O. Box 1418, Salt Lake City. Mine at Eureka, Juab Co., Utah. **Officers:** John Dern, pres.; M. P. Braffet, v. p.; A. Reeves, sec.; W. S. McCornick, treas.; with J. C. Dick, directors.

Inc. 1896 in Utah. **Cap.**, \$200,000; shares 25c par; assessable; all outstanding. Stock transferred at company's office. Annual meeting, first Monday in April. Listed on Salt Lake City Exchange.

Financial report for year ending March 31, 1916, shows: cash on hand March, 1915, \$21,656; received for ore, etc., \$188,340; total, \$205,996; of this amount dividends absorbed \$96,000 and expenses \$80,035, leaving cash on hand March 31, 1916, \$29,961. **Dividends:** paid to April 1, 1916, \$252,000. Last dividend, 2c per share, paid May 25, 1916.

Property: 6 claims, 5 patented, 60 acres, in the Tintic mining district. **Ore:** zinc, silver and lead in limestone. **Development:** by 1,100' vertical shaft and 1,500' tunnel. The mine has been practically out of ore several times; at one time the supply was so low the stock dropped to 1c per share: the larger part of its dividends has been paid since then.

Equipment: includes 50-h. p. electric hoist and compressor, capacity 250 cu. ft.

Production: for year ending March 31, 1915, 1,786 tons lead ore, valued at \$60,088; silver ore at \$4,342; 447 tons zinc ore, and 1,313 tons lead ore from contiguous leased territory, valued at \$27,065. The output for 1915-1916 is not available, but earnings are said to be \$10,000 monthly. Regular shipments are being made, but production is not large.

Development work is being carried on with the hope of finding new orebodies, though it is said the present rate of production can be maintained for some time even if none are found. Part of the property is leased, and company itself leases part of the Chief Consolidated ground.

MAYFLOWER MINING CO.

MICHIGAN

Office: 705 Sears Bldg., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. **Officers:** Chas. J. Paine, Jr., pres.; Geo. P. Gardner, v. p.; preceding, with Harry F. Fay, Geo. E. Clarkson, A. L. Dickerman, F. W. Nichols, directors. Arthur E. Coe, sec.-treas.; Geo. S. Goodale, supt. Inc. 1899 in Michigan. **Cap.,** \$2,500,000; shares \$25 par; \$10 paid. St. Mary's Mineral Land Co. owns 25,000 shares of the capital stock. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Company had \$53,020 cash on hand, Jan. 1, 1916. Expenses were \$52,990 in 1915. Annual meeting, third Wednesday in March.

Property: 840 acres, near Calumet, Mich., between the Kearsarge and Old Colony mines and east of the South Kearsarge and Wolverine mines. Lands comprise Secs. 7 and 8. T. 56 N., R. 32 W. Prospecting, begun in 1899, was continued 5 years. No. 1, or Faull shaft, 400' deep, has considerable drifting on the 1st and 2nd levels and a crosscut opens 2 parallel cupriferous amygdaloids, showing occasional patches of copper, but nothing of promise.

Development: four shafts. No. 2, or Isle Royale shaft, 160' deep, has several hundred feet of drifting and shows a bunchy amygdaloid, 10 to 12' wide, carrying more or less copper in a 2' streak next to the hanging wall. No. 3, 60' deep, in a badly broken amygdaloid. No. 4 shaft, 580' deep, starts from surface on an unnamed amygdaloid, lying approximately 2,000' east of the Kearsarge bed and at a depth of 425' runs into a parallel amygdaloid lying 90' to the eastward of the first bed. The copper showing is poor.

A fairly complete geological cross-section has been obtained by diamond-drill borings and exploratory work was resumed July, 1909, after 3 years' idleness. Up to date 41 holes have been put down which, together with the holes on the Old Colony tract, prove up a big and well mineralized amygdaloid bed, called the Mayflower lode, for a distance of 6,000' and a depth of 1,500'. The lode lies on the extreme eastern side of the copper range, near the Eastern sandstone. In 1915 only 800' of drilling was done; hole No. 42 was bottomed at 2,569'. Hole No. 2, started north of No. 41, had reached a depth of 1,500', June, 1916.

Thirteen holes on the Mayflower and 10 on the Old Colony ground

showed commercial ore; hole No. 20 showed 101' of 1.65% rock; hole No. 22, nearby, showed 100' of 1.2% copper ore, 60' of which carried 1.9%; holes Nos. 16 and 17, in this locality, showed 87' and 95' widths.

Company had about \$50,000 cash in Jan., 1916, with which to continue drilling.

MAZAPIL COPPER CO., LTD.

MEXICO

Office: 47 Peter St., Manchester, England. Mine address: Aptdo. 64, Saltillo, Coahuila, Mex. **Directors:** Alfred Crewdson, chairman; John Seacombe Burrows, W. A. R. Heaven, Jacob Higson, Chas. Hopkinson and Jas. Wm. Purcell. **Inc.** Feb. 18, 1891, and reincorporated April 21, 1896, in Great Britain. **Cap.** increased 1903 to £300,000, shares £10 par, and again increased 1912 to £500,000, shares £1 par; issued, £422,490. Debentures, £120,000, at 6%. Has paid several dividends: 20% in 1910; 20% and a 5% bonus in 1911.

The company is a private concern and does not care to give details concerning its mining operations. Company owns and operates the Coahuila and Zacatecas railway, running from Saltillo to Concepción del Oro, 2 smelters and various mines, employing over 4,000 men normally. Operations were suspended June, 1913, by the Mexican revolution, and property is still idle.

Property: about 850 hectares of mineral land in 4 principal groups. The Aranzazú and Cabrestante mines, carrying copper ores, are the most important; the San Eljío, Naranjera, Cajón, San Francisco and Protrero mines, carrying silver-lead ores, and the Promontorio group, producing mainly fluxing ores. Copper ores occur in irregular masses, in limestone, near granite-porphry contacts.

The various mines of the company have 83 different shafts and tunnels, many of which are small and worthless, remaining from old operations, with upwards of 25 miles of workings.

The smelters are at Concepción del Oro and Saltillo. The first named, of about 800 tons daily capacity, has 4 copper furnaces. The Saltillo smelter, built 1906, has a lead plant of 300 tons daily capacity and does a general custom business, as well as treating ores of the company. There are 3 blast furnaces and 1 reverberatory furnace. Transportation is by 4 aerial trams.

The Ferrocarril Coahuila y Zacatecas has 166 kilometres of main line. **Production:** 1912, was 13,556,208 lbs. copper, 15,024,485 lbs. lead, 8,463,536 lbs. zinc, 1,572,012 oz. silver and 15,560 oz. gold.

MAZATAN COPPER & GOLD MINING CO.

MEXICO

Letter returned from 60 State St., Boston, Mass., Dec., 1915. Mine at La Colorada, Sonora, Mex. Fully described Vol. XI, Copper Handbook. Probably closed down.

McALPINE MINES CO.

CALIFORNIA

Coulterville, Mariposa Co., Calif. **Officers:** Frank R. Whitcomb, pres. and gen. mgr.; C. L. La Rue, v. p.; A. L. D. Barnard, sec.; Fannie W. McLean, treas.; with M. C. Hassett, directors. **Cap.**, \$1,500,000; shares \$1 par; fully paid and nonassessable.

Company was formed by California people to reopen the old McAlpine mine on the Mother Lode, Tuolumne Co., near the line between Tuolumne and Mariposa counties. The mine was a well-known producer in the 60's.

Property: 120 acres, covers 2,100' on the strike of the Mother Lode, including the water rights of Moccasin Creek. The new management plans to sink the shaft from its present depth of 456' to 500' and to develop that level in addition to reopening part of the old workings.

Equipment: includes a Fairbanks-Morse hoist, a 55-h. p. motor and a

5-drill air compressor. Electric power is obtained from the Pacific Gas & Electric Co.

McCONNELL MINES CO.

NEVADA

Office: Yerington, Nev. **Mine office:** Mason, Lyon Co., Nev. O. H. Sonne, pres.; S. B. Elbert, sec. and mg. engr.; preceding, Mrs. O. H. Sonne and Mrs. S. B. Elbert, directors. **Inc.** Sept. 14, 1912. **Cap.**, \$500,000; shares \$5 par; issued, 40,002 shares.

Property: 10 claims, 160 acres, patented, adjoining the Yerington Malachite mine on the west. Claims show limestone, shale and granite with argentiferous contact deposits in the contact zone near the granodiorite. Property has 4 orebodies, 2 under development averaging 25' in width and carrying about 3.5% copper.

Development: by 400' shaft and 3 tunnels. **Equipment:** includes a 25-h. p. hoist, 7-drill air compressor and 8 buildings.

Production: 1912, was 1,074,289 lbs. fine copper, secured from 16,284 tons of ore smelted and at a total cost of about 14 cts. per lb. No later information received. Property regarded as good.

McDONALD-ELY COPPER CO.

NEVADA

Office: Boyd Park Bldg., Salt Lake City, Utah. **Mine address:** J. P. Turner, supt., Ely, White Pine Co., Nev. **Officers:** D. C. McDonald, pres. and gen. mgr.; Col. Enos A. Wall, v. p.; Geo. W. Parks, sec.; Frank Knox, treas.; preceding, with Frank J. Westcott, Geo. W. Lamb and Hon. Thos. Kearns, directors; E. P. Jennings, cons. engr. and mgr. **Inc.** Nov., 1906, in Utah. **Cap.**, \$1,000,000; shares \$5 par; nonassessable; issued, \$790,000. Debentures, \$100,000, at 6%, maturing Nov. 15, 1915. Shares are listed on the Salt Lake Stock Exchange.

Property: 28 claims, patented, 325 acres, 19 claims held under bond and lease. Property, on the lime belt, in the N. E. part of the Ely district, carries 4 contact deposits, between porphyry and limestone, showing prominent iron outcrops. Management estimates veins as 20' wide carrying oxidized ores, assaying 1 to 40% copper, and about 80 cts. gold per ton.

Development: is by the 415' Wall tunnel, showing 21' of heavy iron. The mine as a whole has about 3,000' of workings.

Equipment: includes a 25-h. p. gasoline hoist, 40-h. p. steam hoist, and a 6-drill Ingersoll-Sergeant air compressor. There are 6 buildings, including necessary shops. A pumping plant and pipe line supply water from a spring at nearby ranch.

An old 50-ton mill, with rolls and cyanide plant, remains from a former ownership. The 100-ton concentrator has a gyratory crusher and 3 trains of rolls. In May, 1914, drifting was in progress. Ten men employed. Property considered promising and management good.

McINTYRE EXTENSION MINES, LTD.

ONTARIO

Office: Traders Bank Bldg., Toronto, and Schumacher, Ontario. **Officers:** Alex. M. Hay, pres.; L. J. Pashler, sec.-treas.; preceding, with W. J. Sheppard, J. B. Tudhope, Sir H. M. Pellatt, J. P. Bickell, Alex. Fasken and C. M. Bushnell, directors; R. J. Ennis, supt.

Inc. July 16, 1915, in Ontario to take over the property of the Pearl Lake Gold Mines at Porcupine. **Cap.**, \$2,500,000; outstanding Feb. 10, 1916, \$2,000,001; shares \$1 par. Controlled by McIntyre Porcupine Mines, Ltd. Trust & Guarantee Co., Ltd., Toronto, transfer agent and registrar.

Payment was made by the McIntyre Co. of \$47,733.30 in satisfaction of all claims of creditors of the Pearl Lake Co. (except claim of B. E. Cartwright), for which the McIntyre Co. received 1,020,000 shares of the McIntyre Extension Co., Mr. Cartwright receiving 980,000 shares in satisfaction of his claim of \$175,000.00 for money advanced by him to the Pearl

Lake Co. as admitted and passed by the assignee. A further payment of \$2,500 was made to Mr. Cartwright for 25,000 shares of the Extension Company at 10c per share to enable him to satisfy certain claims which would have delayed the deal and involved a serious loss of time.

The McIntyre Co. has agreed to expend \$18,000 at the rate of \$1,000 per month, for which it gets treasury shares of the Extension Company at 10c per share.

Property: 4 claims, patented, 127 acres, adjoining McIntyre-Porcupine Mines, Ltd., Tisdale Twp., Sudbury district, carries gold ore. (See McIntyre Porcupine Mines, Ltd., for geology.)

Development: 3-compartment vertical shaft, completed in April, 1916, to a depth of 1,000'; shaft was continued to 1,083' depth in order to make provision for ore and waste pockets below the level. This shaft will be the central hoisting shaft on the north side of the McIntyre property. A cross-cut has been started on the 1,000' level, towards McIntyre No. 5 shaft, in order to intersect at this depth the orebodies said to have been proven at 750' depth by diamond drilling; this crosscut was to be finished in June, and a raise started to connect with No. 5 shaft at the 700' level.

Equipment: includes electric hoist and electrically-driven air compressor.

McINTYRE-JUPITER MINES, LTD.

ONTARIO

Office: Traders Bank Bldg., Toronto. Mine near Schumacher, Ont.
Officers: Geo. E. Drummond and K. F. Mackenzie, directors, representing the Jupiter Co. Inc. 1915 in Toronto to take over property of Jupiter Mines, Ltd. **Cap.**, \$2,000,000; shares \$1 par. McIntyre Porcupine Mines, Ltd., subscribed for 955,000 shares of this stock at a price of \$152,000, of which \$60,000 was paid by end of 1915, the balance payable at the rate of \$5,000 per month as working capital for the new company. Stock is issued to McIntyre Porcupine Mines, Ltd., as paid for; 380,000 shares being delivered against the payment of \$60,000, the remaining shares deposited in escrow with the Toronto General Trusts Corp., to be delivered to McIntyre Porcupine Mines, Ltd., monthly in proportion to amount paid. Jupiter Mines, Ltd., received 943,893 shares in capital stock of the new company, and the sum of \$60,000.

An agreement was made between the 3 companies by which the McIntyre company agreed to mill the ore of the new company for \$2 per ton net weight, guaranteeing an extraction of 95%.

Property: 79 acres on the north shore of Pearl Lake and adjoining Porcupine Mines, Ltd. **Ore:** gold occurs in veins in a belt of schistose rocks, which are largely altered volcanics. Occasional bands of schistose quartz-porphry are found in the mine. Veins are lenticular in structure and often consist of interbanded quartz and schist.

Development: vertical shaft to 475' level. The mine had been idle for some time; in 1914 it was worked under option by McKinley-Darragh-Savage Mines, Ltd., but option was allowed to lapse. By May 1st the shaft was in operation to the 300' level. Ore will be conveyed to No. 5 shaft on the McIntyre and from there by aerial tramway to the McIntyre mill.

It is proposed to run a drift from the 600' level of the Pearl Lake shaft across the full width of the Jupiter property 12,500', to connect with the existing shafts. The new company has the advantage of the McIntyre organization, in addition to being able to minimize overhead expense.

McINTYRE PORCUPINE MINES, LTD.

ONTARIO

Office: Traders Bank Bldg., Toronto, and Schumacher, Ontario.
Officers: Alex. M. Hay, pres.; Sir H. M. Pellatt, v. p.; with J. P. Bickell, I. J. R. Muurling, C. B. Flynn, W. J. Sheppard, J. B. Tudhope, directors; P. Vander Woort, sec.; R. J. Ennis, mgr.

Inc. March 16, 1911, in Ontario. **Cap.**, \$3,000,000; shares, \$1 par; outstanding, \$2,986,985. Toronto General Trusts Corp. and Security Transfer & Registrar Co., New York, transfer agents and registrars. Annual meeting, first Monday in February. No dividends paid to 1916. Traded in on New York Curb.

Funded debt: first mortgage 7% 5-year gold bonds, due Aug. 15, 1918; interest February 15 and August 15, at office of the trustee, Toronto General Trusts Corp. Coupon, \$500, registrable as to principal. Authorized \$250,000; redeemed, \$100,000; unissued, \$62,500; purchased \$56,500; outstanding \$31,000. One-fifth of issue may be redeemed at par and interest at end of first year, and the whole or any part of the balance of outstanding bonds at 105 and interest at end of second year.

Company owns a majority stock interest in the McIntyre-Jupiter Mines, Ltd., and in the McIntyre Extension, which two companies control the Jupiter and Pearl Lake properties.

Comparative General Balance Sheet: year ending March 31st—

Assets:	Plant &	Capital	Inv'mts.	Disc. on	Current	Total
	Equip.	Devel.		Sec. Sold		
1916.....	\$2,921,991	\$209,508	\$175,036	\$211,992	\$151,963	\$3,670,490
1915 (a)...	2,799,035	209,508	.....	214,492	104,670	3,327,705
(a) 15 months, ending March 31.						
Liabilities:	Capital	Bonds	Current	Reserves	Profit	Total
	Stock				& Loss	
1916.....	\$2,999,985	\$31,000	\$111,989	\$144,466	\$383,050	\$3,670,490
1915.....	2,986,985	54,500	114,704	4,989	166,527	3,327,705

Comparative Operating Account: year ending March 31—

	Receipts	Disbursements			P. & L. Acct.
		Mine	Mill	Miscel.	
1916.....	\$775,821	\$265,622	\$102,389	\$80,286	\$327,524
1915 (a).....	749,234	319,203	101,354	95,923	232,752
(a) 15 months, ending March 31.					

Property: located on the south, west and north sides of Pearl Lake, Tisdale Twp., comprises 145 acres, of which 113 acres are under Pearl Lake and Gillies Lake. The McIntyre Extension Mines, Ltd., and Jupiter Mines, Ltd., both adjoining McIntyre Porcupine on the north, are described, the first under its title, the latter under McIntyre-Jupiter Mines, Ltd. This consolidation was part of a general plan to strengthen the position of the McIntyre Co. by extending its operations on orebodies worked within its own boundaries to extensions on adjoining properties.

Geology: the north and south sections of the property show areas of altered volcanic schist, basalt and associated lavas; between them there is a broad band of schistose quartz porphyry. Veins are classified in the following systems: veins in the basalt and gray schist and veins in the contact between the quartz porphyry and gray schist on the south side of Pearl Lake; No. 5 vein and veins in the contact zone paralleling the north contact between the quartz porphyry and the basalt on the north side of Pearl Lake, veins in the quartz porphyry.

Exploration has shown that the best deposits of gold occur in the altered volcanic schist, at or near the contact with the quartz porphyry; development in the quartz porphyry away from the contact has not shown much gold. Orebodies are lenticular in form and very irregular; the ore shoots consist of quartz more or less interbanded with mineralized schist. The location of orebodies has been rendered difficult by the presence of compression faults which have displaced portions of the ore as much as 130'.

Development: by shafts; No. 1, 300' deep; Nos. 2 and 3, each 90' deep; No. 4, 600' deep; No. 7, 700' deep. No. 4 will be sunk to the 700' level in the near future. The Pearl Lake shaft, 1,083' deep, located 400' from the Jupiter line and 300' from the McIntyre line, will be the main working shaft for that part of the property. Development work during last fiscal year totaled 6,534' in addition to 5,787' of diamond drilling, compared with 4,879' new work and 3,046' diamond drilling during previous year.

Ore reserves: due to form and occurrence of orebodies, it is impracticable to attempt to block out ore in the usual manner.

Date—	Tons	Aver. Value	Total Value
Mar. 31, 1916.....	201,920	\$11.12	\$2,247,128
1915.....	109,693	7.79	854,436

In the Jupiter workings, there is said to be a considerable tonnage available for stopping.

Equipment: property is well equipped with hoisting and milling facilities, the latter including a 450-ton cyanide plant. The ores yield a larger per cent of their gold content to the simple treatment of grinding in cyanide solution and giving them a short period of agitation.

From the beginning of operations to March 31, 1916, the property produced \$1,800,241 in gold bullion, the result of milling 237,891 tons ore, average value \$8.10.

Production:	Tons		Rec. %	Costs per Ton—			Profit per Ton
	Milled	Val. per T.		Mine	Mill	Tot. Optg.	
1916 (a).....	105,758	\$7.71	95.6	\$2.51	\$0.96	\$4.28	\$3.09
1915 (b).....	85,654	8.87	94.4	3.72	1.18	6.02	2.35
1913.....	31,979	7.85	89.8	....	....	....	....
1912.....	14,500	7.00	75.0	....	....	....	....

(a) Year ending March 31. (b) 15 months, ending March 31.

Mine development during the past two years has shown steady improvement. The lower levels so far as opened up have proven to be as productive as the upper levels, while lateral development on the upper levels has cut new orebodies. The results of the underground work, in addition to the control of the adjoining properties, assures a productive life to the company.

McKINLEY-DARRAGH-SAVAGE MINES, LTD. ONTARIO

Offices: Canada Life Bldg., Toronto, and Cobalt, Ont. **Off ers:** J. R. L. Starr, pres.; Thos. W. Finucane, v. p.; J. H. Spence, sec.; Harper Sibley, treas.; Jos. S. Hunn, asst. treas.; with H. W. Sibley and G. L. Thompson, directors; T. R. Finucane, mgr. **Inc.** 1906 in Ontario. **Cap.**, authorized \$2,500,000; issued, \$2,247,692; shares \$1 par. Traded on New York Curb.

Comparative General Balance Sheet:

Assets:	McK.-D.		Reserve			Total
	Mine & Plant	Sav. Mine & Plant	Bennett Claim	Current	Inv., Etc.	
1915.....	\$1,385,728	\$689,104	\$100,000	\$444,166	\$7,731	\$2,626,729
1914.....	1,402,798	694,168	100,000	447,852	7,716	2,652,534

Liabilities:	Capital Stock	Surplus	Govt. Tax	Current	Total
1915.....	\$2,247,692	\$280,299	\$2,500	\$96,238	\$2,626,729
1914.....	2,247,692	313,935	4,000	86,907	2,652,534

Comparative Statement of Operations:

	Gross Oper. Profit	Deductions	Net Oper. Profits	Interest	Total Net Profits
1915.....	\$260,424 (a)	\$28,991	\$231,433	\$5,224	\$236,657
1914.....	328,850 (b)	30,876	297,974	9,678	307,652
1913.....	816,025 (c)	53,098	762,927	8,560	771,487

(a) McKinley mine, \$238,216; Savage mine, \$22,208. (b) McKinley mine, \$320,367; Savage mine, \$8,483. (c) McKinley mine, \$649,205; Savage mine, \$166,820.

Dividends: 2% in 1907; 9% in 1908; 10% in 1909; 15% in 1910; 50% in 1911; 50% in 1912; 32% in 1913; 18% in 1914; 12% in 1915; 3% to date in 1916.

Property: 1' claim, 40 acres, the McKinley-Darragh mine, located at southern end of Cobalt Lake; 1 claim, 40 acres, the Savage mine, on the east side of Cart Lake; 40 acres in Bucke Twp., the Bennet claim. The McKinley-Darragh, which adjoins the Nipissing and La Rose holdings, has been the most important producer; deepest workings are at about 300', where the contact with the Keewatin formation is exposed. Thus far no values have been found in the Keewatin here, though in other parts of the district it has furnished good ore.

Ore reserves: Jan. 1, 1916, 35,000 tons broken ore, containing 1,871,000 oz. silver, compared with 2,132,000 oz. Jan. 1, 1915. Reduction in reserves is apparently due to the fact that the Savage mine has not responded to development as well as formerly. Development work at the Savage mine totaled 1,572' in 1915, 2,846' in 1914; at the McKinley, 2,965' in 1915, compared with 4,392' in 1914. Company employs 125 to 150 men.

A year ago the McKinley-Darragh was thought to be fast approaching the end, but ore reserves were maintained during the year, as it was found practical to carry stopes wider than contemplated. The extension of the Blind vein to the 250' level added a large tonnage to the reserves; on the 250' level this vein is reported to have a maximum width of 55', average 30', with milling value about 15 oz. per ton.

Costs at the McKinley-Darragh mine:

	Tons Milled	Mines	Costs		
			Mill	Mktg.	Total
1915.....	50,912	\$1.78	\$0.93	\$1.01	\$4.71
1914.....	45,098	2.22	1.44	1.70	6.99
1913.....	48,761	2.44	1.39	1.88	7.37

Per cent extraction on all ore milled: 86.9 in 1913; in 1914, 85.1 on McKinley ore and 64.1 on Savage ore; 80.9 in 1915.

	—Ounces Silver Shipped—			Cost per Oz.	Profit per Oz.
	McK.-D.	Savage	Total		
1915.....	803,717	256,419	1,060,136	\$0.2871	\$0.221
1914.....	1,051,925	208,121	1,260,046	.313	.231
1913.....	1,672,431	556,066	2,228,497	.223	.369

Total ounces silver shipped to Jan. 1, 1916: McKinley, 12,443,155; Savage, 2,740,506; total, 15,183,661.

There is still a tonnage of mill rock at the mine which more than pays expenses, but if other oreshoots are not soon found, property will have to close down; it has been so thoroughly prospected that the chance of discovering an orebody of great importance is very slight. It is a liquidating proposition.

McKINLEY GOLD MINES CO.

IDAHO

M. F. Smith, sec., 506 Gumbel Bldg., Kansas City, Mo. Inc. in Ariz. Cap., \$1,000,000; \$1 par. Has spent \$75,000 without return.

Property: 700 acres on Jupiter Mountain, Boise Basin, 6 miles from Idaho City, Idaho, shows a big vein carrying erratic values. **Development:** a crosscut tunnel which has not yet reached the vein. Idle 1915 for lack of funds.

McKINLEY MINES, LTD.

BRITISH COLUMBIA

Office: Rossland, B. C. Mine near Franklin, Boundary district, B. C.

Officers: B. Lequime, pres.; H. W. Warrington, v. p.; A. M. McKenzie, sec.; C. L. Hammond, managing director. **Property:** 4 claims, on the North fork of Kettle river, about 34 miles north of Grand Forks and 18 miles from the Kettle Valley railway terminus.

Orebodies occur as sulphides and oxides of iron carrying gold and copper. Several tunnels on property. Results of extensive diamond drilling not reported. Claims were under bond and lease to the British Columbia Copper Co., 1912, and a long tunnel driven. James Breen, of Spokane, owns 75% of the stock. The company was promoted by P. A. O'Farrell, who spent \$30,000 supplied by F. A. Heinze, in diamond drilling, before Heinze abandoned the proposition. Property is too inaccessible to work its low-grade ore profitably.

McKINLEY MINING CO.

WASHINGTON

Dissolved Dec. 31, 1913. Claims relocated Jan. 1, 1914, by some of the old stockholders and the Vulcan Mining Co. was organized. Obligations of old company were not assumed. Described under title of Vulcan Mining Co.

McKINLEY MINING & DEVELOPMENT CO.

ARIZONA

Prescott, Ariz. A. M. Gough, pres.; Chas. E. McKinley, gen. mgr. Inc. 1906 in Arizona. Cap., \$1,000,000; shares \$1 par.

Property: 38 claims, 760 acres, in the Copper Basin district, 11 miles south of Prescott. The Dixie group of 6 claims has veins of 5 to 15' width, carrying copper ore. The Peacock group has a vein of 60' claimed width, carrying surface ores said to average 3.7% copper, developed by the Peacock shaft, planned to be sunk to 700', showing sulphide ore giving assays up to 15% copper, 5 oz. silver and \$6 gold per ton.

Equipment: includes power plant with hoist good for 1,000' depth. No returns securable 1915, but reported to be working 2 shifts.

McMAHAN GROUP.

ARIZONA

Zonia, via Kirkland, Yavapai Co., Ariz. Owned by C. H. McMahan and brothers. **Property:** the Zonia mine and a group of 9 claims, unpatented, south of Zonia, shows irregular bedded veins in micaceous schists, carrying small and bunched shoots of high-grade oxidized ore. Small shipments of 5 to 6% ore have been made. Property was under option to Shannon Copper Co. interests in 1911, but was relinquished.

Development: consists of several shallow shafts. Assessment work only done in 1915. Planning to sink a 450' vertical shaft. See Old Vesuvius mine.

McMILLAN ZINC CO.

WISCONSIN

Offices: Platteville and Hazel Green, Grant Co., Wis. **Officers:** A. C. McMillan, pres.; Henry Hornischfeger, v. p.; H. B. Morrow, sec.-treas.; preceding, with L. C. Dagenhardt and C. M. Echols, directors; L. C. Dagenhardt, supt., Hazel Green.

Inc. Aug. 3, 1914, in Wis. Cap., \$100,000; shares \$1 par. Annual meeting, August 14. Operating expenses for 1915 are given as \$34,536 with no income, due to fact that the company was putting the property in shape to produce.

Property: 100-acre lease, at Hazel Green, said to show zinc and lead sulphides occurring in a disseminated deposit in Galena limestone formation. **Development:** 180' vertical shaft.

Equipment: includes steam hoist, 300 cu. ft. air compressor, pumps and a mill, capacity 400 tons per 20 hours.

Operations in 1915 consisted of sinking the shaft 160', building concentrator and surface plant. The only output was that obtained from shaft sinking.

McMILLEN-STONEWALL MINING CO.**ARIZONA**

Globe, Gila Co., Ariz. V. Y. Smith, pres. and gen. mgr.; C. N. Lightle, sec.-treas. Inc. March 27, 1907, in Arizona. **Cap.**, \$1,000,000; shares \$1 par.

Lands: 34 claims, in the Richmond basin, 16 miles N. E. of Globe, carry 3 miles of the strike of the Stonewall Jackson vein, of 25 to 35' average width. Property includes the Stonewall Jackson mine, worked 1876-83, with an estimated production of about \$500,000 of silver ore, of high average grade.

Development: by the 300' three-compartment McMillen shaft and the old 600' Stonewall Jackson shaft, latter showing no stoping down below 230'. The mine is said to have considerable ore carrying 5 to 50 oz. silver per ton, with about 40,000 tons of discarded silver ore on the old dumps.

Equipment: includes an old stamp mill and a small cyanide plant. A full and favorable report on the property was made, May, 1912, by R. B. Wagner.

In 1914 property was bonded to G. H. Hayes and explored by diamond drilling, which proved unsatisfactory owing to the broken nature of the ground. Shaft sinking is now proposed.

MEADOW MINING CO.**MICHIGAN**

Idle. **Office:** c/o C. A. Wright, sec., Calumet, Mich. Mine near Copper Falls, Keweenaw Co., Mich. Inc. 1898 in Michigan. **Cap.**, \$1,500,000; shares \$25 par; \$252,813 outstanding; 37,500 shares were given in payment of property. Is a reorganization of the Meadow Mng. Co., inc. 1863, under special Michigan charter. Is controlled by the Keweenaw Copper Co.

Property: 364 acres, adjoins the Humboldt and Phoenix mines and carries the Ashbed lode, which was first opened 1851, with a little mining previous to 1860. Where the Ashbed is crossed by transverse fissures, bunches of ore occur and such places usually show pits of prehistoric miners. Fully described Vol. II, Copper Handbook.

MEDIA MINING CO.**MISSOURI**

Webb City, Mo. Has a lease on Guinn land, north of Webb City, covering the site of the old Hold Out mine. **Ore:** zinc sulphide, in sheet ground formation at a depth of 230', with ore faces 9' high. Company recently completed one of the largest mills in the Missouri-Kansas-Oklahoma district, capacity 600 tons per ten hours. Equipment of mill includes two 18" crushers, 3 sets of 42" rolls, two 48"x96" trommels, jigs and tables. Mill can treat 2% ore profitably. Concentrates assay about 59% zinc, with only a trace of lead. Steam power is used.

MELCHER MINING & MILLING CO.**IDAHO**

Office: 409 Hooper Blk., Salt Lake City, Utah. Mine office: Albion, Cassia Co., Idaho. Samuel McIntyre, Sr., pres., gen. mgr. and treas.; R. M. Wilkinson, sec. and purch. agt.; P. McIntyre, supt. Inc. in Utah. **Cap.**, \$1,000,000; shares \$2 par; issued, 410,000 shares.

Property: 37 claims, including former holdings of the Cumora Mining Co., bought 1912, in the Stokes district, 38 miles from a railroad. Country rock is schist, granite and quartzite, orebodies occurring as fissure veins in both schist and granite. The vein developed runs N. 10° E. and dips 68° west.

Development: by two shafts and 3 tunnels, one 3,290' long. Shows a 3' vein of chalcopyrite and galena and lead carbonates said to average about 1% copper, 10% lead, 5 oz. silver and \$5 gold per ton.

Equipment: includes 200-h. p. steam and water power plant, 5-drill air compressor and 6 small buildings. Company developing vein in Giant tunnel and driving the Melcher crosscut tunnel to crosscut the 3 veins, at last accounts.

MELTZER MINING CO.**MEXICO**

See Copete Consolidated Copper Co.

MELONES MINING CO.**CALIFORNIA**

Office: 131 State St., Boston, Mass. **Mine office:** W. G. Devereux, mgr., 800 Powell St., San Francisco, and Melones, Calif. **Officers:** W. E. C. Eustis, pres., Boston; A. H. Eustis, sec.-treas.; C. Minot Weld, James Parker, Frank Lyman, W. B. Devereux, T. H. Watkins and W. C. Ralston, directors. **Inc.** in West Virginia. **Cap.,** \$400,000; shares \$1 par; nonassessable; 275,000 issued. Bonds authorized \$500,000, \$400,000 outstanding; no interest has been paid on bonds since 1906. State St. Trust Co., Boston, Mass., transfer agent. Annual meeting, 3rd Wednesday in March.

Property: 16 claims, 152 acres, on Carson Hill, has been steadily operated since 1898. **Ore:** gold, occurs in a quartz vein in schist with N. W.-S. E. strike and a dip of 70° N. E.

Development: by 5 tunnels to the 1,100' level, the main working level, which is 5,000' long and cuts the vein at 4,000' from the portal. At this point a 3-compartment shaft has been sunk on the vein to the 1,350' level, below which the vein dips 50° and the shaft continues in it to the lowest level, at 1,750'. There are about 3 miles of underground workings. Above the 1,100' level the ore is mined by glory holes; below, shrinkage stoping is used. Ore is trammed from mine to mill in 8-ton cars hauled by a d. c. 500-volt locomotive.

Equipment: includes double-drum electric hoist, driven by 250-h. p., 220-volt induction motor, hoisting 3½ ton skips at the rate of 1,000' per minute, and air compressor.

Mill: 120 stamps, weight 1,050 lbs. each, dropping 7", 102 drops per min., crushing 5 tons ore per stamp through 20-mesh screen; outside amalgamation is used; battery pulp from sluices to classifying cones, and concentrated on Wilfley tables and Frue vanners; middlings elevated, reclassified and reconcentrated; concentrates to a 20-ton cyanide plant, capacity 600 tons per month. Concentrates assay \$30 to \$50 per ton. Value of ore milled is \$2 to \$2.50 per ton; extraction 83%; loss in tailing is \$0.25 per ton. Cyanide plant makes a 92% extraction. Total operating cost is about \$1.60 per ton. Production figures not available; 201,150 tons said to have been treated in 1915 with gross value of \$716,000. See Mines & Mining Resources of Calaveras Co., Calif. State Mineralogists' Report, 1915, pp. 93-96.

MEMPHIS & IDAHO SPRINGS GOLD M. & M. CO. COLORADO

Idle. Mine near Idaho Springs, Clear Creek Co., Colo., J. J. Williams, pres.; Wm. M. Slack, sec.-treas., at last accounts. **Inc.** in Colorado. **Cap.,** \$1,500,000; shares \$1 par, nonassessable.

Property: 14 claims, patented, carry veins with lead, copper and zinc sulphides. Mine is developed by shafts of 125', 250' and 460' and is tapped at depth of 2,350' by the Newhouse tunnel. **Equipment:** includes 22-h. p. electric hoist and air compressor. Was leased to John Kuykendall of Denver in 1915.

MEMPHIS MINING CO.**NEW MEXICO**

Office: 204 Mills Bldg., El Paso, Texas. **Mine office:** Organ, Dona Ana Co., N. M. **Officers:** J. I. McCullough, pres.-mgr.; W. N. Small, v. p.; Jas C. White, sec.-treas., with T. S. Semple, Chas. E. Head, directors. **Inc.** 1911, in Arizona. **Cap.,** \$1,000,000; shares \$1 par; 650,000 shares outstanding. Gross earnings in 1915 amounted to \$27,841, all from ore sales.

Property: 5 claims, 100 acres, is the old Torpedo, or Memphis copper mine. Developed by 4 shafts, showing veins 1-25' wide, said to carry copper ore assaying 10% copper, 6 oz silver, \$3 gold per ton. Worked under

lease 1914-15 and ore shipped to El Paso, Tex. Reported taken over by Phelps, Dodge & Co. in 1916.

MENDHA-NEVADA MINING CO.**NEVADA**

Office: Commercial Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Lincoln Co., Nev. T. J. Osborne, pres.; M. C. Godbe, sec. **Cap.** \$1,000,000; shares \$1 par.

Property: is said to have produced \$500,000 under its former ownership. The mine is reported to have a vein 3 to 15' thick, averaging 6', practically vertical and showing silver and gold-bearing lead and copper ores on 700' level. Development is by a 900' incline shaft.

MERCER SILVER MINES, LTD.**ONTARIO**

Offices: 103 Bay St., Toronto and Cobalt, Ont. **Officers:** Harry Worth, pres.; F. W. Zoller, v. p.; R. F. Segsworth, sec.-treas., with R. F. Robertson and W. E. Segsworth, directors. A. C. Bailey, supt.

Inc. July, 1915. **Cap.**, \$1,000,000. Company is closely identified with the Seneca Superior Mines, Ltd. Has a 10-year lease from the Peterson Lake Co., on property adjoining the Seneca-Superior, formerly leased by Gould Cons. Mines, Ltd. The Peterson Lake Co. will receive 25% royalty on smelter returns.

MERCHANTS FINANCE CO. (Western Metals Co.) CALIFORNIA

Address: Los Angeles, Calif. Company in 1915, built an antimony smelter at Industrial Harbor, Los Angeles, operated antimony mines in Calif. and Nev. and bought ores from the Western States, Alaska and foreign countries. The largest production was made from deposits of antimony ochre and stibnite near Wild Rose Spring, on the N.W. slope of Telescope Peak in the Panamint Range, Calif. These deposits known for many years, have been too far from transportation to be profitably worked until the high prices of antimony in 1915 and the completion of a railroad to Trona on Searles Lake, 25 miles from the property made their exploitation possible. The company also worked deposits 30 miles N.E. of Mojave, Kern Co., Calif.

MERCURY MINING CO. (Quicksilver).**NEVADA**

G. D. Abbott, sec., 1022 Crocker Bldg., San Francisco, Calif., **Mine office:** Ione, Nye Co., Nev. **Officers:** F. B. Bradley, pres.; M. L. Requa, v. p.; G. D. Abbott, sec.-treas.; preceding with John H. Mackenzie, W. E. Goldsworthy, supt.

Inc. May 7, 1910, in Nevada. **Cap.**, \$1,000,000, all outstanding; shares \$1 par. Annual meeting second Wednesday in January.

Balance sheet for 1915 shows assets: \$48,517, which include: property and plant, \$32,489; supplies, \$1,902; stock, \$5,950; cash, \$5,308; surplus, \$2,868. Liabilities include operating accounts, \$44,945; reserve account, \$3,572.

Comparative Operating Statement:

	Gross Earnings	Operating Expenses	Operating Profits
1915.....	\$44,127	\$26,299	\$17,828
1914.....	16,110	17,868	1,758 (d)

(d) Deficit.

No dividends have paid.

Property: 10 patented claims near Ione, Nevada, said to show cinnabar ore. Company has one 25-ton Scott furnace in operation.

Production: in 1911-12, 9,467 tons ore, 2,480 flasks mercury; in 1913, 7,715 tons ore, 1,013 flasks mercury; in 1914, 2,100 tons ore, 384 flasks mercury; in 1915, 5,375 tons ore, 417 flasks mercury. Flasks contain 75 lbs. mercury.

MERGER MINING CO., LTD.**IDAHO**

Purchased property of the Mizpah Copper Mining Co., Ltd., paying for same in stock. **Address:** J. C. Northrup, Palouse, Wash. **Mine office:** Harvard, Latah Co., Idaho. **Officers:** J. C. Northrup, pres. and gen. mgr.; C. E. Frederick, v. p.; W. E. McCroskey, sec.; G. A. Weldon, treas. **Inc.** Oct. 15, 1913, in Washington. **Cap.**, 3,750,000 shares; \$1 par; nonassessable.

Property: 18 claims, 318 acres, known as the Hoodoo mine, well watered and timbered, on Copper mountain, near the Palouse river, in the Hoodoo district, Latah county, almost 40 miles from Palouse, with a 20-mile wagon-road to Harvard, and 10 miles from the Puget Sound railway. The property shows quartzite and schist, with 8 fissure veins in quartzite, serpentine and schist, having a N. E. strike, and a dip of about 40°. Two veins, partly developed, are estimated by the management at 40' average width, carrying cuprite, malachite, chalcocite and chalcopyrite, latter associated with pyrrhotite, with quartz and limestone gangue, said to average 6% copper, 2 oz. silver and \$2 gold per ton. The veins are traceable 2,000' on the company's lands by outcrops showing carbonates and there are intrusive porphyry dikes.

Development: includes 5 tunnels and a shallow shaft, with about 2,000' of workings, estimated by the management to show 100,000 tons of ore.

Equipment: includes 60-h. p. gasoline power, with a 3-drill air compressor. There are 16 buildings. Idle in 1914-1915. Planning to resume operations, 1916.

METAL DE COBRE; COMPANIA MINERA.**MEXICO**

Mine near San Antonio de la Huerta, Ures, Sonora, Mex. **Inc.** in Mexico as holding company of the Rio Yaqui Copper Co.

METALINE LEAD & ZINC CO.**WASHINGTON**

Controlled by Lewis P. Larsen and Jene Jensen, of Metaline Falls, Wash. **Property:** the Josephine mine at Metaline Falls, Pend Oreille district, was the only zinc producer in Washington in 1915. Mine is being prospected by diamond drilling. Equipped with 250-ton ball concentrating mill and aerial tram.

METALINE ORIOLE MINING CO.**WASHINGTON**

Metaline, Pend Oreille Co., Wash. Fred N. Davis, pres. and gen. mgr.; Thos. R. L. Harris, sec.; Joseph Lancaster, mg. eng. **Inc.** Dec. 30, 1910, in Washington. **Cap.**, \$1,500,000; shares \$1 par, assessable. Total calls to end of 1912, \$30,000.

Lands: 5 claims, 100 acres, and a 5-acre mill site, unpatented. Property has a fissure vein in quartzite 6 to 8' wide, carrying about 1% copper, 12% lead, 25% zinc, with silver and gold values. **Development:** by 200' shaft and tunnels of 50', 400' and 750'. A 100' incline shaft sunk on the vein from the lower tunnel shows ore throughout a 70' drift. **Equipment:** includes steam power, with small hoist and 3-drill air compressor. Company planning to erect a 50-ton mill in 1916.

METALLURGICAL COMPANY OF AMERICA.**UNITED STATES**

Office: 61 Broadway, New York. **Officers:** C. M. Loeb, pres. and gen. mgr.; B. Hochschild, v. p.; Otto Sussman, treas.; preceding with Richard Merton, Theo. Sternfeld and Edw. Randolph, directors; Julius Goldman, sec. **Inc.** May 19, 1904, in New Jersey. **Cap.**, \$100,000; shares \$100 par; issued for the purpose of exploiting mining and smelting enterprises. Annual meeting second Tuesday in April, at Jersey City, N. J.

METALS CHEMICAL CO.**ONTARIO**

Welland, Crowland Twp., Ontario. **Officers:** C. S. Richardson, pres.; J. H. Charles, sec.-treas.; K. S. MacLachlan, supt. Operates a plant for

the treatment of cobalt ores, near Welland. **Equipment:** includes one small blast furnace, one roasting furnace, one reverberatory furnace, 15 leaching vats, 7 filter presses, one crystallizing plant, 2 bag-houses. Electric power is used. Company employs 35 men. Output is silver, arsenic, oxides of cobalt and nickel, and various cobalt and nickel salts.

METALS MNG. CO. See Sheldon Mng. Co.

METEOR SILVER MINING CO., LTD.

ONTARIO

Cobalt, Ontario. **Officers:** D. Crawford, pres.; D. D. Flanagan, v. p. and gen. mgr. In 1915, company was developing its property on the side of Diabase mountain, near the Savage mine. In 1914, 310' of new work was done. Fifteen men employed.

METHOW GOLD & COPPER MINING CO.

WASHINGTON

Winthrop, Okanogan Co., Wash. **Officers:** W. D. Scott, Spokane, pres.; W. G. Traub, v. p.; J. N. Tewinkel, sec.-treas.; W. D. Scott, W. B. Traub and N. O. Baldwin, directors. Inc. 1889, in Washington. Cap., \$1,500,000; shares \$1 par.

Property: 8 claims, patented, 150-acres, shows fissure veins in Algonkian rocks. The sulphide ores assay 9% copper, 2 oz. silver and \$5.50 gold per ton. **Development:** includes 3 tunnels, longest 564', and a 52' shaft. Has available water power and timber. Idle, except for annual assessment work, on account of lack of transportation.

MEXICAN EXPLORATION & MINING CO.

MEXICO

Controlled by Pacific Smelting & Mining Co.

MEXICAN GOLD AND SILVER MINING CO.

NEVADA

Offices: 265 Russ Bldg., San Francisco, Calif., and Virginia City, Nev. **Officers:** H. L. Slosson, Jr., pres.; Herman Zadig, v. p.; with Whitman Symmes, directors. Chas D. Olney, sec.

Inc. 1874, in Calif. Cap., \$201,600; shares \$1 par; assessable; all issued. In Jan., 1916, assessment No. 103, 10c per share, was levied. No. 2 was levied Dec. 6, 1910. Stock transferred at company's San Francisco office. Annual meeting, first Tuesday in December. Listed on New York Curb and San Francisco Exchange.

Property: 1 claim and 5 fractions, patented, on the Comstock lode, at Virginia City. During the height of the Bonanza excitement the stock sold for over \$100 per share in spite of the fact that not a ton of pay ore was found. Owing to its favorable location at the north end of the Comstock, it was always a favorite stock and levied and collected upward of \$4,000,000 in assessments. In 1911, the present management obtained control from the stock brokers who formerly mismanaged things so badly on the Comstock, and having resolved to prospect the hanging-wall for fractures, were rewarded by finding an orebody yielding over \$1,400,000 which enabled them to build a modern mill, equip the mine, contribute heavily toward the pumping of the Comstock lode, and pay two dividends aggregating nearly \$200,000.

The Comstock lode is a great fissure vein filling a fault plane. The main body of the lode is a belt of quartz and vein matter, 10,000' long and several hundred feet broad with a general strike N. 15° E. At each extremity of this main fissure the lode ramifies into diverging branches. The east or hanging-wall is diabase throughout the entire 10,000' of the main lode, and for some distance on the S. E. and N. E. branches; it is in an extreme state of decomposition. The foot wall of the main fissure is diorite for more than $\frac{3}{4}$ of its length, but at the southern end is chiefly composed of metamorphic slates; it is much less altered than the hanging. Accompanying the vein for half its length is the narrow dike of younger diabase called the "black dike". Contents of the vein are simple, on the

whole consisting of country rock in fragments varying from very small to several thousand feet in length, clay, quartz, and argentiferous minerals. With few exceptions all of the orebodies of any importance were found close to the diabase, while the Gold Hill bonanzas rest upon metamorphic rocks. The geology is described in detail in U. S. G. S., Monograph, No. 3.

Development: the principal mining now being done is on the 5 north end mines; from north to south these mines are the Sierra Nevada, Union Mexican, Ophir and the Cons. Virginia. At present ore is being extracted on the 2,500' level and above in the Union and Sierra Nevada; the Union, producing approximately \$1,000 per day for the first four months of 1916. Ophir is beginning to extract low-grade ore above the 2,500' level near the old stopes from which about \$4,000,000 has been taken in the last ten years; also exploring the 2,700' level. Cons. Virginia and Mexican are also prospecting on the 2,700' level. The Mexican orebody which yielded about \$1,400,000, was worked out two years ago; search is now being made for the downward continuation of the shoot. A recent report states that good ore has been found below the 2,700' level, which will necessitate unwatering the Northend mines to the 2,900' level. This is not serious as the flow of water below the 2,500' level is less than 1,000 gallons per minute.

The ore now being mined comes from the contact and hanging-wall fissures: it has a quartz gangue, with lead-zinc-silver-copper sulphides, zinc predominating, and carries free gold and argentite. Average value of shipping ore about \$35 per ton; of milling ore \$10 per ton.

Equipment: includes 3 electric hoists of 25-h. p. 112-h. p and 150-h. p; electric pumps; two compressors, 75-h. p. and 100-h. p. each; and an 80-ton all slime cyaniding plant effecting an extraction of 93.2%.

Recent production has been: 19,396 tons in 1912; 29,365 tons in 1913; 11,150 tons in 1914; 3,404 tons in 1915.

MEXICAN LEAD CO. See *Mexicana, Cia. Met.*

MEXICAN METALS CO.

Office: 35 Congress St., Boston, Mass. **Officers:** Geo. E. Keith, pres.; Geo. H. Woodman, v. p.; Sumner M. Teele, sec.; Harold C. Keith, treas., with William Brocken and Eldon B. Keith, directors. August Fritsche, gen. mgr.

Inc. Aug. 16, in Arizona. **Cap.,** \$5,000,000; shares \$5 par; assessable; \$2.25 paid. Company succeeded the Arizpe Mines Co. and holds title to property through the Moctezuma-Arizpe Development Co., legalized in Mexico. Old Colony Trust Co., registrar; Federal Trust Co., transfer agt. Annual meeting, second Monday in September.

Mexican property near Cananea, Sonora, Mex., closed down in autumn of 1914. After geological survey of property made by J. M. Little, checked by A. H. Rogers, Boston and Franklin W. Smith, of Bisbee, it was decided to sell or abandon such property as directors considered unworthy and to invest capital in stock of Cananea M. & D. Co., or to purchase new properties. Fully described Vol. XI, Copper Handbook.

MEXICAN MILLING & TRANSPORTATION CO. **MEXICO**

See Guanajuato Development Co. (Pinguico Mines Co.)

MEXICAN SMELTING & REFINING CO. **CALIFORNIA**

Office: 82 Beaver St., New York. A subsidiary of the Compania Metalurgica Mexicana and holds title to the Blue Ledge mine in Siskiyou Co., Calif., which see.

MEXICANA; COMPANIA METALURGICA. **MEXICO**

Offices: 82 Beaver St., New York, and No. 26, Ave. 16th de Septiembre,

Mexico City, D. F. Mine offices: Sierra Mojada, Coahuila, Mex., and Concepcion del Oro, Zacatecas, Mex. Works office: San Luis Potosi, S. L. P., Mex. **Officers:** D. C. Brown, 1st v. p.; C. J. Peabody, 2nd v. p.; R. E. Safford, sec., asst. treas., preceding with H. H. Dean, G. F. Peabody and R. H. McCarter, **directors.**

Inc. 1890, in New Jersey. **Cap.**, \$4,000,000; shares \$100 par; fully issued; in \$1,000,000 cumulative 8% preferred stock, \$1,250,000 guaranteed 6% second preferred stock, and \$1,750,000 common stock. \$3,000,000 first-mortgage 5% bonds authorized, due July 31, 1931, with a 2% annual sinking fund. bonds being subject to call at 110 and accrued interest; issued, \$2,774,700. Company is not a dividend payer. Guaranty Trust Co., New York, registrar. Annual meeting, first Monday in June.

The company's interests are extensive, including control of numerous subsidiary mining, transportation and land companies, among the more important being the Sombrerete Mining Co. and the Mexican Lead Co., at Sombrerete, Zacatecas, Tex., the Montezuma Lead Co., Alvarez Lead & Timber Co., Mexican Mineral Railway Co., and Potosi & Rio Verde Railway Co.

The Veta Rica mine owned outright at Sierra Mojada, is an important silver-lead producer. Development is by a 600' main shaft and values are mainly in lead and silver.

Other important producers are the silver-copper mines at Concepcion del Oro, developed by tunnels. The San Pedro and San Pablo mines at Monterey are also important producers of lead and the mines of the San Pedro district at San Luis Potosi are heavy producers of silver, gold and lead ores.

The smelter, treating about 1,000 tons daily, has a modern equipment, including 12 furnaces for the reduction of gold, silver and lead ores, and a special copper department of 100 tons daily capacity. The works have steam and electric power, and employ about 1,000 men. In addition, there has lately been completed the Carmen 250-ton cyanide plant for cyanidation of lower grade ores from the San Pedro mines.

The company is a large producer of lead and silver, with outputs of copper and gold, secured mainly as byproducts, and is active and enterprising in the rejuvenation of old properties and the development of new mines.

Companies controlled by Compania Metalurgica Mexicana.

Mexican Lead Co.

Office: 82 Beaver St., New York. **Officers:** C. J. Peabody, v. p.; R. E. Safford, sec.; with W. F. Gillesby, Acosta Nichols, D. C. Brown, and G. F. Peabody, **directors.**

Inc. July 31, 1899, in New Jersey. **Cap.**, \$5,750,000 common and \$1,250,000 7% cumulative preferred; all outstanding; \$100 par. Stock transferred at company's office. Annual meeting, third Tuesday in February.

Property: lead mines located near Monterey, Mex. Idle at present on account of the revolution.

Montezuma Lead Co.

Office: 82 Beaver St., New York. **Officers:** same as Mexican Lead Co. **Inc.** Dec. 30, 1899, in New Jersey. **Cap.**, \$2,500,000 Com. and \$500,000 7% cumulative Pfd.; shares \$100 par. Annual meeting third Tuesday in February.

Property: lead mines in State of Chihuahua, Mex. Idle at present on account of the revolution.

MEXICANA MINING CO.

MEXICO

Is the operating subsidiary company of the Keystone Mng. Co., of Shamokin, Pa., which see.

MEXICO MINES OF EL ORO, LTD.

MEXICO

Offices: 2 St. Helen's Place, London, E. C., and 18 Rue Laffitte, Paris. **Directors:** E. M. Clarke, Don Guillermo de Landa y Escandon, F. J. Fourmier, H. Higgins, and Sir R. J. Price, M. P. F. L. Allan, resident manager, El Oro, Mexico; J. Vincent, asst. mgr.; C. R. Pinder, cons. engr.

Reg. Oct. 14, 1904, in England. Cap., £210,000; shares £1 par; increased from £180,000 in July, 1914; 180,000 shares issued and fully paid; 30,000 to be issued for acquisition of the Nolan properties.

Financial statement for year ending June 30, 1914, issued July 30, 1915, showed receipts, £320,262 with profits of £169,421, balance forward, £247,340; dividends absorbed, £162,000; permanent improvements, £2,109; tax reserve, £7,702; leaving £75,529 carried forward.

Financial statement for year ending June 30, 1915, issued in Paris, Feb., 1916, shows profits of £24,811; balance forward, £100,341; absorbed by improvements, £2,214; tax, £7,000; leaving £91,127 carried forward.

Dividends: including bonuses—

Year	Year
1907-8.....5s.	1911-12.....16s.
1908-9.....12s.6d.	1912-13.....18s.
1909-10.....14s.	1913-14.....18s.
1910-11.....16s.	

Property: company was formed to acquire by agreement with the Exploration Co., Ltd., 26.63 hectares, 65.79 acres, total with surface rights, 75 acres, adjoining the Esperanza mine, near the town of El Oro, Mex. The land, formerly held by the Mexico Venture Syndicate, Ltd., includes the Mexico gold and silver mine.

The properties of the Compania Miniera de Oro Nolan were acquired in Jan., 1915, for 30,000 fully paid shares.

The ore is gold-silver, occurring in fissure veins. **Development:** by shafts. The North shaft is 1,547' deep, the South shaft, 1,687'. **Equipment:** includes a 40-stamp mill, 7 tube mills, and a cyanide plant.

Milling operations started in Oct., 1907, were suspended in April, 1914, owing to revolutionary conditions. In year ending June 30, 1915, the mill worked 5 months. At the end of 1915 the mine was producing a limited tonnage, but supplies were rapidly becoming exhausted, with little prospect of obtaining transportation for more.

Production:	Tons Milled	Yield	Value p.t.	Costs p.t.	Profit p.t.
1914-15.....	30,825	£ 84,650	\$....	\$...	\$...
1912-13.....	158,395	1,669,540	10.5	4.1	6.5
1911-12.....	142,884	1,555,095	10.8	4.3	6.5
1910-11.....	136,408	1,528,229	11.2	4.3	6.9
1909-10.....	136,372	1,392,336	10.2	4.7	5.5
1908-9.....	101,105	1,257,560	12.4	5.6	6.7
1907-8.....	62,394	807,971	12.9	6.3	6.6

MEXICO MINING, REFINING & EXPLORATION CO. MEXICO

Office: 501 I. W. Hellman Bldg., Los Angeles, Calif. **Officers:** Wm. T. Calderwood, pres. and gen. mgr.; Dr. Chas. B. Nichols, v. p.; F. C. Lamb, sec.-treas.; preceding with E. B. Lovie, C. A. Neil, L. A. Davis and A. A. Snodgrass, directors. B. A. Ogden, supt.; A. Wainwright, engr. **Inc. 1905, in Arizona. Cap., \$5,000,000; shares \$1 par; nonassessable. Annual meeting, second Monday in April, at Nogales, Ariz.**

Property: 260 acres, El Creston de Cobre mine, about 35 miles west of

Hermosillo, shows dolomite and granite and is an *antigua* dating from the eighteenth century. The property carries 4 orebodies, of which 2, reported by company as of 30' average width, and traceable 1,400', carry copper ores averaging 4% copper, 8 oz. silver and \$1 gold per ton. **Development:** by 8 shafts, deepest 300', and 4 tunnels with 1,000' of workings, estimated by the company to show 100,000 tons of ore.

La Cobriza mine, at Soyopa, is said to show a 16' vein with a 7' pay-streak, carrying copper-silver ore.

Equipment: includes 235-h. p. steam plant, 2 hoists, 6-drill air compressor, and 20-ton mill. Company was planning, 1913, to erect a 100-ton smelter. No recent information secured. Probably idle owing to conditions in Mexico.

MIAMI COPPER CO.

ARIZONA

Office: 61 Broadway, New York. **Mine office:** Miami, Gila Co., Ariz. **Officers:** Adolph Lewisohn, pres.; J. Parke Channing, v. p.; Sam A. Lewisohn, treas.; preceding with Hermann Sielcken, J. H. Susmann, Wm. H. Nichols, Walter T. Rosen, F. W. Estabrook, B. Hochschild and Theo. L. Herrmann, directors. Herman Cook, sec.; B. Britton Gottsberger, gen. mgr.; F. W. MacLennan, asst. mgr.; F. W. Solomon, mill supt.; W. F. Williams, chief clerk; Arthur Stonham, auditor.

Inc. Nov. 30, 1907, in Delaware. **Cap.,** \$3,000,000; shares \$5 par; increased Nov., 1909, to \$3,500,000, and again increased Aug., 1910, to \$4,000,000; issued, \$3,735,570. Of this last increase in capitalization, 60,000 shares were offered to stockholders at \$18 per share. Of the issued stock, 300,000 shares were given, Nov., 1907, in payment for lands; 200,000 shares were issued April, 1908, at \$5 per share; 100,000 shares were issued Aug., 1908, at \$10 per share; 60,000 shares were issued Aug., 1910, at \$18 per share, and of the balance, 88,236 shares were set aside for conversion of bonds, and 52,886 shares remain unissued. Debentures, \$1,500,000 first-mortgage 10-year 6% gold bonds have been retired.

The company is controlled, through stock ownership, by the General Development Co. Mechanics & Metals National Bank, New York, and Old Colony Trust Co., Boston, registrars; Bankers Trust Co., New York, and American Trust Co., Boston, transfer agts. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, third Wednesday in April.

Comparative General Balance Sheet:

Assets:	Property & Equip.	Devel.	Metal on Hand	Other Current	Stock Invest.	Total
1915.....	\$4,593,765	\$1,416,994	\$3,017,566	\$299,163	\$100,000	\$9,427,488
1914.....	4,465,743	1,535,208	966,489	471,712	100,000	7,539,152
Liabilities:	Capital Stock	Bonds	Surplus(a)	Pay. Acc'ts	P. & L. Acct.	Total
1915....	\$3,735,570	\$.....	\$1,995,412	\$521,161	\$3,175,345	\$9,427,488
1914....	3,735,560	19,000	1,995,412	341,392	1,447,788	7,539,152

(a) Premium on shares, less expense of issue.

Dividends: started in 1912, were paid regularly until Oct., 1914; resumed in May, 1915, at rate of 50 cts., and increased 25c each quarter since: \$1.50 per share in 1912; \$2.00 in 1913; \$1.50 in 1914; \$2.25 in 1915; \$2.75 (to May 15) in 1916.

Property: 222 acres, mining claims, patented, 555 acres held for the mill and power plant and 345 acres for water rights, in the Miami district, 6 miles west of Globe. Claims show an area of silicified schist at and near a contact with a great intrusive body of granite, known as Schultze granite. The altered schist belt averages about 1,200' in width and has a generally

E.-W. direction. The granite merges into granite porphyry at its borders, and this and offshoots, or dikes of the granite in the schist, are mineralized along the ore belt. This is seen in a dike with E.-W. strike, of 40 to 60' width, mineralized in the same manner as the schist.

The schistose area is netted with contraction fractures and later fissuring due to metasomatic changes of volume, accompanying mineralization and alteration. The ore belt is marked by silicification and intense alteration of the schist, a change that fades out into natural gray schist a few hundred yards north of the Miami and Inspiration mines. The ore zone is oxidized and leached to an average depth of 210', this part containing small seams and veinlets of oxidized ore. Below this leached belt a few feet of mixed ore is succeeded by the zone of disseminated glance, a rather soft, much altered rock specked with tiny glance grains and films.

Development: has been by extensive underground operations, supplemented by churn drilling. Up to the end of 1914 drill holes of 605' average depth had been drilled to the number of 73. Drill holes were put down at the corners of 200' squares and practically all of them cut ore, carrying from 110 to 210' in thickness and ranging from 2 to 2.5% in copper tenor. Drill borings in the vicinity of the mine have shown commercial ore to at least 115' additional depth below the 720' level of the mine.

The mine is worked by a very large main shaft with 3 others sunk during prospecting operations and development. The latter are known as the Captain, Red Springs and Red Rock shafts. The Red Rock shaft with 3 compartments is 720' deep, and is sunk in about the center of the mineral deposit. All of the ground around this shaft has been mined practically to the 370' level and use of shaft has been discontinued. The Red Springs shaft, 2,150' N. W. of the Red Rock, has 3 compartments and is 422' in depth, sunk through surface capping into ore. The Captain shaft, the first shaft put down on the property, was stopped at 210', but in 1913 was deepened to 420' and a tramping level prepared for stoping and ore extraction.

The Miami, or main workings, 5-compartment shaft, equipped for ultimate production of 5,000 tons of ore daily, is sunk outside the proven mineral zone in order to be immune from caving and is bottomed in granite at depth of 720', the first 450' being through conglomerate. It is 12x16' inside of timbers with 15x19' outside dimensions and framed with Louisiana long-leaf yellow pine, preserved by the use of 12 lbs. of creosote per cubic foot. The timber was creosoted after framing by the International Creosoting & Construction Co., of Galveston, Texas, at a charge of \$20 per 1,000' board measure.

As the mine has a solid orebody, the upper levels are opened in the ore zone at only 50' intervals, with sub-levels between each, giving ore developed in slices of only 25' vertical depth. Ore is blocked out horizontally by 5x7' drifts, with centers spaced 100' apart, while on the upper levels there are drifts with centers spaced at 50' intervals, blocking out ore in cubes of various sizes, but with all dimensions that are multiples of 25'. On account of the thickness of the ore, it is planned to extract it in two sections, the upper one consisting of the ore above the 270' level, from which point a transfer will be made through specially prepared raises to the main tramping level, the 420' level. The 420' and 570' levels have 1,000-ton loading pockets. Ore is hauled in trains of twenty 2½-ton ore cars by 6½-ton electric locomotives.

Development: work in 1915 amounted to 21,746', as compared with 22,865' in 1914. Total amount of underground workings at close of 1915 amounted to 248,560'. There being practically no waste in the mine, within the limits of the ore zone, the most serious problem was to devise a method

by which the greatest amount of ore could be extracted with the least waste. The system used is an adaptation by N. O. Lawton of the auxiliary raise and sub-level stoping method, by which about 60% of the ore will be mined in rooms and the remainder extracted by top-slicing and sub-level caving methods. This gives minimum timbering and the compactness and uniformity of the orebody make it well adapted to this plan of extraction. During 1914 an improvement in mining work was made by the addition of an artificial ventilating system, consisting of a pressure fan of 70,000 cu. ft. capacity.

Ore reserves: Jan. 1, 1916—	Tons	% Copper
High-grade sulphide ore.....	18,140,000	2.40
Low-grade sulphide ore.....	17,000,000	1.21
Total	35,140,000	1.82

In addition there are 6,000,000 tons partially developed mixed sulphide and oxide ore of an approximate grade of 2% copper. These figures are reliable, because of the unusually thorough manner in which the ore has been developed and blocked out and the well-known conservatism of the management. A very large part of this ore is actually blocked out underground, and the estimated average percentage is based upon thousands of careful assays, made of samples taken at 5' intervals, throughout the workings. There remains a considerable portion of the mineral ground yet to be tested, of which a large aggregate area should have ore. It is probable that further development of the mine will develop more or less additional ore, possibly above what is considered the present payable limits, probably below, and almost certainly in the lateral extensions.

The power house is on the flat below the mine and reached by side-tracks from the main line of the Gila Valley, Globe & Northern railway. Power generates compressed air at 90 lbs. initial pressure, and a 25-cycle alternating current at 6,600 volts. There are three 4-cylinder triple-expansion engines taking steam at 185 lbs. pressure, with 100° superheat, direct-connected to three 1,000-k. w. 3-phase 25-cycle generators. There are two 4-cylinder triple-expansion air compressors with capacity of 4,000 cu. ft. of air per minute, at 90 lbs. initial pressure. Electric current is used for the mill, shops, pumps and underground traction, and compressed air is used for power drills and hoists.

The boiler house has five 600-h. p. Edgemoor water-tube boilers, generating steam at 200 lbs. pressure, equipped with Green fuel economizers and Foster superheaters, burning petroleum, and a 500,000-gal. storage tank is to be built for oil storage. The boiler plant is so designed that coal can be used with automatic stokers.

The main shaft has 2 Nordberg hoists, the larger for raising ore having 2 drums of 10' diameter with 55" face, capable of handling 1,000' of 1 $\frac{3}{8}$ " rope. An auxiliary hoist has 16x16" cylinders with a drum of 8' diameter and 6' face for hoisting the man cage. Both hoists are operated by compressed air, reheated. The ore hoist raises two 7 $\frac{1}{2}$ -ton skips which are dumped directly into the pockets of the crusher building. No. 4 shaft is planned and equipped to handle 2,000 tons of ore in 8 hours, giving a maximum productive capacity of 6,000 tons per diem.

The crusher building, at No. 4 shaft, of 6,000 tons daily capacity, has Chalmers-Williams crushers, breaking ore to 1 $\frac{1}{4}$ " size, the product being fed through two 4x10' trommels to four 62x18" rolls that crush oversize to half-inch cubes. Ore then goes by belt conveyor, Miami type, heavy duty Traylor, to the mill bins.

The concentrator, capacity 1,000 tons, designed by H. Kenyon Burch,

is located on a hillside, south of the ore deposit, permitting gravity handling, and with a large acreage nearby, available for tailings. The mill is of steel and stands on a foundation of about 15,000 cu. yds. of concrete. Ore is delivered from the crusher house, at the main shaft, by 300' belt conveyors leading to six 1,000-ton ore bins, 1 at the head of each section of the mill. Each bin is made of steel, has 30' diameter and 30' height, capacity 1,000 tons, with automatic weighing and sampling devices. The sections being similar, a description of one answers for all save the sixth unit.

From the bin ore goes by conveyor to a set of rolls, reducing pulp to $\frac{1}{8}$ " size, after which it is classified by 22-mesh screens, oversize going to Hardinge conical mills replacing the Chilean mills used at first, mill having 30-mesh. The product, with the undersize from the 22-mesh screens, goes to classifiers, the coarse product from which goes to sand concentrating tables and the finer material to slime tables, there being 22 sand tables and 30 Deister tables to each section. Concentrates go through a tunnel having 6 concrete settling tanks, in which they are dried by vacuum pumps and then taken by belt conveyors to storage tanks above the railway. Concentrates leave one side of the mill, and tailings the other.

The Chilean mills were replaced in 1915 by Burch fine crushing rolls, because the product gave an extraction of 4 lbs. of copper more than formerly, mainly due to finer grinding and additional table treatment. Capacity of mill is now 4,200 tons daily.

A 20-ton experimental plant treats mixed sulphide and oxide ores by a new process consisting of: (a) coarse crushing and removal of fine dust; (b) rough water concentration to take out coarse sulphide matter; (c) roasting of tailings from above; (d) leaching with sulphuric acid solution; (e) precipitation of copper by electrolysis and regeneration of solution with sulphurous acid gas, solution then being used again for leaching.

Concentrates formerly shipped to the Greene Cananea Copper Co., at Cananea, Mex., have been shipped to the International smelter at Miami since April 9, 1915.

The water supply of the mill comes from Pinal creek, and from 3 wells, each producing 500,000 gals. daily at the lower end of the Miami wash. Water is taken from Pinal creek by a 25,000' pipe line of 14" diameter. In addition the company buys from the Old Dominion Copper M. & S. Co. 2,000,000 gals. of water daily. Water from the Old Dominion flows to McLean's ranch, near Pinal creek, whence it is pumped by a Nordberg electric pump of 1,500 gals. capacity per minute, to a 50,000-gal. storage tank at the concentrator, and thence distributed through the works in 12" cast-iron mains.

Buildings include machine shop, warehouses, steel change house, store, boarding house, bunkhouse and upwards of 150 frame dwellings for employes, all lighted by electricity. There is a substantial office building, erected at a cost of \$15,000, a club house and recreation hall, and a hospital owned jointly with the Inspiration Consolidated Copper Co.

The mine is served by the Gila Valley, Globe & Northern railway, with standard gauge, having an excellent average grade and light curves, so that favorable freight rates are given the mine and mill.

In the Miami district the scale of wage for miners varies from \$3.50 when copper sells at 13c to a maximum of \$5 when the price is 25c per lb.

Production: begun March, 1911—

1916 (6 mos)	Tons		Oper. Cost p. Ton	Cu. Total	%	%	Cu. Rec.	Cu. In Rec. per Cncta.	Cu. T. Ore	Net Prod. Lbs. Cu. (a)	Cost Cncta. per Lb.	Selling Price Cncta.
	Treated	Mine										
	839,485			2,086	71.44	41.80	31.38	25,585,314	8,9526			
1915	1,348,122	\$1.016	\$5.79	\$1,878	2.17	75.17	41.91	32.66	41,832,059	8.765	17.331	
1914	1,096,633	1.188	4.99	1,959	2.28	69.93	39.31	31.96	33,296,010	9.204	15.349	
1913	1,068,784	1.603	.572	2,465	2.30	71.96	38.09	32.68	32,867,866	10.609	15.240	
1912	1,040,744	1.203	.650	2,042	2.39	69.39	37.02	33.21	32,832,809	9.568	16.582	
1911	445,036	1.213	.627	2,011	2.48	73.37	40.36	36.39	15,345,783	9.163	13.08	
(a) Smelter returns. Production for 1st quarter 1916 was 12,092,936 lbs. with net earnings approximately \$1,230,000.												

In 1914 the Mineral Separation Co. brought suit against the company for infringement of patent. The Miami is a property of demonstrated worth and the management is thoroughly experienced and capable. The stock is a first-class investment, with an assured long life for the mine.

MIAMI NEEDLES COPPER CO.

ARIZONA

Globe, Ariz. D. R. Williamson, pres.; F. Beston, v. p.; F. W. Ham, sec.-treas.; the above and Geo. J. Stoneman, directors. Inc. 1912. Cap., \$500,000; shares \$5 par.

Property: 11 claims on Needle mountain, about 5 miles west of Miami, slightly developed, shows altered schist and Schultze granite, the former with evidences of mineralization along narrow belts. Much of the group is covered by barren Gila conglomerate.

Is apparently succeeded by Inspiration Needles Copper Co., which see.

MICHIGAN & ARIZONA DEVELOPMENT CO.

ARIZONA

Office: 905 Metropolitan Life Bldg., Minneapolis, Minn. Mine near Helvetia, Pima Co., Ariz. C. C. Prindle, pres.; R. M. Bennett, v. p.; Chas. W. Sexton, sec.-treas. This company reorganized the Helvetia Copper Co. under a plan explained Vol. V. Formerly owned a considerable share interest in the Helvetia and about 40 undeveloped claims adjoining the Helvetia. Reported idle.

MICHIGAN COPPER MINING CO.

MICHIGAN

Office: 15 William St., New York. Mine office: Rockland, Ontonagon Co., Mich. **Officers:** John R. Stanton, pres.; Geo. W. Drucker, sec.; F. McM. Stanton, treas.; preceding officers, Jas. S. Dunstan and Alfred M. Low, directors. Samuel Brady, supt.; Henry Stubensky, clerk.

Inc. Jan. 5, 1899, in Michigan. Cap., \$2,500,000; shares \$25 par; fully issued; \$21 paid in. Last assessment levied July 19, 1915, brought the company \$76,727. The company ended 1915 with a deficit of \$117,907 compared with \$156,172 in 1914. Income, 1915, \$77,104; operating expense, \$31,253; interest and taxes, \$7,997; surplus, \$38,265. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in May. Listed in Boston.

Property: the Minnesota, Rockland and Superior mines, 4,870 acres of mineral territory, 1,466 acres of timber and miscellaneous lands and a 150-acre mill site, giving total holdings of 6,686 acres, mineral lands being in Secs. 1, 2, 3, 9, 10, 11, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26 and 27, T. 50 N., R. 30 W.

The main tract is 3 miles east and west by $4\frac{1}{2}$ miles north and south, in addition to which there are 4 scattering tracts to the westward, 1 of 40 acres, 2 of 80 acres each and 1 of 160 acres, all carrying the outcrop of the Calico amygdaloid. The Superior mine produced 567,331 lbs. fine copper, 1856-69 and 1876-79. The Rockland, lying next east of the Minnesota, was operated 1853-70, making 6,210,309 lbs. fine copper from the Minnesota contact vein which averaged about 2' width and carried considerable silver in that mine. The old Minnesota mine, opened 1847, closed 1870, made 34,704,668 lbs. fine copper and paid dividends of \$1,820,000. The Minnesota mine is fully described Vol. II, Copper Handbook.

The Michigan tracts carry the following known copper-bearing beds of the Evergreen belt: Calico, Contact, Minnesota, Branch, North Contact, Knowlton, Mass, Butler, Ogima, North Amygdaloid and South Amygdaloid, and presumably the other parallel beds, in addition to various other unidentified copper-bearing beds of the Keweenaw series. The Knowlton, or northernmost of the Evergreen belt of parallel beds, lies about 1,000' south of the old Minnesota shafts and the 7' amygdaloidal bed supposed to be the Butler, opened to some extent in Peninsula bluff, 2,000' south of

"B" shaft, shows some heavy copper and stamp rock. There are 3 old shafts on the Butler bed and a tunnel cutting several parallel copper-bearing strata. There also are cupriferous amygdaloidal outcrops north of the Calico bed on which no work has been done.

The Michigan mine has 3 shafts on the Calico bed and about 10 miles of workings. "A" shaft is 2,133' deep; "B" is bottomed at the 14th level, and "C" at the 11th level. The lode grew steadily poorer with depth and showed a tendency to pinch, being only about 5' wide on the 16th level of "A" shaft, though well charged with copper. The mine was closed down Oct., 1909, continuing about 25 men in exploratory work until the end of 1910, when the property was turned over to tributors, who continued to scram the mine with some profit to themselves and the company until May, 1913, when all work was stopped.

In July, 1915, work was resumed in the old "E" shaft, 265' deep, on the Butler lode; it was sunk to the 6th level, where drifting east and west is said to have opened a lode 7' in width, containing good copper values.

Buildings include a machine shop, smithy, carpenter shop, warehouse, office and changing house.

The mill, construction of which was begun April, 1906, is about 1 mile north of the Mass mill, on Keweenaw bay, with ample water frontage. Construction was suspended, 1907, though perhaps no more than \$10,000 would be required to complete the mill, on which about \$175,000 has been expended.

Production: 1900-1905, 6,113,500 lbs. copper; 2,875,341 lbs. copper in 1906; 2,665,404 lbs. in 1907; 3,000,206 lbs. in 1908; 1,979,305 lbs. in 1909; 36,682 lbs. in 1910; 327,773 lbs. in 1911; 162,590 lbs. in 1912. The mine in the past has proven a disappointment, and untoward financial conditions have restricted the exploratory and development work that are clearly called for. The property is very fully described in Vol. X, Copper Handbook.

MICHIGAN COPPER & GOLD MINING CO. UTAH

Mine office: Frisco, Beaver Co., Utah. **Officers:** Lawrence Green, pres.; Sam S. Porter, v. p.; Geo. Winsness, sec.; Rodney T. Badger, treas.; preceding, with H. M. Dinwoody, H. G. Williams and R. P. Morris, directors; E. Rummelmeyer, cons. engr. Inc. Dec., 1902, in Utah. **Cap.**, \$300,000, increased, 1911, to \$1,000,000; shares \$1 par. Assessment of $\frac{1}{4}$ c levied Feb., 1914.

Property: 6 claims, patented, including the New York group, near the Horn Silver mine, 1 mile east of Newhouse, in the San Francisco district and $\frac{3}{4}$ mile from the railway. Claims said to show 12 parallel veins intersecting the main contact. **Development:** by shafts of 80', 100' and 200' and a 50' tunnel. The mine has a paystreak carrying ore giving assays of 13.3% copper, 2.1% lead and 7.5 oz. silver per ton. Was developing with contract labor, at last accounts.

MICHIGAN MINING & MILLING CO. COLORADO

Office: 502 Majestic Bldg., Denver, and Kokomo, Summit Co., Colo. W. R. Benzie, sec.-treas.

Company has 5-year lease, with option to purchase, on 8 claims in the Kokomo district. Property is an old one, extensively developed, and has produced considerable quantities of gold-silver ore, but was forced to close down several years ago due to the heavy zinc penalty on the ore. Since that time it is said bodies of zinc and lead ore have been opened up and shipments started early 1916. In March, company was planning on a daily output of 50 tons.

MICHIGAN SMELTER CO. MICHIGAN

Office: 82 Devonshire St., Boston, Mass. **Works office:** Houghton,

Houghton Co., Mich. **Officers:** Wm. A. Paine, pres.; John R. Stanton, v. p.; Frederic Stanwood, sec.-treas.; Frederick I. Cairns, supt., and Chas. A. Snow, directors; John Mugford, asst. supt.

Inc. 1903 in Michigan. Cap., \$500,000; shares \$25 par. The entire stock issue is owned by 6 mining companies, the Copper Range group holding 12,000 shares and the Stanton companies 8,000 shares, holdings in shares being as follows: Champion, 4,400 shares; Trimountain, 4,400; Baltic, 3,200; Mohawk, 3,200; Wolverine, 3,200; Atlantic, 1,600. No dividends have been paid, profits having been turned back into improvements. Annual meeting, second Monday in January.

Company owns and operates the Michigan smelter, 3 miles west of Houghton, near the old Atlantic stamp mill, with frontage on Portage lake. It was designed by Frank Klepetko and is the largest and most modern smelter in the Lake Superior district, with a capacity of 90,000,000 lbs. fine copper yearly.

The plant is terraced throughout, permitting automatic handling of material. The copper ore (locally mineral) is delivered in 40-ton bottom-dumping steel cars by the Copper Range railroad, which also hauls away the refined copper for shipment from the Copper Range wharves in Houghton.

The 3,000-ton storage bins hold 10 days' supply for the works. Mineral is dehydrated in rotary dryers by water gases from the furnaces, taken to the furnaces in tram cars and dumped into hoppers on the charging floor. Coal trestles, on an upper level, hold 15,000 tons of hard and soft coal, with tunnels underneath through which fuel is taken in tram cars, descending by gravity to the furnaces and boiler rooms. There also are separate storage bins for charcoal, sand and limestone.

The reverberatory furnace buildings has three 5-ton traveling cranes and 6 furnaces. Alternating with the larger reverberatories are one 300-h. p. and two 200-h. p. Stirling water-tube boilers, heated by waste gases from the furnaces. After leaving the boilers the gases are drawn through a 6x8' subterranean flue, with arched roof, up the hill to a 150' smokestack, with base 100' above the furnace building.

The blast-furnace building has 2 blast furnaces. Blister copper is cast, mechanically, in moulds upon a circular casting table, cooled in water, and carried by a link elevator to the loading platform. Slags are carried mechanically to the sampling mill and reduced in a 30-ton crusher of 1,000 tons daily capacity for resmelting. The slag from the final fusion is granulated by water and discharged through launders to low ground northward for grading.

The combination machine shop and power house has a complete equipment driven by an independent engine, and a 300-h. p. Nordberg horizontal tandem-compound engine, driving a 200-k. w. generator, actuates the rotary blowers for the blast furnaces. Electric power is used for operating the drying plant, cranes, casting machinery and lighting. There are 3 specially designed Jeffrey electric locomotives.

Miscellaneous buildings include office, laboratory, warehouse, barn, etc. Water is obtained from the old Atlantic dam, on Cole's creek, through a 4,300' flume with capacity of 5,000 gals. per minute, leading to a 50,000-gal. storage tank, 100' above the works, giving good pressure at all points. The plant is well planned and well handled.

MICHIGAN-UTAH CONSOLIDATED MINES CO.

UTAH

Office: 412 Dooly Blk., Salt Lake City, Utah. Mine office: Alta, Salt Lake County. **Officers:** Norman W. Haire, pres. and managing director; H. R. MacMillan, v. p.; C. A. Gillette, sec.; L. H. Farnsworth, treas.; with

Duncan MacVichie, Frank B. Cook and N. A. Robertson, directors; A. O. Jacobson, gen. mgr.; Henry Barney, supt.

Inc. April 26, 1915, in Utah, as a reorganization of the bankrupt Michigan-Utah Mining Co. Cap., 1,500,000 shares; 25c par; assessable; 1,092,614 shares issued. Listed on Salt Lake Exchange. Columbia Trust Co., registrar. Annual meeting, 2nd Monday in February. Gross earnings in 1915 were \$29,901, all from ore sales.

Property: 72 claims, 42 patented, 1,200 acres, including a millsite, in the Big and Little Cottonwood mining districts. Claims show Paleozoic sediments cut by granite, the ore occurring in fissure veins in limestone, and as contact metamorphic deposits between limestone and granite, having a general strike of N. 65° E., and a dip of 32°. There are 5 distinct and parallel veins showing average widths of 2½' and traceable 5,000', reported to carry copper, lead, zinc, silver and gold values, averaging \$25 per ton. Ores are carbonates at and near surface, succeeded below by sulphides.

Development: principally by tunnels, all workings being in the oxide and carbonate zones, but sulphides are proven to occur in depth by workings of the Columbus Consolidated Mining Co., near by. Total underground openings aggregate 50,000', about one-half being represented by tunnels, drifts and crosscuts that are all in ore, raises and winzes aggregating 10,500' additional. Ore is transported by aerial tramway to Tanners flat, 5 miles from the mine, and thence by wagon road and railway to the Midvale smelter. The tram has a maximum capacity of 200 tons daily.

Equipment: includes two 90-h. p. hoists, and a 12-drill Ingersoll-Rand air compressor. A small concentrator is run by a 200-h. p. steam plant, but mine uses electric power throughout.

Buildings include machine shop, carpenter shop, several dwellings and a smithy, located underground as a measure of protection from snowslides, which are of frequent occurrence in this region.

Production: from July to December, 1915, 67,404 oz. gold, 43,135 oz. silver, 99,066 lbs. copper, 515,296 lbs. lead; total gross value, \$65,182.

Property considered promising and management reported Feb., 1916, that company has been financed, part of its debts paid and sufficient money is in the treasury to continue development work.

Triangle Leasing Co. is reported to be shipping 50 tons of ore daily from a lease on a portion of company's property.

MICHOCAN RAILWAY & MINING CO., LTD. MEXICO

Address: G. A. Mitchell & Co., secretaries, 2 Suffolk Lane, Cannon St., London, E. C., England. Mine office: Anganguero, Michoacan, Mex. Works office: Ocampo, Zitacuaro, Michoacan, Mex. G. A. Mitchell and C. H. Potter, directors.

Inc. Jan. 29, 1889, in Great Britain. Cap., £105,364; shares £1 par, in £21,015 "A" noncumulative 7% preference shares, £12,190 "B" noncumulative 7% preference shares, £70,745 ordinary shares, and £1,414 founders' shares; issued £99,370. Debentures, £27,090 of 5% prior lien bonds, and £103,000 of 4% mortgage bonds. Is £47,380 in arrears of interest on mortgage bonds. The railway rights originally held have been disposed of to the Michoacan & Pacific Railway Co., in which the company has a £60,000 share interest in addition to £18,600 bonds held.

Property: 537 hectares known as the Anganguero silver mines, opened by tunnels and variously reported to have 14 to 30 kilometers of workings, was leased, 1909, for 10 years, to the American Smelting & Refining Co., and this lease has been extended until July, 1933, at a minimum annual rent of \$50,000 (Mexican) and ½ the net profits. No reports issued 1914-15 owing to revolutionary conditions in Mexico. Cash balance Dec., 1913, £18,518.

MID-COLORADO MINES CO.**COLORADO**

Georgetown, Colo. **Officers:** Abraham Plank, pres., Wooster, Ohio; O. H. Kniffen, v. p.; L. A. Lang, sec., Denver; I. E. O'Hail, treas., Wooster; preceding, with Geo. B. McFadden, directors.

Inc. March, 1915, in Colorado. **Cap.**, 600,000 shares; \$1 par; 400,000 outstanding. Annual meeting, second Tuesday in July. Operating expenses in 1915, \$1,200 monthly. Indicated earnings in 1915, 10c per share, used for development work.

Property: 13 claims, 11 patented, on Republican Mt., ½ mile W. of Georgetown, including the Mineral Chief mine, was purchased in 1915. **Ore:** gold, silver, lead, zinc in fissure vein in porphyry, said to assay .09 gold, 16 oz. silver, 18% lead, 7% zinc.

Development: by 7 shafts ranging in length from 140' to 1,100', with total workings of 1½ miles. **Ore reserves:** said to be 50,000 tons. Company has a 50-ton mill equipped with crusher, rolls, jigs and tables. Electric power is used.

Production: previous to 1915 said to be 190,000 tons. The output in 1915 came from development work and had an average value of \$15 per ton. Company intends driving a new tunnel 100' below the 6th level.

MIDAS COPPER CO.**ALASKA**

Property now owned by Granby Cons. M., S. & P. Co., which see.

MIDDLEMARCH COPPER CO.**ARIZONA**

Office: 212 Henne Bldg., Los Angeles, Cal. Mine office: Middlemarch, Cochise Co., Ariz. Mine formerly owned by Gird Bros. and M. M. O'Gorman, of Los Angeles, Cal. **Inc.** April 26, 1907, in California. **Cap.**, \$1,000,000, increased March 28, 1906, to \$3,000,000; shares \$100 par. Absorbed the Cobreloma Consolidated Copper Co., about 1907. Annual meeting, first Monday in April. Reported to be under option for about \$50,000 to Geo. Mitchell, Jr., Los Angeles, Cal.

Property: 68 claims, 1,360 acres, in the Dragoon mountains, showing several contact deposits between limestone and granite-porphyry, with a general N. W. strike, and dip of 42 to 54°. The 2 orebodies under development, said to be 30 to 80' wide, show oxidized ores succeeded by chalcopyrite, with some chalcocite.

Development: by 9 shafts, deepest 210', and 6 tunnels, total workings being about 2 miles, estimated by management to show 200,000 tons of ore, with 100,000 tons blocked out for stoping in the Missouri mine, with ore in other properties, though not extensively developed.

Equipment: includes a 300-h. p. steam plant, 50-h. p. hoist and 4-drill Laidlaw air compressor. There are 12 buildings, including engine house, boiler house, machine shop and smithy.

MIDLAND LEAD & ZINC CO.**WISCONSIN**

Platteville, Wis. **Officers:** John Zimmerman, pres.; Wm. S. Perrigo, sec., both of Beloit; R. E. Davis, supt., Platteville. **Inc.** in Wis. **Cap.**, \$25,000; shares \$1 par.

Property: 80 acres, 5 miles south of Platteville, said to show lead-zinc ore in limestone. Developed by 120' shaft. **Equipment:** includes steam hoist and 100-ton concentrator. Company is a small producer of lead-zinc concentrates.

MIDNIGHT MINE.**ARIZONA**

Office: care St. Charles Bros., owners, Kingman, Ariz. Mine near Chloride, Mohave Co., Ariz., has a deposit of gold-copper ore developed by 200' shaft. **Equipment:** includes 10-stamp mill and concentrator.

Under option, 1916, to G. H. Holmes, Salt Lake City. Reported to be drifting on 200' level and planning to sink shaft deeper.

MIDWAY SUMMIT MINING & MILLING CO., LTD. IDAHO

Office: 419 Chamber of Commerce Bldg., Spokane, Wash. Mine near Burke, Shoshone Co., Idaho. Geo. Herron, mgr. Inc. 1911 in Idaho. Cap., \$1,500,000; shares \$1 par. Applied for patents on 11 claims, 1914, in Lelande and Hunter districts.

Development: over 6,000' of work has been done on property, without disclosing ore in commercial quantities. Drifting on 1,100' level, 1915.

MILDRED GOLD MINING CO. ARIZONA

Mine near Congress Junction, Yavapai Co., Ariz. Dan B. Genung, supt., Stanton, Ariz. **Property:** 14 unpatented claims said to carry gold, silver, lead ore. Developed by about 3,000' of shafts, drifts, etc., and equipped with 2 hoists, 10-stamp mill, pump, etc.

MILITARY MINING & MILLING CO., LTD. IDAHO

Fred Bergen, pres.; L. H. Hays, sec. Cap., \$1,000,000; shares \$1 par. **Property:** 2 claims near Burke, Shoshone Co., said to show a 5' vein, traceable 2,000', carrying copper with quartz and quartzite gangue, developed by a 57' shaft. Was under option to F. Cushing Moore, Wallace, Ida., for \$100,000 in 1914, but option was not exercised. Assessment work only done, 1915.

MILLER HILL MINING CO. UTAH

Idle. Office: Knight Block, care Knight Bros., Provo, Utah. Mine office: American Fork, Utah Co., Utah. **Officers:** Jesse Knight, pres.; J. Wm. Knight, v. p.; W. Lester Mangum, sec.-treas. Cap., \$100,000; shares 10 cts. par. Shares are listed on the Salt Lake Stock Exchange. Stock selling at 20-24c.

Property: 33 claims, 30 patented, adjoining the Mineral Flat mine, are developed by shaft and tunnel with about 400' of workings. Company purchased the adjoining Mountainedell property in 1916.

MILLER MINING & SMELTING CO. UTAH

Office: P. O. Box 7, Salt Lake City, Utah. W. A. Wilson, gen. mgr. **Property:** 10 claims, patented, 56 acres, in American Fork canyon. Ore carries a little copper, with mainly gold, silver and lead values. Management reports production of \$1,600,000 to end of 1912. Company inactive at present, but property reported under examination, Jan., 1916.

MILLERTON GOLD MINES, LTD. ONTARIO

See Hollinger Cons. Gold Mines, Ltd.

MILLER LAKE O'BRIEN MINE. ONTARIO

K. D. Woodworth, mgr., Gowanda, Ont. Is a privately owned property and has been one of the leading silver producers in the Gowanda district. Developed by shafts; No. 2, the deepest, 450', at last accounts. In 1914 underground work totaled 2,552'.

Equipment: includes hoists, 20-drill compressor, and a mill; a hydro-electric plant between Gowanda and Burke Lakes is equipped with 2 turbines and a 900-h. p. generator.

In 1914 the mill treated 2,348 tons, producing 46 tons of concentrates. Power difficulties, caused by shortage of water, necessitated curtailed production for several months during winter of 1914-1915.

MILLTOWN EXTENSION GOLD MINING CO. COLORADO & NEVADA

Cripple Creek, Colo. Inc. in Nevada. Cap., \$1,500,000; shares \$1 par; in treasury, 800,000 shares. Company was organized in 1915 to secure title to the Louise Fraction and Milltown Extension claims at Goldfield; also owns 2 claims in Pioneer, Nev., has a lease on the Pioneer Extension property, and a half interest in the lease on the Jerry Johnson mine at Cripple

Creek; this lease, owned by the Cripple Creek Deep Leasing Co., is from the 650' level down.

The 2 claims at Goldfield are being explored on the 700' level by a cross-cut being run from the Yellow Tiger Co.'s shaft to the property of the Red Lion Cons. Mng. Co., which lies on the opposite side of Milltown Ext.

Work at present in the Jerry Johnson mine is on the 850' level. Management states that since shipments started in 1915, to May, 1916. 22 carloads of ore have been shipped, ranging in value from \$6.30 to \$28 per ton.

Property holdings of the company do not look attractive.

MINA MEXICO CO.

MEXICO

Is the operating and Mexican company of the Chicago Exploration & Development Co., operating the Mexico mine, 45 miles from Tonichi, Sonora, Mex. W. E. Pomeroy, mgr.; Geo. B. Squire, supt. of smelter; Chas. Gercken, mine supt.

Veins are very narrow, from a few inches to 2' in width, and values vary from a few ounces to several hundred ounces silver per ton. Mine is very wet. Has 85-ton charcoal-burning smelter. Was working 1914, but all American officials left Mexico and placed mine in charge of Mexican foreman.

MINE LA MOTTE CO.

MISSOURI

Mine La Motte, Madison Co., Mo. A. J. Meier, pres.; J. F. Thompson, supt. Inc. about 1903 in Maine. Cap., \$200,000.

Mine reported leased to National Lead Co. for 10 years from 1913 on a 10% royalty basis, with option to buy at \$800,000.

Controls about 37,000 acres of land in the disseminated lead ore district of southeastern Missouri. For geology, see Kemp's "Ore Deposits," p. 228, also Mo. Geol. Survey, Vol. IX, Report 4, p. 48. The property is said to have been worked for lead since 1720.

Development: by a number of shafts, average depth 125'. The shallow surface diggings, which were first worked, were followed down 100-125' and from this level the ore has been coming that for 50 years has supplied the mill and smelter. In recent years the copper and nickel-cobalt sulphide ores, which occur in bunches and masses in the lead ore, have not been mined, owing to the difficulty of smelting them. In 1915 four shafts were operated and much of the ground was reworked with steam shovels. The mill, practically new, treats 800 tons per day with Hancock and Hartz jigs and tables. Much carbonate of lead is recovered. Production in 1915 was largest in history of the mine, but figures cannot be given, as the company gives out no information.

MINERAL DEVELOPMENT CO.

MEXICO

See Proprietary Mines Co. of America.

MINERAL FARM MINING CO., LTD.

IDAHO

Offices: Paulsen Bldg., Spokane, and Mullan, Idaho. **Officers:** L. C. Jaquish, pres. and mgr.; Wm. Sellars, v. p.; C. D. Miller, sec.-treas.; above, with John Kamerer, J. H. Pelletier and J. H. Greiner, directors.

Inc. 1904 in Idaho. **Cap.**, 1,500,000 shares; \$1 par; assessable; outstanding 670,000. Annual meeting, first Monday in September. Listed on Butte Exchange. Treasurer's report for period Oct. 25, 1913, to May 10, 1916, shows receipts of \$4,450, with disbursements of \$2,618, leaving balance of \$1,832.

Property: 9 claims, 8 patented, 170 acres, 1 mile west of Mullan, has a fissure vein in Revett and Burke quartzite, on which work was started in 1908. **Development:** 3 tunnels, 60', 800' and 1,445' in length, with 3,700' of underground workings. Mine was idle in 1915. Management resuming operations, 1916.

MINERAL FLAT EXTENSION MINING & MILLING CO. UTAH

Carbonate, Juab Co., Utah. **Officers:** Jos. I. Bullock, pres.; F. E. Brown, sec.; Wm. H. Horner, supt. **Inc.** March, 1909, in Utah. **Cap.**, \$50,000; shares 5 cts. par; assessable.

Property: 2 miles south of Alta, in Little Cottonwood district, White Pine canyon, shows a 3' vein of copper ore, giving assays up to 50% copper, also silver-lead ores. Developed by tunnel and shaft, with drifting on vein. Company has kept up assessment work on its unpatented claims. Tunnel in 300' early in 1916.

MINERAL FLAT MINING CO. UTAH

Office: Provo, Utah. Mine office: American Fork, Utah Co., Utah. Jesse Knight, pres.; J. C. Jensen, mgr. **Inc.** in Utah. **Cap.**, \$100,000; shares 10 cts. par; assessable. Shares listed on Salt Lake Stock Exchange.

Property: 22 claims, partly patented, 25 miles from a railway, carries lead and copper ores. Developed by shaft and tunnels of about 1,500' aggregate length, upper levels showing occasional bunches of good ore, but without continuity of payable mineral. **Equipment:** includes a hydro-electric plant, with a 9,000' pipe line and several buildings. Worked by lessees 1914-15 and reported to be shipping high-grade lead carbonate ore.

MINERAL MILL CONSOLIDATED COPPER CO. ARIZONA

Office: 331 Fourth Ave., Pittsburg, Pa. Mine office: Tucson, Pima Co., Ariz. **Officers:** M. S. Isherwood, pres.; Boon Ingells, v. p.; E. B. Reeser, sec.-treas. and gen. mgr. **Inc.** March, 1904, in Arizona, as successor of Azurite Copper & Gold Mining Co. **Cap.**, \$3,000,000; shares \$1 par.

Property: the Azurite mine with 26 claims, 12 patented, 520 acres, in the San Xavier district, 18 miles S. W. of Tucson, said to have produced \$550,000 worth of ore under former ownership. Company's lands also include the American group of 8 claims and the Mineral Hill group of 5 claims. The mine is claimed to have a large body of sulphide ore averaging about 3.5% copper.

Development: by 74 pits and open cuts, 8 tunnels, longest 250', and 48 shafts, deepest 345', mine having a total of about 1 mile of workings. Company operated in 1912, but closed down in Sept., 1913, and apparently still idle, 1916.

MINERAL HILL CONSOLIDATED MINES CO. NEVADA

Mineral Hill, Nev. **Officers:** S. C. Pratt, pres.; Dan'l Pratt, v. p.; L. A. Squires, Brooklyn, N. Y., sec.; J. S. Wilcox, treas. **Inc.** 1906 in Ariz. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; 713,000 issued; \$100,000 6% bonds authorized; issued, \$2,500.

Property: 11 claims, 3 patented, 135 acres, in Mineral Hill district, Eureka Co., Nev. Mine discovered 1869 was worked from 1871 to 1878, when it was closed because of the drop in silver; reopened in 1906.

Ore: occurs in dolomitic limestone and carbonaceous shale. Commercial orebodies, usually confined to the limestone, are found in fracture zones which correspond to strike faults. Principal ore is silver, which occurs as argentite with some gray copper, galena and gold. There is about 2,000' of underground development.

Samples of over 4,000 tons varied from 3.8 to 177 oz. silver and 0.5% to 0.7% lead, averaging 53.5 oz. silver and 0.04 oz. gold.

MINERAL HILL MINING CO. NEW MEXICO

Office: 13 Arch St., Philadelphia, Pa. Samuel P. Hanson, pres. Is the successor of the Donna Dora Mining Co. **Property:** on the eastern slope of the Organ Mts., near Organ, Dona Ana Co., N. M., is developed by 400' tunnel and shallow shaft sunk on a 5' vein containing copper, lead, silver and gold values. No recent returns received.

MINERAL HILL TUNNEL & COPPER MINING CO. WASHINGTON

Address: F. E. Houghton, Room 1140 Old South Bldg., Boston, Mass. Mine office: Danville, Ferry Co., Wash. Lewis A. Crosby, pres.; A. L. Bradley, gen. mgr. Inc. 1906 as successor of Minnehaha Copper & Gold Mining Co. **Cap.**, \$2,000,000; shares \$1 par.

Property: 700 acres, in 8 groups, about 5 miles from the Granby smelter, in the Curlew district, Ferry Co., Wash. Idle and in process of reorganization. Letters neither answered nor returned. See Vol. XI, Copper Handbook.

MINERAL LANDS COMPANY.**UTAH**

Idle. Office: 36 Exchange St., Portland, Me. Mine address: Bingham Canyon, Utah. J. A. Waterman, treas. Inc. 1913 in Maine. **Cap.**, \$500,000; shares \$5 par. Company owns entire capital stock of the Markham Gulch Mining & Milling Co.

Property: the Red Wing and Butler-Liberal mines, with about 300 acres in Markham gulch, formerly owned by the North Utah Co., of Bingham, Utah. The claims carry the Florence and Erie fissures, latter having been a good producer in the upper levels. **Development:** mainly by tunnels, with about 5 miles of workings, showing ores carrying lead, silver, copper and gold values, in about the order named.

Equipment: includes 200-h. p. electric hoist and 12-drill compressor. No recent returns received.

MINERAL POINT ZINC CO.**WISCONSIN**

(Subsidiary of New Jersey Zinc Co.) Concentration works at Mineral Point, Wis. Operates the Kennedy, Red Jacket, Franklin, Black Jack, Coker, New Coker, Fox and Penna-Benton mines, in the Wisconsin zinc field. The concentration plant at Mineral Point is equipped with a new multihearth roaster treating 150 to 200-ton charge. The pyrite is removed by magnetic separating machines and the jig concentrate raised from 37% to about 59%, with 90% recovery and a cost of \$2 per ton.

MINERAL ZONE MINING CO.**IDAHO**

G. L. L. Baskett, supt., Elk City, Idaho. **Property:** known as the Parr group, includes the Mineral Zone gold mine near Elk City. In April, 1916, a clean-up of a 15 days' run is said to have yielded \$2,300. **Development:** is by tunnels. There is a 3-stamp mill on the property. Ten men employed.

MINERALS SEPARATION, LTD.

Sec. and offices: A. O. Williams, 62 London Wall, E. C., England. **Directors:** J. Ballot, chairman and managing director; J. H. Curle, F. L. Gibbs, Dr. S. Gregory, H. A. Krohn, W. W. Webster. Inc. in 1903 to carry on metallurgical operations. **Cap.**, £50,000; shares £1; all issued and fully paid.

Annual report for 1914, submitted Dec. 29, 1915, shows a profit of £11,925; balance forward, £35,177; cash, £8,861; investments, £69,672; creditors, £12,901; debtors, £25,969; share premium account, £21,266.

Company owns 30,430 A and 200,000 B shares in Minerals Separation American Syndicate (1913), Ltd. The chief assets of the company are a number of patents for flotation processes and machines for recovery of concentrates from silver-lead, zinc and copper ores. The use of this process has been as great an advance in the treatment of zinc and copper ores as the cyanide process has been for gold ores. It is heartily recommended where applicable.

MINES COMPANY OF AMERICA.**MEXICO**

Office: 111 Broadway, New York City. **Officers:** John Lambert, pres., Chicago; W. E. Reis, v. p.; W. H. Aldridge, 2nd v. p.; A. T. Black, 3rd v. p.;

H. S. Black, treas.; J. D. Tooker, sec. and asst. treas.; preceding, with W. L. Fillwood, W. B. Thompson and W. H. Smith, directors; Chas. Biesel, gen. mgr., El Paso, Texas.

Inc. Dec., 1902, in Me., as a holding company. Owns entire capital stock of the **Creston Colorado Co.**, 99% of capital stock of **Dolores Mines Co.**, 99½% of capital stock of the **El Rayo Mines Co.**, and 33⅓% of the **La Dura Mill and Mining Co.**, of which company the Dolores Mines Co. owns 33⅓% and the El Rayo Mines Co. 33⅓%. Also owns the **Chihuahua-Esperanza Gold Mining Co.** and the **Consuelo Mining, Milling & Power Co.**

Cap., \$9,000,000; outstanding, Dec. 31, 1915, \$8,376,583; shares \$10 par. Authorized capital stock increased 1910 from \$2,000,000, and par value shares from \$1. Of the new stock \$4,000,000 was set apart to acquire the \$2,000,000 stock of the Dolores Mines Co., and \$2,499,100 was appropriated to acquire the \$714,040 stock of the El Rayo Mines Co. U. S. Mortgage & Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Annual meeting, first Wednesday after first Saturday in November, at Augusta, Me.; books close 10 days in advance. Stock listed on New York Curb.

Dividends: total paid to Dec. 31, 1915, amounted to \$4,958,600, including a dividend in 1906 in stock of the Dolores Mines Co. No dividends were paid in April, July or Oct., 1912, owing to revolutionary conditions in Mexico; in January, 1912, 1½% was paid. Dividends resumed in January, 1913, with payment of 1¼%, which rate was also paid in April and July, 1913; no payments since.

Comparative Cons. General Balance Sheet, Dec. 31

Assets:	Prop. & Investments	Plant & Equip.	Claims Against Mex. Govt.	Current Assets	Total
1915.....	\$7,911,712	\$1,050,660	\$392,859	\$732,089	\$10,087,322
1914.....	7,951,718	1,041,639	382,920	960,848	10,337,126

Liabilities:

Cap. Stock Outstanding	Sub. Co.'s Stock Out.	Suspense Account	Cur. & Wk'g Accts. Pay.	Surplus & Res.	Total	
1915..	\$8,376,583	\$23,604	\$302,202	\$56,358	\$1,328,573	\$10,087,322
1914..	8,376,583	23,624	291,314	90,743	1,554,861	10,337,126

Operating receipts for 1915 were \$955,953; operating expenditures, \$884,915, leaving an operating profit of \$71,037, compared with \$84,062 in 1914. Adding interest \$8,908 and deducting general expenses and taxes, \$31,400, leaves a profit for 1915 of \$48,546, as compared with \$56,050 for 1914.

Ore reserves: on Jan. 1, 1916, estimated total ore reserves of the company's properties were 418,016 tons, with a gross value of \$4,414,393. During 1915 the company milled 164,919 tons ore, having a total value of \$963,310.

Companies controlled by Mines Company of America:

Chihuahua-Esperanza Gold Mining Co., Mexico.

Owned by Mines Company of America. **Property:** adjoining that of the Dolores Mines Co., Chihuahua, on the west, consists of 3 claims, 304 acres. Company also owns 10,000 acres of timberland 5 miles north of Dolores.

The formation is similar to that of the Dolores. No development work has been done on the property; its value is prospective, but as the Dolores main vein dips toward the Esperanza east side line, the future lower levels of Dolores will probably be in Esperanza ground.

Consuelo Mining, Milling & Power Co., Mexico

Control owned by Mines Company of America. **Property:** adjoins that of the Dolores Mines Co., west of Madera, in Chihuahua, on the south and east, and consists of 77 pertenencias, 190 acres, and a half interest in 9

pertenencias; 22 acres, also a water right on the Tutuaca River. The formation is similar to that of Dolores. No systematic development has been done; the value of the ground is prospective.

Creston Colorado Co., Mexico

Controlled through entire stock ownership by Mines Company of America. Mine office: Torres, Sonora, Mex. **Officers:** John Lambert, pres.; W. E. Reis, v. p.; A. T. Black, 2nd v. p.; H. S. Black, sec.-treas.; J. D. Tooker, asst. treas.; John Lambert, W. E. Reis, J. H. Hoyt, H. A. Kelly, G. von den Steinem, directors. **Inc.** February, 1902, in Ohio. **Cap.**, authorized and outstanding, \$100,000; par \$100. Annual meeting, 1st Saturday in November.

Property: 27 claims, 828 acres, commonly known as "Minas Prietas" (Black Mines), in Sonora, at La Colorada, a station on the narrow-gauge Mexico Union Ry., 12 miles east of Torres, on the Southern Pacific R. R. of Mexico, and 200 miles south of Nogales, Ariz. The mines have been worked for 100 years and have produced regularly during the last 33 years. Gross production estimated at over \$112,000,000.

The property is divided into 4 different mines: the Creston, Colorado, Amarillas-Grand Central and Verde. The claims contain a number of producing veins, and cover the latter for 8,000' along their strike. Company also owns surface rights to 7,000 acres land, including the mining claims. It also owns a water right on the Matape River.

Ore: veins have a general E.-W. strike, dip N. 55° to 90°, and vary in width from 3' to 40'. Larger orebodies occur principally in diorite, metamorphic rocks and quartz porphyry. The Creston ore, or east end ore, is a highly fractured quartz. The Colorado is a harder quartz. Sulphides of silver, iron, lead and zinc occur from the surface down. Streaks of high-grade sulphide shipping ore are occasionally found. The Verde ore is a hard quartz, at times very refractory. The Amarillas-Grand Central ore is a highly oxidized quartz, containing free gold in places. Average values in ores, as milled, are said to be 60% gold and 40% silver.

Development: in 1915 totaled 2,578', compared with 8,470' in 1914. Work was divided as follows: Creston mine, 2,048'; Colorado mine, 161'; Amarillas-Grand Central mine, 369'. **Ore reserves:** estimated Jan. 1, 1916, as 200,300 tons, average assay \$4.89 per ton, or a gross value of \$981,350, as compared with 272,700 tons, average assay \$4.73 per ton, the previous year; gold figured at \$20 per oz., silver at 50c per oz. The Amarillas-Grand Central mine has one dump of tailing containing 280,000 tons which will be retreated.

Equipment: at the Creston mine includes steam hoisting and compressor plant, foundry, etc.; a large Gates crusher receives the ore from the mine; at the Colorado includes electrically-driven crushing and hoisting plants, also a 350-ton steam operated cyanide plant, which receives Creston ore over a 3,200' aerial tramway, and the Colorado ore over an 800' incline tramway; at the Amarillas-Grand Central mine includes steam operated hoisting and compressor plants, also a 350-ton cyanide plant, which receives ore partly over a branch of the Creston mine tramway and partly over a short aerial tramway from the collar of the Amarillas shaft. A pumping plant, 18 miles from the mines, on the Matape River, supplies water for all purposes through a 5" pipe line.

Mill and cyanide plants: in 1915 extensive shut-downs were in order, due to revolutionary disturbances. The Colorado unit was operated 151 days and treated 58,750 tons of ore; the Amarillas-Grand Central unit was operated 227 days and treated 72,600 tons ore. Extraction amounted to 77.2%, 19.3% by concentration and 57.9% by cyanidation.

Prod'n— Year	Creston Mine, Tons	Colorada Mine, Tons	Am.-G. C. Mine, Tons	Old Tail- ing, Tons	Total Tons	Value per Ton
1915....	98,662	18,854	10,365	3,469	131,350	\$4.80
1914....	94,655	18,090	10,887	3,243	126,875	4.67

The Colorado mine is under water below the 400' level, but will be unwatered as sampling disclosed ore a short distance below the level.

Dolores Mines Co., Mexico

Controlled through ownership of 99% of capital stock by Mines Company of America. Same directorate. Inc. Nov., 1903, in Mex. Cap., authorized and issued, \$2,000,000; full paid and nonassessable; par \$5. No bonded debt. U. S. Mortgage & Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Annual meeting, first Tuesday in December. Listed on New York Curb.

Entire capital stock of this company was formerly owned by an English company called Dolores, Ltd.; dissolved Feb. 25, 1908, by exchange of stock, share for share, of Dolores Mines, Ltd. The company owns 33 $\frac{1}{3}$ % of the La Dura Mill & Mining Co.

Property: 17 contiguous claims, 250 acres, in Chihuahua, west of Madera, a station on the Mexico Northwestern Ry., about 250 miles S. W. of El Paso, Texas, and 200 miles N. W. of the city of Chihuahua. Mines are reached over a 45-mile trail, requiring 5 to 7 days' time for pack trains. Company also owns 2 detached mineral claims, 126 acres, near Dolores, and all surface rights to 12,500 acres, also a water right on the Tutuaca river. The main group, as shown by developments to date, contains 4 main vein systems, known as the Alma, San Francisco, West San Francisco, Washington and Arco Iris dikes, covered for 8,000' on the strike of the Alma vein system, 4,000' on the San Francisco vein system, 3,800' on the West San Francisco, 1,000' on the Washington, and 2,600' on the Arco Iris vein system.

Geology: vein systems consist of rhyolite dikes in andesite; the veins are fissures in these rhyolite dikes, strike north and dip 55° to 90°. Ore-bodies occur at or near intersections of side fractures and within the boundaries of the dike. The Dolores ore is a very hard quartz, containing about 2% sulphides of iron, silver and occasionally lead and traces of zinc. Values in ore are approximately 40% gold and 60% silver.

Development: in 1915 totaled 2,833', as compared with 1,145' in 1914; all done by hand and above the 500' level. The 600' and 700' levels are under water.

Ore reserves: were estimated Jan. 1, 1916, as follows—

	Tons	Value per Ton	Gross Value
Ore in place.....	114,298	\$13.94	\$1,593,015
Broken ore.....	12,365	14.21	175,678
Total	126,663	\$14.00	\$1,768,693

Compared with 111,116 tons of \$14.09 ore with gross value of \$1,565,513 on Jan. 1, 1915. Values are based on \$20 per oz. for gold and 50c per oz. for silver.

Equipment: includes steam-operated crushing, concentrating and cyaniding plants, also compressor and hoisting plants, machine shops, etc. A steam driven Reidler pump, 2 $\frac{1}{2}$ miles east of the mine on the Tutuaca river, supplies all necessary water. Electrical equipment to supplant steam power is in place. A 30-mile transmission line connects Dolores with Madera; line is designed to carry 3-phase, 60-cycle current of 33,000 volts. Power will be furnished by a generating plant built near Madera, to consist

of three 320-k. w. generators, driven by 3 Diesel type oil engines of the "Snow" make. It is the intention to double the capacity of the milling plant, which now has 25 stamps and four 5' Bryan mills.

The milling plant was not operated in 1915 on account of the revolution. When operating, extraction is about 87%, 18% by concentration and 69% by cyanidation. Bullion is marketed in Maurer, N. J. Concentrates are shipped to the El Paso smelter.

Company employs about 365 men under normal conditions, only 17 being Americans. The small amount of development work done in 1915 gave good results; an orebody of good size and grade was opened up on the 400' level in new ground. What is thought to be the same orebody was recently cut 130' lower on the 500' level. On this level an intermediate vein between the former and the Dolores was also found. Several small orebodies were found on the West San Francisco vein. Management expects to reduce power costs by over 300% when the plant is running by electricity and to double the milling capacity. The future of Dolores looks promising.

El Rayo Mines Co.

Mexico

Controlled through ownership of 99½% of capital stock by Mines Co. of America. Same directorate. **Mine office:** Santa Barbara, Chihuahua, Mex.

Inc. Feb. 13, 1906, in Maine. **Cap.**, \$1,000,000; outstanding \$714,040; shares \$2 par. No bonded debt. Annual meeting, second Tuesday in February. Listed on New York Curb. Company is the American holding company for the El Rayo Mining & Development Co., S. A., a Mexican corporation. Owns the Descubridora Mining & Development Co., and Bueno Vista Gold Mining Co., also 33½% of the La Dura Mill & Mining Co.

Property: 21 claims, 766 acres, in the State of Chihuahua, S. W. of Santa Barbara, the terminal of a branch line of the Mexican Central Railway. Mines can be reached from Santa Barbara over an 8-mile trail. Company also has a 14-year lease on about 12 square miles of timberland, adjoining the mining property. El Rayo is at an elevation of 7,200' above sea level. The mining claims cover the N. S. strike of the producing veins for over 2 miles.

Ore: gold, silver in fissures in rhyolite. Veins dip from 50° to 90° and the filling varies from a friable and oxidized quartz at the north end to a harder sulphide-bearing quartz at the center and south end of the property. The north end contains about 4% sulphides, chiefly iron, with traces of lead and zinc. Copper sulphides are found occasionally. Values in the ore as produced during 1915 are, approximately 74% gold and 26% silver. The orebodies consist of a number of irregularly shaped lenses, greatly varying in width and values. They occur principally at the intersection of side fracture with main fracture.

Development: total underground workings amount to 78,986'. In 1915, 3,989' was done during the limited time of operations; divided as follows: Adela mine, 2,747'; El Rayo mine, 595'; Descubridora mine, 647'. The Adela mine covers 4,700' of the vein system at the north end. The El Rayo mine covers 2,300' of the vein system and adjoins the Adela on the south. The Descubridora mine covers 5,000' of the vein system on the extreme south end of the property. A promising body of \$13 ore was found on the bottom level of the Adela mine. A crosscut to the Richmond vein exposed a narrow vein of high-grade ore. The waste filling system of stopping is used.

Ore reserves: were estimated Jan. 1, 1916, as follows—

	Tons	Value per Ton	Gross Value
Ore in place.....	61,710	\$10.42	\$643,283
Broken ore.....	13,328	10.77	143,542
Total	75,038	\$10.48	\$786,825

Compared with 751,161 tons of \$12 ore with gross value of \$901,000 on Jan. 1, 1915. Values are based on \$20 per oz. for gold and 50c per oz. for silver.

Equipment: includes a 1,950 cu. ft. steam operated compressor plant. A 2-mile aerial tramway furnishes the necessary fuel, lumber and mining timbers.

Mill: includes 160-ton crushing, concentrating and cyaniding plants. From the storage bin at the portal of the 1,100' level of the Adela mine the ore is trammed 1,300' in 6-ton cars to the mill storage bin. Course of ore through plant is as follows: from bin through 9"x15" Blake crusher, set at 1" discharge; undersize by conveyor belt to bin, by Challenge feeder over conveyor belt to one set of 16"x36" Traylor rolls, discharge to 2 sets of 14"x30" Traylor rolls; to classifier; overflow to flotation, oversize in closed circuit returned to 7"x14' tube mill; discharge to classifier, overflow to flotation, oversize in closed circuit returned to tube mill. Flotation rougher cell concentrates to cleaner cell, finished product to Kelly press for dewatering. Flotation tailings discharges to Wilfley tables; Wilfley tailing to elevator to Dorr Thickener and cone for dewatering; dewatered pulp is treated by cyanide solution. Resulting bullion and also the concentrates are marketed in the U. S.

Power: electrification of entire plant is under way. Electricity will be furnished, under contract, by the Cia. Agricola y de Fuerza Electrica del Rio Conches, S. A., from their plant at La Boquilladam, about 70 miles from El Rayo.

Extraction has been as follows:

Year	Conct. & Flotation	Cyanidation	Total
1915.....	20.7%	63.3%	84%
1914.....	(a) 14.0%	66.0%	80%
1913.....	(a) 12.0%	77.0%	89%

(a) By concentration alone.

Flotation by the Callow system was proven a success. During the last month's operations recoveries were 42.7% by cyanidation and flotation and 47.6% by cyanidation.

Due to revolutionary conditions the property was closed down Sept. 9, 1915, to be reopened when practicable. Work has been carried on under most adverse conditions, but at a profit. When operating under normal conditions the company employs 15 Americans and about 385 Mexicans.

La Dura Mill & Mining Co.

Office: 111 Broadway, New York City. **Mine office:** La Dura, Sonora, Mex. **Cap.,** outstanding, \$1,000,000. The Mines Co. of America, Dolores Mines Co. and El Rayo Mines Co., each own $\frac{1}{3}$ of the capital stock.

Property: 4 individual mines—Gloria-Fortuna and La Dura, on the east bank of the Yaqui river, Sonora; California and Prieta, $1\frac{1}{2}$ miles N. E. of the former. The mines are near La Dura station on the Cananea, Yaqui River & Pacific Ry., which leaves the main line of the Southern Pacific of Mexico at Corral station, 325 miles south of Nogales, Ariz. Mines are connected with railroad by aerial tram.

Ore: silver, copper, lead, in 5 main veins; the California, Prieta, Gloria-Fortuna, West Floria and La Dura veins. The Prieta and Gloria veins, from 6" to 4' wide, occur in andesite, strike N. W.-S. E. and dip 30° S. W. Ore is a white quartz containing sulphides of silver, copper, lead, iron and zinc. It occurs in lenses in terraces formed by frequent faulting. Most of the ore requires milling. **Ore reserves:** estimated Jan. 1, 1916, as 14,832 tons, average grade \$58.17 per ton.

Only the Prieta and Gloria mines have been operated since they were acquired by the company. The Prieta has a 3-compartment shaft, 1,040' deep. The Gloria is operated through a 1,600' incline shaft and a 700' vertical shaft, connected with the former, on the 500' and 700' levels.

Equipment: in 3 units as follows: the Prieta-Gloria steam-operated compressor and hoisting plants; the Gloria-Fortuna-La Dura steam-operated compressor, hoisting, milling and generating plants; pumping plant, stores, offices, and shops located half way between the two groups of mines. A transmission line from the Gloria-Fortuna plant furnishes power for pumping.

The mines employ under normal conditions, 8 Americans and about 225 Mexicans. Owing to the revolution the property was closed down in September, 1913, but will be reopened as soon as it is safe to do so. Accumulated products are stored in the bottom of the mine under water.

MINES DEVELOPMENT CO:

MONTANA

C. J. Stone, mgr., P. O. Box 3, Butte, Mont. **Officers:** J. J. O'Mara, pres.; J. P. Brown, v. p. and sec.-treas. **Inc.** 1913, in Montana. **Cap.**, \$50,000; outstanding \$10,000; shares \$1 par. Annual meeting, July 1. Operating expenses in 1915, \$10,000; earnings, nil.

Property: 6 claims, patented, 62 acres, in Tobacco Root Range, 12 miles from Twin Bridges, Madison Co., including the Moffit mine, operated under bond and lease.

Ore: gold, silver, copper, in orebodies said to be 80' to 125' wide; average assay, 1.5% to 2.5% copper; 0.5 oz. silver, 40c gold. **Development:** a 1,000' tunnel with total workings of 1,125'. Management claims 500,000 tons blocked out, which seems excessive for the small amount of development work done.

Equipment: includes compressor and gas engine. Plans continuing tunnel 500', also driving a 1,500' tunnel 400' lower. Was shipping ore June, 1916.

MINES DEVELOPMENT CO. OF NEVADA.

NEVADA

Lovelock, Humboldt Co., Nev. **Officers:** John T. Reid, pres.; treas. and gen. mgr.; Paul G. Reid, sec. and supt.; preceding with R. C. Moore, J. Thies, Peter Ancher and E. B. Loring, directors. **Inc.** Sept. 1, 1904, in Arizona. **Cap.**, \$750,000; shares \$1 par; issued, \$450,696.

Property: 5 claims, 100 acres, in the Juniper Mountain district, said to show various fissure veins, alongside of quartz porphyry dikes, intrusive in monzonite. Veins run N. 10° W. and are nearly vertical. The vein developed averages 5' wide, is traceable for 2,000' and proven to 170' depth. Small seams of ore found at or near surface show chalcocite, bornite and tetrahedrite, giving average assays of 2% copper, 11 oz. silver and \$3.50 gold per ton. **Development:** by a 30' shaft and 365' tunnel. Idle several years.

MINGUS MOUNTAIN COPPER CO., LTD.

ARIZONA

Office: 516 Grant Bldg., Los Angeles, Cal. Mine near Jerome, Yavapai Co., Ariz. W. W. Thomas, pres.; A. Gleason, sec., and E. R. Jeffrey, directors. **Inc.** June, 1900, in Arizona. **Cap.**, \$3,000,000; shares \$1 par; issued \$2,400,000.

Property: 5 claims, 100 acres, in the Black Hills district, 12 miles south of Jerome, the nearest railroad point, has good surface showings of carbonate ores. Assays from 2,800' vein traversing property, N. E.-S. W., are reported to show .02 oz. gold, \$1.45 silver and 6.39% copper S. W. and .17 oz. gold, 6.5 oz silver and 4.10% copper, N. E. Orebody claimed to be 45' in width with dip of 60° E. but ore has only been found in bunches and streaks.

Development: by 4 shafts, deepest 430', with several tunnels, giving a total of 4,240' of workings. **Equipment:** includes 50-h. p. steam plant, with 2 hoists, good for 1,000' each, and several mine buildings. Out of cash and idle some years.

MINING CORPORATION OF CANADA, LTD. ONTARIO

Office: Traders Bank Bldg., Toronto. Is the Canadian and operating company of the Canadian Mining Corporation, which see. April 1, 1914, the Mining Corp. of Canada acquired the mining properties formerly operated by the Cobalt Townsite Mng. Co., Ltd., Cobalt Lake Mng. Co., Ltd., City of Cobalt Mng. Co., Ltd., and the Townsite Extension Mines, Ltd., total area, 183½ acres, at Cobalt. In 1915, the property of the Little Nipissing Mining Co., 40 acres, was acquired.

Officers: Sir H. M. Pellatt, pres.; J. P. Watson, 1st v. p.; W. P. P. Parker, 2nd v. p., with G. M. Clark, R. E. G. van Cutsem, D'Arcy Weatherbee and Graeme Watson, directors. W. W. Perry, sec.; C. E. Watson, mgr., Cobalt; M. F. Fairlie, mill mgr.

Inc. March 20, 1914, in Ont. **Cap.**, \$2,075,000; shares \$1 par; all issued; 1,911,319 shares are held by the Canadian Mining Corp., Ltd. For last 9 months of 1914, the net profit was \$752,106, leaving balance carried forward after payment of dividend, \$492,731. On Nov. 16, 1914, company declared a 12½% dividend, \$259,375. In 1915 dividends totaled \$518,750.

Owens entire capitalization, \$250,000, of Cobalt Reduction Co., Ltd., operating a 300-ton mill and 140-ton cyanide plant. The profit of this company for 9 months ending Dec. 31, 1914, was \$114,599, making with balance brought forward, \$161,908, of which dividends absorbed \$133,678 and \$28,230 was written off capital expenditure.

Ore: silver, occurs in narrow calcite veins in Huronian conglomerate and Keewatin formation. The high-grade ore assays about 2,000 oz. silver per ton, the mill ore, 20 oz. to 30 oz. silver per ton. **Development:** by shaft to a depth of 500'; total underground workings about 16 miles. **Ore reserves:** estimated Dec. 31, 1914, at 94,026 tons on the Townsite and City properties, containing 3,209,000 oz. silver and 24,000 tons on the Lake property, containing 800,000 oz. silver.

Production: for last 9 months of 1914, 107,384 tons ore, yielding 3,185,124 oz. silver; in 1915, 97,300 tons ore treated, yielding 4,181,000 oz. silver. Concentrates averaged 2,200 oz. silver per ton. The company is, next to Nipissing, the largest producer in the Cobalt district.

MINNEAPOLIS COPPER CO. MEXICO

Office: 525 Plymouth Bldg., Minneapolis, Minn. **Mine address:** Cumpas, via Nacozari, Sonora, Mex. **Officers:** J. W. Christy, pres.; James Thompson, sec.; F. A. Guice, gen. mgr. **Inc.** June, 1906, in South Dakota. **Cap.**, \$1,000,000; shares \$10 par, nonassessable; also inc. in Mexico as Minneapolis Copper Co., S. A., the South Dakota corporation being a holding company. Is operated in the United States under the title of Minneapolis Copper Development Co., the reason for which has not been explained.

Property: 277 hectares, about 30 miles S. E. of Cumpas. Property carries several fissure veins, in andesite, with N. E. strike, of which 4, under development, are of 5' to 8' estimated average width, carrying tetrahedrite,

estimated by company to average 10% copper, with traces of lead and zinc, 5 to 40 oz. silver, and \$1 and upwards in gold, with occasional very high assays. The property has been under development continuously with a small force, since the company took it in 1906. The 155' Fryer shaft develops a 4' vein carrying ore said to average about 9% copper and 20 oz. silver per ton. The Archipelago mine, the principal property, has a 250' incline shaft, and the mine as a whole has about 8,000' of workings, mostly in ore.

Equipment: includes a 35-h. p. gasoline hoist and 5 buildings. There is also a 75-ton smelter, built in 1912. Transportation is by wagon-road to Cumpas, freight being carried in two 90-h. p. gaso-electric trucks.

In 1914 holdings were attached by a Douglas, Ariz., bank, but management was changed and bills are being paid off. Said to be ready to resume operations in 1916.

MINNEAPOLIS & TEXADA COPPERITE CO., LTD.

BRITISH COLUMBIA

Offices: 1311 Washington Ave. N., Minneapolis, Minn., and Vanada, Texada Island, B. C. **Officers:** C. F. Stremel, pres.; E. E. Rorem, 1st v. p.; John Kraft, 2nd v. p.; A. E. Barker, sec.; Wm. Bofferding, treas.; above with Eden Schmidt, Hilmer Olson, B. F. Laffin, and W. H. Curtis, directors. Inc. in Ariz. **Cap.**, \$1,000,000; shares \$1 par.

Property: 5 claims, 225 acres, on Texada Island, 47 miles N. W. of Vancouver, said to show 2 main veins, the Swan and the Paxton, containing copper ore with gold and silver. Paxton vein is said to be traceable 1,500' on surface.

Development: 200' shaft, with 300' of drifting; also a number of test pits. Value of property is entirely prospective.

MINNESOTA-NEVADA COPPER MINES CO.

NEVADA

Formerly the Wabuska Copper Mines Co. Near Wabuska, Lyon Co., Nev. **Property:** the Minnesota group, 13 claims, 16 miles from Yerington, said to show a contact deposit, between limestone and granite, of about 20' average width, carrying sulphide ore assaying 1 to 30% copper.

Development: by 2 shafts, 1 of about 500' depth, showing ore said to average better than 3% in copper tenor.

MINNESOTA NEVADA INVESTMENT CO.

NEVADA

Office: 436 Endicott Bldg., St. Paul, Minn. Mine near Fairview, Churchill Co., Nev. **Officers:** Alf. Patterson, pres.; O. S. Deringer, sec.; M. P. Ryan, treas.; A. A. Day, gen. mgr.; Chas. A. Peet, mg. engr. **Inc.** Aug. 6, 1906, in Oklahoma. **Cap.**, \$1,000,000; shares \$1 par; issued \$690,000. Annual meeting, Aug. 6.

Property: 28 claims, 160 acres placer ground, total about 750 acres, on Chalk mountain, 3½ miles north of Fairview. Claims said to show several orebodies, of which 3, under development, are 6' average width and proven to depth of 126', showing 2% copper, 32% lead, 26 oz. silver and \$8 to \$20 gold per ton.

Development by 3 shafts, deepest 126'. Management reports a shipment of 3 cars of 12% ore, 1915. Company succeeded to the property of the Corinthian Mining Co. and Chalk Mountain Copper Co.

MINNIE MOORE MINES CO.

IDAHO

Officers: I. E. Rockwell, Bellevue, Idaho, pres.; J. A. Blomquist, v. p.; Lalla Rookh White, sec.-treas. **Cap.**, \$500,000; shares \$1 par.

Property: at Bellevue, in the Mineral Hill district, Blaine Co., was bonded to Chas. M. Schwab interests but relinquished by them in 1906 when ore was found to be cut off by complex faulting.

In June, 1912, all the property of the Idaho Cons. Mines Co. was

bought at receiver's sale and in 1914 the Mill Side and Onyx lode claims were bought for \$5,000. Lead and zinc concentrates were being shipped, 1915.

MINONG COPPER CO.**MICHIGAN**

Office: 122 Winder St., Detroit, Mich. **Louis O. Broadwell**, pres.; **Hugh A. McPherson**, sec. **Inc. Dec. 16, 1874. Cap., \$1,000,000; shares \$25 par.**

Property: 1,455 acres in Secs. 22, 23, 26, 27, 34 and 35, T. 66 N., R. 35 W., lying at the head of McCargo's Cove on the Isle Royale, shows a line of ancient pits, largest 400' and about 1½ miles long. Idle since about 1881.

MISSOULA COPPER MINING CO.**IDAHO**

Mullan, Shoshone Co., Idaho. **Officers:** **Henry Billberg**, pres.; **C. A. Barnes**, v. p.; **R. J. McLeod**, gen. mgr.; preceding with **Harry Cheney**, **J. N. Thennes** and **John Brown**, directors. **Inc. 1901, in Idaho. Cap., \$100,000; increased 1907, to \$1,500,000; shares \$1 par, assessable; issued, \$1,350,000. Shares listed on Spokane and Vancouver Stock Exchanges. Annual meeting, first Tuesday in November.**

Property: 10 claims, about 175 acres, at the head of Deadman gulch, adjoining the Lucky Calumet, and about 1½ miles N. W. of the Snowstorm, in the Hunter district. Property has a strong fissure vein, of 85' maximum width, in Revett quartzite, carrying native copper, cuprite, azurite, malachite, bornite and chalcopyrite, with values mainly in sulphides, ranging from about 1%, on the hanging wall, to 8% on the foot-wall, ore averaging about one-half oz. silver per unit of copper. The property also carries some argentiferous galena.

Development: consists of a 1,400' upper tunnel and a 2,800' lower tunnel, with a connecting shaft and nearly 1 mile of workings. The main tunnel runs N. 30° E. for 1,900', then N. 70° E. for 700', passing from purple St. Regis slates at the portal into Revett quartzite. (Geology described U. S. G. S. Bull. 540, E. p. 48, 1913.)

Equipment: includes a 100-h. p. electric plant, with an 8-drill air compressor and necessary mine buildings.

March 1, 1914, ten of the largest stockholders formed an ironclad pool with 650,000 shares, deposited with Union Trust & Savings Bank of Spokane to March 1, 1916. In April, 1914, a lease and bond was given to Snowstorm M. Co. at \$600,000, said agreement calling for expenditure of \$2,000 for each month the option ran. Snowstorm expended \$36,000, and option was canceled on Sept. 12, 1915, claiming that development and values were disappointing.

Missoula stockholders assert that property contains apex of National vein. The Missoula vein is flat, dipping about 37° S. and towards National vein which was struck in long crosscut at vertical depth of 1,400', and is said to show dip similar to Missoula's. It is said that National Co. feared to raise lest it prove apex in Missoula ground. Property should be consolidated with the National Co. Both companies are failures at present, but if combined might succeed.

MISSOURI COPPER MOUNTAIN MINING CO.**MISSOURI**

Office: 323 West Seventh St., Sedalia, Mo. **Works office:** **Sullivan**, Franklin Co., Mo. **Officers:** **L. M. Barnard**, pres.; **W. D. Scoble**, v. p.; **Wm. H. H. Myers**, sec. **Inc. Jan., 1903, in Arizona. Cap., \$1,500,000; shares \$1 par; issued, \$1,396,000.**

Property: about 7,000 acres in Crawford and Washington counties, Missouri, including some farm lands. The Copper Hill mine, 32 acres, worked in a small way before 1850, shows an orebody with a good gossan in magnesian limestone. **Development:** by a 140' shaft and about 1,200'

of tunnels. An opencut, 40' wide and 200' long at base of hill, is said to show 30' of ore running as high as 36.3% copper. Ore deposit shows carbonate and sulphide ores, with a hematite gangue claimed by the company to average about 12% copper. The lands are also claimed to carry iron ore, lead, nickel, zinc and coal.

Equipment: includes a 60-h. p. steam plant, with 2 hoists good for depth of 300'. The reduction plant includes a mill and smelter, former having a Blake crusher, 18" and 22" rolls, 4 New Century jigs, a Card table and hydraulic classifiers. The smelter has a 30-ton Allis-Chalmers blast furnace and a Connersville blower.

Company plans to work its large iron deposits open cast, to do which it will be necessary to first remove an overburden of 70 to 120' thickness. Letters unanswered 1915-16.

MIZPAH CONS. COPPER & GOLD MINING CO. NEVADA

Office: East Ely, Nev. **Eastern office:** 913 Crozier Bldg., Philadelphia, Pa. **Mine office:** Mizpah, Elko Co., Nev. **Officers:** Robt. T. Seagrave, pres.; Harry Darlington, sec. and gen. mgr.; Wm. L. Bassett, treas.; John F. Crow, Supt. Inc. April 7, 1907, in South Dakota. **Cap.,** \$1,000,000; shares \$1 par, nonassessable; issued \$751,250. Annual meeting, third Monday in January.

Property: 23 claims, unpatented, 460 acres in the Dolly Varden district, 5 miles east of Mizpah, on Nevada Northern railroad. Claims show several fissure veins in granite and contact deposits between granite and rhyolite, one of which is estimated by the management at 200' width, carrying mainly bornite and chalcopyrite ore.

Development: by 70' two-compartment shaft, showing a 3' orebody, said to give maximum assays of about 15% copper, 8 oz. silver and \$18 gold per ton, which are not to be considered as average ore values. At last reports company was driving a tunnel, 1,365' long, expected to cut ore at about 1,400'.

MIZPAH COPPER MINING CO., LTD. IDAHO

Property sold to Merger Mng. Co., which see.

MIZPAH EXTENSION MINING CO. NEVADA

Offices: Bullitt Bldg., Philadelphia, Pa. and Tonopah, Nev. **Officers:** John F. Braun, pres.; Chas. E. Knox, v. p. and gen. mgr.; Wm. P. M. Braun, treas.; Chas F. Griffith, sec., with M. B. Cutter, Harry W. Davis and Lambert Ott, directors.

Inc. in .Del. Cap., 2,000,000 shares; in treasury, 344,318 common and 280 shares preferred stock. Listed on San Francisco and Salt Lake City Exchanges; traded in on New York Curb:

Property: about 400 acres at Tonopah, adjoining the Tonopah Mining and Tonopah Belmont properties on the N. E. A 2-year option has been taken on the property by the Tonopah Mining Co. and development work was assumed by the latter on Jan. 7, 1915. Under the terms of the option, if exercised, a new company is to be organized with a capitalization of \$2,000,000, shares \$1 par, of which Tonopah Mng. Co. stockholders will receive 60% and Mizpah stockholders 40%.

Ore: silver. For geology see U. S. G. S. Prof. Paper 42, Geology of the Tonopah Mining District, by J. E. Spurr.

Development: 1,000' shaft, with a winze from the 1,000' to the 1,155' level, now being sunk deeper. Work during the year has been mainly on the 1,000' and 1,155' levels with no startling developments. Mining was recently started on the flat vein discovered in 1915. This ore is low-grade, but management wishes to determine if it will pay to mine it; stoping width 2'-2½'.

MOCTEZUMA COPPER CO.**MEXICO**

Office: 99 John St., New York. **Mine office:** Nacozari, Moctezuma, Sonora, Mex. **Officers:** Dr. Jas. Douglas, pres.; Arthur Curtis James, v. p.; C. H. Dodge, v. p.; Geo. Notman, sec.-treas.; J. S. Williams, Jr., gen. mgr.

Inc. 1896, in West Virginia. **Cap.**, \$3,000,000; issued, \$2,600,000. Is controlled through entire stock ownership by Phelps, Dodge & Co., Inc., and holds direct title to lands through Moctezuma Copper Co., S. A. **Inc.** Feb. 4, 1896, in Mexico. **Cap.**, 500,000 pesos. **Dividends:** were 77% or \$2,262,000, 1902-07; none in 1908; \$988,000 in 1909; \$468,000 in 1910; \$754,000 in 1911; \$2,118,569 in 1912; \$1,950,000 in 1913; \$1,170,000 in 1914.

Property: about 2,500 acres of mineral land in the Moctezuma and Arizpe districts of Sonora, including the Pilares de Nacozari mine 6 miles east of Nacozari. Company also owns the Juarez and Nicolas ranches of about 35,000 acres, which carry considerable valuable timber.

The Pilares mine lies in a high and precipitous country near the divide of the Yaqui and Oposura rivers. The ore deposit is a large pipe, or chimney, of rock breccia cemented by ore. The rock fragments are angular, of all sizes up to masses over a ton in weight and consist of creamy-tinted, hard but altered fine-grained felsitic, rhyolitic porphyry. The orebody has an elliptical cross section 2,000' long and 600' wide. The ore carries chalcopyrite with pyrite and some bornite, the ore being mostly of concentrating grade, averaging 2.3% copper as mined. The deposit has no clearly-defined footwall and the hanging dips at an angle of about 80°. There is a small outcrop of rich carbonate ore, but croppings are mainly red-stained porphyry, carrying considerable low-grade hematite. The leached zone is about 20' in depth only, with payable ore coming in at depth of about 60'.

In addition to the Pilares mine, the company owns a number of other properties that have been operated for several years past by lessees, including the Churunibabi, Bella Union, Fortuna, San Francisco, El Vaquero and San Pedro. The Bella Union has high-grade ore, including oxides and native copper, shipments assaying up to 39% in copper tenor, with small gold and silver values. The Churunibabi property, operated by Col. Norton Hand for several years, yielding \$100,000 worth of silver ore, will hereafter be operated by the company, a rich gold-silver-copper orebody having been struck July, 1913.

Development: 4 shafts; three 3-compartment main working shafts, the Guadalupe 1,100', Pilares 1,285' and Esperanza 1,265' deep. A new shaft, the Margarita, 239' deep, early in 1916 cut a stringer of 8% copper ore which widened to 3' and a shaft will therefore be sunk to the 500' level.

The mile long Porvenir tunnel taps the deposit 600' below surface; 25-ton narrow gauge railway cars run from Nacozari into the tunnel direct to the mine ore chutes. The tunnel has storage bins in a 25x100' chamber to which ore is milled down from the upper workings, no ore being hoisted, all ore as broken being sent in chutes to the tunnel.

The mine employs 2 methods of ore extraction, the room-and-pillar with waste filling as work progresses, and shrinkage stoping with waste filling after all the ore has been extracted.

The mine has some enormous stopes, No. 4 stope, on the 3d level, having been 85' high, 125' wide and 150' long. The ground stands very well and the systems of extraction used give minimum timber requirements at a cost of only a few cents per ton of ore mined. Costs are about 3 pesos per metric ton for ore loaded on the tram cars. No water is hoisted above the Porvenir tunnel level and very little water is raised from the workings below. The mine is well ventilated and is equipped with electric lights.

The Pilares orebody is one of the largest in the world and is comparable, in many respects, with that of the Rio Tinto. The orebody shows no decrease in value at 110' depth. **Ore reserves:** estimated Jan. 1, 1916, 3,220,000 tons, a decrease of 255,700 tons for the year. The Pilares is the main working shaft. Plans for the proposed cyanide plant are held in abeyance on account of the revolution.

Equipment: includes new electric hoists and a 25-drill air compressor. There is an emergency steam plant at the mine having 2 boilers held in reserve in case of accident, but electricity is used throughout.

The power plant, at Nacozari, built in 1908, has four 435-h. p. Stirling water-tube boilers, equipped with Green fuel economizers, Foster superheaters and Rooney stokers, burning New Mexican coal, having a 196' reinforced concrete stack. The plant has three 1,000-k. w. Curtis turbo-generators giving a 6,600-volt current, and an auxiliary 50-k. w. steam turbine generator set is used as an exciter. Current is transmitted at 6,600 volts to the mine and mill and at the mine is stepped down to 230 volts for the pumps, while the hoists and electric locomotives use a 250-volt direct current. An old gas engine plant is described Vol. X.

The mine is connected with the mill by a 6-mile 20"-gauge railway. Rolling stock includes four 60-ton locomotives and twenty 30-ton Ingoldsby steel side-dumping cars.

The 2,000-ton concentrator, designed and built by H. Kenyon Burch, at a cost of about \$1,000,000, is one of the most complete and efficient in existence. The crushing plant receives ore from the mine in 6,000-ton bins, whence it is fed by 2 automatic ore feeders, of special design, to grizzlies, with bars set 2½" apart, oversize going to a No. 8 gyratory crusher, and undersize to a belt-conveyor, meeting material from the crusher, and going by belt conveyor to two 4x10" manganese trommels, with 1½" perforations. Undersize from the trommels goes to belt conveyors and oversize from the trommel goes to No. 5 gyratory crushers, breaking the material to 1" cubes, which joins the material from the trommels and is sent by belt conveyors to 4,000-ton storage bins.

Each 1,000-ton unit of the mill is equipped with 6 coarse and 12 fine jigs, 3 sets of rolls, Swain classifiers, Callow screens, 44 Wilfley tables and 72 Johnson vanners. From the storage bins the ore is fed by a portable ore feeder to a belt conveyor, passing over an automatic weighing machine and sampler, delivering it to an 18-mm. trommel. This trommel screens the ore, the coarse pieces going to bull jigs and undersize to 11-mm. trommels; the latter feed oversize to coarse jigs and undersize to 7-mm. trommels. These trommels in turn feed oversize to intermediate jigs and undersize to 4-mm. trommels, whose oversize goes in its turn to 2-mm. trommels; oversize from latter goes to fine jigs. The undersize from the 2-mm. trommels goes to 22-mesh Callow screens and thence to Wilfley tables handling oversize and undersize.

Slimes from the Wilfleys go to the vanner settling tanks and middlings from the Wilfleys go to the Chilean mills by elevators. Tailings from the bull jigs, coarse jigs and intermediate jigs go to either of 3 sets of 42x16" rolls, then by elevator to the mixing-box at the head of the trommels. Tailings from the fine jigs go to dewatering machines, and overflow from dewatering machines goes to vanner settling tanks, dewatered material going to the jig tailings bin and thence to Chilean mills, crushing to pass a 2½-mm. screen and thence to Callow screens of 22-mesh. Product is a concentrate of about 12% copper tenor, about 85% of the assay value being saved.

An aerial tramway carries tailings from the concentrator to a dump on the hillside, far above the river level.

Water is pumped from a well sunk at the side of the river by 1 triplex and 3 Worthington pumps, of 500 gals. capacity per minute, to 500,000-gal. tanks at the mill. Wash water from the concentrates is settled and re-used. A large dam 3 miles east of Nacozari, 90' in height, stores water sufficient for 2 years steady operation of the mill.

The old 600-ton concentrator is available for use on immediate notice.

The company built and owns the town of Nacozari, and a town at the Pilares mine. At Nacozari the company maintains both English and Spanish schools for the children of employes, and a well-equipped hospital and a free library, and amusement hall.

Forces normally are 1,300 men at the mine and mill, of which the great majority are Mexicans, with a few Japanese, no American labor being employed at the mine aside from shift-bosses and timbermen. Mining is performed under contract at 7 to 11 pesos per foot, and the larger part of the tramming is done by contract also, the mine proper employing about 200 miners, 80 carmen and 75 contractors.

In 1915 the mill treated 424,027 tons of 3.4% copper ore; concentrates averaged 13.32% copper; extraction 83.6%; ratio of concentration, 4.71; 861 gal. fresh water used per ton of ore milled. Operations at the property in 1915 were suspended entirely for 4 months and interrupted frequently during the remainder of the year.

Production:	Lbs. Copper		Oz.	
	Net	Gold	Silver	
1915.....	22,889,885	599	331,836	
1914.....	29,591,658	1,006	435,482	
1913.....	36,598,132	.....	.....

The Moctezuma is one of the world's really great copper mines and the management is of the best.

MODOC MINES CO. CALIFORNIA

Highgrade, Modoc Co., Calif. Officers: Wm. Wrigley, Jr., pres.; Jas. C. Cox, sec.-treas., Kesner Bldg., Chicago; N. E. Guyot, v. p. and mgr., Oatman, Ariz., directors.

Inc. May 1, 1909, in Ariz. Cap., \$1,000,000; all outstanding; shares \$1 par. Annual meeting July 1. Is a close corporation.

Property: 259 acres, patented, and 60 acres, unpatented, in High Grade mining district, in the extreme N. E. corner of Modoc Co., being the only operating mine in the county. Ore: gold, silver, in a vertical quartz vein in rhyolite; vein has an average width of 10", and is said to be proven for 150' in length downward to the 200' level. The ore in 25-car lots is said to assay \$23 per ton.

Development: by 210' vertical shaft, with 1,800' of underground workings.

Equipment: includes 6"x10" hoist. Steam power is used. In 1915 about 100 tons of \$23 ore was shipped. Working conditions are bad, due to the heavy winter snow and to the opposition of the ranchers in that section. For geology of the High Grade district, see U. S. G. S. Bull. 594, pp. 38-48.

MODOC MINING & MILLING CO. COLORADO

Cripple Creek, Colo. Wardner Williams, pres., Pueblo, Colo. Operates the Modoc mine between Battle mountain and Bull Hill, which has been a constant producer of high-grade ore for many years. Output said to be 150 tons monthly, yielding \$40 to \$50 gold per ton. Mine is developed to the 16th level at 1,230' depth. Shaft sinking resumed, Jan., 1916.

MOGOLLON GOLD & COPPER CO.**NEW MEXICO**

Dead. Entire holdings bought at public sale. Aug., 1915, by Socorro, M. & M. Co., which see. Company paid \$22,500 in dividends from 1901-1915.

MOGOLLON MINES CO.**NEW MEXICO**

Mogollon, Socorro Co., N. Mex. **Officers:** Frank H. Hitchcock, pres.; Alfred Levinger, sec.; J. H. Hoban, treas., all of New York City. **Directors:** Frank H. Hitchcock, Eugene Meyer, Jr., and J. W. Sebinus. Sidney J. Kidder, gen. mgr.

Inc. Dec. 6, 1912, in Maine. **Cap.**, \$1,778,410; all outstanding; shares \$5 par, New York Trust Co., New York, registrar. Annual meeting, 2nd Monday in October. On June 30, 1915, the Mogollon Mines Co. absorbed the Ernestine Mining Co., which was organized Nov. 18, 1902.

Gross earnings, 1915, \$508,502; **operating expenses**, \$428,025. Paid a 2% dividend in July, 1915; prior to this dividends had been suspended for some time, earnings having been devoted to development and betterment of property.

Property: 16 claims, 12 patented, 216 acres, at Mogollon. **Ore:** gold and silver sulphide, in quartz veins in andesite and rhyolite, said to average \$12-\$15 per ton. Main vein, known as the Last Chance, strikes S. E.-N. W.; dips 60° to 70° and is 10'-26' wide.

Development: incline shaft 700' below main tunnel, which is 2,972' long; greatest depth of workings, 1,430'; underground workings total 22,530'. Shrinkage stoping is used.

Equipment: includes electric hoist; Ingersoll-Rand compressor; De La Vergne oil engines; electric power; 40-stamp mill and cyanide plant, capacity 160 tons daily.

Production: 51,862 tons of ore treated, 1915. Output is gold-silver bullion.

MOHAWK MINING CO.**MICHIGAN**

Geo. W. Drucker, sec., 15 William St., New York. **Mine office:** Mohawk, Keweenaw Co., Mich. **Mill office:** Gay, Keweenaw Co., Mich. **Officers:** John R. Stanton, pres.; F. McM. Stanton, treas., with Jas. S. Dunstan, Wm. A. Paine and F. W. Denton, directors. Theo. Dengler, supt.; John Trevarrow, Jr., mng. capt.; F. Wm. Hartmann, engr.

Inc. Nov., 1898, in Mich. **Cap.**, \$2,500,000; shares \$25 par; all issued; assessable; paid in \$18. Stock listed on Boston Exchange. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agt. Annual meeting last Tuesday in March.

Dividends: (paid semi-annually, Feb. and Aug.) \$5 in 1906; \$9 in 1907; \$2.50 in 1908; \$3 in 1909; \$2 in 1910; \$1.75 in 1911; \$3.50 in 1912; \$5 in 1913; \$1 in 1914; \$6 in 1915; \$10 to Aug. 1, 1916; a total of \$4,875,000.

Property: 800 acres, in an irregular tract, having its axis on the strike of the Kearsarge amygdaloidal bed, in Secs. 27, 28, 33 and 34, T. 57 N., R. 32 W., about 4 miles N. E. of Calumet, with the Ahmeek and Seneca mines on the north and Ahmeek to the west. In May, 1916, purchased 900 acres near Dollar Bay, lying between Torch and Portage lakes, with a long strip of shore on each side, thus acquiring an excellent millsite on Torch lake.

Geology: property carries the Kearsarge amygdaloidal bed, which ranges from 15' to 18' in average width, or about the same as at the Wolverine, and the upper workings carry about the same percentage of copper as in the Wolverine mine, but the lower workings are by no means so rich. The Kearsarge bed is crossed at approximately right angles by a number of narrow fissure veins, with nearly vertical dip, that are yielding a considerable amount of mass copper and in addition there are 3 cross-fissures carrying copper arsenides, including mohawkite, keweenawite, mohawk-

whitneyite, and stibio-domeykite, the first two being peculiar to this district and first found in this mine. The fissures carrying mohawkite range 3" to 3' in width, are well mineralized where crossing the amygdaloidal bed and for an indefinite but usually short distance on either side, the mohawkite and allied arsenides occasionally occurring massive, but commonly being disseminated in an arenaceous gangue. Values in the arsenides decrease with depth and recent production has been small. There also are other cupriferous amygdaloidal beds in the stratified series that may be given attention later.

Development: 6 shafts, numbered from north to south, of uniform size, 8x18' inside of timbering, with solid cribbing through the overburden and with identical equipment. No. 5 shaft has a concrete collar 10½'x23'x100' deep, and No. 6 is concreted for a depth of 90'. The skipways are laid with concrete stringers, which prove very satisfactory. The mine is equipped with Richmond electric signals and operates about 65 power drills. About 10,000' of new openings are made annually.

No. 1 shaft, about 1,500' south of the northern boundary, is bottomed at the 22nd level and is 2,379' deep. No. 1 hoist, in the central power plant at No. 2 shaft, operates two 4-ton skips in counterbalance. No. 1 shaft has a combination shaft rock house, equipped with a 12x24" Nordberg engine and crushers.

No. 2 shaft is 2,364' deep. Like No. 1, it had good ore near surface with impoverishment at depth, followed by improvement below the 12th level. The power plant at No. 2 shaft, serving both Nos. 1 and 2, includes an engine house and boiler house. Hoists are Nordberg double-conical-drum duplex-cylinder engines, good for 6,000' depth, each handling two 4-ton skips in counterbalance. The boiler house has 2 locomotive firebox boilers, with foundations for 3 additional boilers, and the engine house has 2 Ingersoll-Sergeant air compressors, of 40 drills aggregate capacity.

No. 3 shaft is 1,600' deep, and has been abandoned, as the ground tributary to No. 3 can be reached to better advantage through shafts Nos. 2 and 4. No. 4 shaft is 2,194' deep, developing good average ground from surface. Equipment includes a steel shaft rock house with 3 crushers and a steam hammer. The engine house has a Nordberg double-conical-drum hoist, good for 6,000' depth. A compressor plant, at No. 4 shaft, has a 60-drill Nordberg and a 60-drill Ingersoll-Sergeant cross-compound 2-stage compressor.

No. 5 shaft is 1,620' deep. Equipment includes a new all-steel shaft rock house and a Bullock hoist good for 2,000' depth.

No. 6 shaft, the southernmost and newest, is about 2,600' south of No. 5 and 2,600' from the Ahmeek boundary, commanding about three-fourths of a mile of the strike of the Kearsarge bed under about 160 acres, or approximately as much ground as the entire Wolverine mine. This shaft, located about 60' in the foot wall rock, is 1,250' deep, and can be sunk to a maximum of 4,000'.

The mill, near the mouth of the Tobacco river, on Traverse bay, Lake Superior, opposite the mill of the Wolverine, is 178x206' in size, of steel frame sheathed with iron, on foundations of sandstone. A steel trestle, 350' long and 50' high, leads into the mill, loaded cars being pulled up the incline by a winding engine. The mill has 4 stamps, all compounded, giving a daily capacity of 2,800 to 3,000 tons. The mill has a Chilean mill and 3 sets of auxiliary crushing rolls, with fixed bearings, to reduce oversize material from the mortar boxes of the heads, this averaging 20 to 25% of rock stamped. Mineral from the wash discharges automatically and is sluiced into the basement, where shoveled into 1½-ton mineral cars, having 14 mesh

perforated steel bottoms that allow the drainage out of water, after which the cars are weighed, then lifted by a cage elevator and dumped into bins. The bin house has 4 compartments, each with cement floor and steam-pipes underneath, for drying the remaining moisture from the wash. The mineral is taken from the bin house, in self-dumping steel mineral cars to the Michigan smelter at Houghton for reduction. Tailings from the mill are dewatered, then raised by bucket elevator, and stacked by belt conveyor, some distance from the mill.

Water for both the Mohawk and Wolverine mills is furnished from a joint pump house, standing near the Tobacco river, from which water is taken. The pump house has a 20,000,000-gal. triple expansion Snow pump, supplemented by a 9,000,000-gal. Nordberg pump, giving an ample water supply for both mills.

A 30x300' wharf, on Traverse bay, a short distance from the mill, with 14' of clear water alongside, is fitted with coal hoists and storage sheds, ample for the needs of both mills. Employs about 700 men.

Yield of fine copper, per ton of rock stamped, averaged 15.79 lbs. for the decade ended 1912.

Production:

1915.....	Tons Rk. Hoisted	Cost per Ton Hoisted	Tons Rk. Stmpd.	Cost per Ton Stmpd.	Lbs. Cu.		Mineral Lbs.	Ref. Cu. Lbs.	Cost per Lb.		Sell. Price
					per Ton	per Ton			Cu. (a)	Cu. (b)	
	885,023	\$1.16	329,789	\$1.20	19.16	20,705,000		15,883,914	7.31	7.45	17.00
1914.....	885,852	1.31	649,649	1.24	17.08	14,591,000		11,094,859	8.23	8.58 b	12.47
1913.....	885,100	1.53	366,458	1.64	15.76	8,018,000		5,778,235	10.42	13.22 b	15.38
1912.....	888,841	1.34	787,941	1.47	15.32	15,901,500		11,995,598	9.67	10.61	16.08
1911.....	902,859	1.29 ^a	802,548	1.40 ^b	15.07	15,760,700		13,091,056	9.33	10.39 ^b	12.63
1910.....	906,243	1.367	802,537	1.433	14.22	15,013,500		11,412,066	10.076	11.441	13.60

(a) Includes construction. (b) Includes strike expense.

The mine was closed from July, 1913, to April, 1914, due to the Western Federation of Miners' strike. Toward the close of 1915 recovery amounted to over 21 lbs. copper per ton of rock, and costs were down to about 7½¢ per lb. Production, 1916, is at the rate of 18,000,000 lbs. per year.

Finlay in 1911 estimated 176,000,000 lbs. extractable copper, and a life of 15 years further. Our present estimate is 260,000,000 lbs. and a life of 23 years.

The Mohawk, while a much lower grade mine than was anticipated at the beginning, is a fine property with an assured future and has the benefit of a strong, honest and thoroughly economical and competent management.

MOJAVE TUNGSTEN CO.

CALIFORNIA

Office: 165 Broadway, New York. Mine office: Nipton, Nev. Officers: Pierre de P. Ricketts, managing director; William A. Kerr, v. p.; Geo. B. Read, sec.; James T. Anyon, treas.; with Wm. W. Cohen, John J. Cone, Julian Codman, John T. Smith, R. M. Whitman, directors. Ricketts & Co., Inc., 80 Maiden Lane, New York, mgrs. F. S. Naething, supt.; L. L. Draper, asst. supt.

Inc. Nov. 23, 1915, in Del. Cap., \$1,000,000; par value \$2; nonassessable; all outstanding. Traded on New York Curb. Transfer offices: The Corporation Trust Co., Jersey City; American Trust Co., Boston. Registrars: Empire Trust Co., New York; State Street Trust Co., Boston. No financial data regarding operations are available, since work did not begin until Dec., 1915. Company is the resurrected United States Tungsten Co., which failed several years ago.

Property: 12 unpatented claims in the Clarke mining district, San Bernardino Co., Cal., 19 miles from Roach, Nev., the shipping point. Tungsten occurs chiefly as wolframite in a quartz vein in gneissoid granite. The vein is practically vertical with course N. W.-S. E. Pay ore occurs in shoots of which there are said to be several from 20' to 60' long.

Development: two claims, Jack No. 4 and Jack No. 3, are developed by

shafts, 165' and 60' deep, respectively. Water level in No. 1 shaft is at 105' and the flow per 24 hrs., about 4,000 gal., is sufficient for all purposes, including concentration of 100 tons of ore. Total underground workings, about 550'.

Distance between the two shafts is 1,500', and trenching along the outcrop is said to show a continuation of ore. It is planned to join these two shafts on the 150 or 200' level.

Ore claimed to average 4% tungsten trioxide, and to be suitable for concentration, recovery being calculated at 85%. No ore reserves given.

Equipment: hoist, steam drill, pumps, etc. Company will increase its equipment as work progresses to provide for an output of 300 to 400 tons of ore per month.

Ricketts & Co. have examined the property and report that, with an expenditure of \$10,000 to \$12,000 for surface and underground work, 300 tons of 4% ore and 5 tons of 30% ore can be mined per month with about 20 men. In May the company acquired the Bracken group of 6 tungsten claims at Boulder Falls, Boulder, Colo. Is a curb promotion.

MOLLIE GROVES MINING & MILLING CO. COLORADO

Office: 328 New York Life Bldg., Kansas City, Mo. **Operating office:** 420 Ernest & Cranmer Bldg., Denver, Colo. Mine near Parshall, Grand Co., Colo.

Property was not regarded favorably by the late Horace J. Stevens, owing to its alleged preposterous claims. Letters neither answered nor returned. Fully described Vol. XI, Copper Handbook.

MOLOLOA MINING CO., LTD. MEXICO

Hostotipaquillo, Jalisco, Mex. **Officers:** W. G. Miller, pres.; F. G. Stevens, managing director; W. M. Mathews, treas. and gen. mgr.; Edw. Fenley, supt., at last accounts. **Inc.** 1908 in Canada. **Cap.**, \$250,000.

Property: 130 hectares, include antiquas opened by the Spaniards in the 16th century, reopened in 1904. Said to have been abandoned by former owners because of vein faulting. Several fissure veins in andesite carrying gold-silver ore were worked in 1914 and shipments made to the El Favor mill.

MONARCH MINE. MONTANA

Lease and bond given to C. E. Fryberger, Helena, Mont., 1916. **Property:** near Elliston, Powell Co., Mont., shows andesite intruded by quartz monzonite, cut by fissure veins carrying galena, blende, pyrite and arsenopyrite. A 3 to 5' vein of copper sulphide ore yielded considerable copper in the past. Developed by 265' shaft and 1,200' tunnel. Shipment of one car recently reported to have run 3½% copper, 35 oz. silver, 10% lead and \$5 gold per ton.

MONARCH MINING & SMELTING CO. ARIZONA

Wickenburg, Ariz. **Officers:** W. O. Donovan, Vidalia, Ga., chairman; J. H. Mulholland, pres.-gen. mgr.; Jas. R. Vaughan, v. p.; J. B. Everidge, v. p.; Geo. A. Sharpe, sec.-treas.; officers are directors. A. D. Akin, cons. engr. **Inc.** Aug., 1904, in Ariz. **Cap.**, \$1,000,000; increased to \$1,500,000 in 1913 and to \$3,000,000 in 1914. **Bonds:** \$100,000 1st mtge., issued 1913; \$57,400 outstanding. Assets of company given as \$62,523 over liabilities, Jan., 1915.

Property: 6 claims, patented, 100 acres, known as the Ryland or Three, Black Buttes group, in the Black Rock or White Picacho district, 9 miles S. E. of Wickenburg, shows diorite and schist carrying oxidized ores changing at shallow depth to chalcopyrite and occasional bornite, said to assay 2 to 20% copper and estimated by management to average 1 to 3 oz. silver and \$3 to \$15 gold per ton.

Development: several shallow shafts and tunnels of 600 and 360', with about 1,500' of underground workings and several thousand feet of surface trenching.

Equipment: includes a 50-h. p. distillate engine, 5x8" Rumsey triplex pump, and a 4-drill Sullivan compressor. There are about 26 buildings, all owned by the company. Water is taken from the Hassayampa river through 7 miles of 4" pipe.

Development has proved surface ores to be badly broken, not continuous and occurring in pockets. Former management counted on raising funds for deep development by milling surface ores, but with wet concentration process used in 100-ton mill, major part of oxides and carbonates was lost in the tailing. Mill was therefore closed down after trial run and shaft is being sunk deeper, 1916.

MONARCH PITTSBURGH MINING CO.

NEVADA

Tonopah, Nev. **Officers:** H. C. Brougher, pres., 6150 Harwood St., Oakland, Calif. W. J. Douglass, v. p.; R. B. Govan, v. p.; E. J. Erickson, sec-treas.; with W. Brougher, directors. B. H. Smith, supt.

Inc. in Nevada. **Cap.**, \$1,500,000; shares \$1 par; fully paid; assessable; assessment No. 4, 1 ct. per share, levied May 15, 1915. Stock transferred at company office. Listed on San Francisco Exchange.

Balance sheet for 1915 shows assets \$1,555,978, which includes: mine property, \$1,484,150; treasury stock, \$70,146; supplies, \$132; cash on hand, \$1,550. Liabilities include: assessments paid, \$54,304; unpaid accounts, \$1,673. Receipts for 1915, \$23,854; of which assessments furnished \$13,911. and cash, Jan. 1, 1915, \$4,619. Disbursements were: labor, \$10,876; vouchers, \$11,428.

Property: 3 patented claims at Tonopah, adjoining Tonopah Extension on south and west. Claims show veins with silver ore. **Development:** by vertical shaft, 1,100' deep. Work in 1915 was confined mainly to the 850' and 1,000' levels, amounting to 1,806' at a cost of \$9.91 per ft.

No commercial ore has been found to date.

MOND NICKEL CO., LTD.

ONTARIO

Secretary's address: Hugh Hughes, 39 Victoria St., London, S. W., England. Mine office: Victoria Mines, Algoma, Ont. Works office: Clydach, Glamorganshire, Wales. **Directors:** Sir Alfred Mond, chairman; Dr. Bernhard Mohr, gen. mgr.; E. J. Griffith, Saxton W. A. Noble, Sir Robert Hadfield, Emile S. Mond, Robt. L. Mond, Dr. Carl Langer, Robt. Mathias and Sir Edmund Walker. C. V. Corless, mgr. Oliver Hall, supt.; A. Sharp, supt. Garson mine.

Inc. Sept. 20, 1900, in Great Britain. **Cap.**, £600,000, increased July, 1908, to £850,000; in £500,000 cumulative 7% preferred shares, £5 par; £300,000 ordinary shares, £1 par, and £50,000 deferred shares, £1 par; total issued capital, £750,000. Reorganized July 22, 1914, with authorized capital of £2,400,000, in shares of £1; 500,000 being in 7% cumulative preferred shares, 1,000,000 in 7% noncumulative preferred shares, and 900,000 ordinary shares. All except £520,000 of the noncumulative shares has been subscribed and called up; £375,000 5% first mortgage debenture stock and £500,000 6% redeemable debenture stock has been issued. For fiscal year 1915, profits were £300,296.

Dividends: 7% has been paid regularly on preferred shares; dividends on ordinary shares: 6% in 1905; 10% in 1906; 12½% in 1907; 15% in 1908, 1909 and 1910; 16¼% in 1911 and 1912; 21¼% in 1913; 35% in 1914; 20% in 1915 on new capital. Dividends on deferred shares were 18% in 1906; 33% in 1907; 48% in 1908, 1909 and 1910; 55% in 1911 and 1912; 85% in 1913. Reserve fund, £100,000. Cash balance, April, 1915, £134,011. **Net profits:**

£111,320 in 1909; £114,107 in 1910; £140,803 in 1911; £146,650 in 1912; £191,047 in 1913; £248,088 in 1914; and £285,282 in 1915.

Property: about 14,000 acres in the Sudbury district and mining rights on about 12,000 acres near to and including Bruce Mines. Mines in the Sudbury district include Levack, Garson, Victoria, Worthington, Frood Extension, Kirkwood and North Star. Only the first four named worked at present. Mines in the Bruce Mines area consist of several openings grouped under the general name of Bruce Mines. The former group produces copper-nickel ore and the latter quartz-copper ore, used as flux in the converters. For geology of the Sudbury nickel-copper deposits, see Eng. & Min. Jour., Vol. 101, No. 19, and Vol. 102, No. 2.

The Levack mine, purchased in 1913, is being opened up by a 5-compartment shaft, 400' deep, early in 1916. The present deepest level is at 350'.

Garson mine has a 3-compartment 800' shaft. Present deepest level is at 600'. Extraction to date has been almost exclusively from the upper 400', where a large tonnage still remains to be extracted.

Victoria mine is one of the deepest mines in Canada. The bottom level is over 2,300' vertically from the shaft collar, and the 3-compartment shaft, the sinking of which is nearly continuous, is now over 2,400' deep.

Worthington mine, now about 500' deep, produces a mixture of very high-grade ore and rock, which is subjected to close sorting. The orebody is a brecciated basic dike and not typical of the Sudbury deposits. For geology see Economic Geology, Vol. X, No. 6. The Worthington is developed by a 3-compartment shaft.

The purchase and opening of the Levack mine, 1913, caused the closing down of several properties, including Frood Extension mine, which had been opened up to a depth of 1,000' by a 4-compartment shaft.

The copper-nickel ratio of the ore from these mines differs quite widely, but the production from the various mines is usually so arranged as to give close to an evenly balanced copper-nickel matte.

The old smelter, near the mines, has been abandoned, and a new 1,500-ton smelter, erected 1912, at Coniston, Ont., was blown in May 15, 1913. **Equipment:** includes 2 Allis-Chalmers water-jacketed copper blast furnaces, 50" x 240", and 2 Peirce-Smith basic converters with shells 10' in diam. and 25'-10" long. Ores are smelted and bessemerized to a copper-nickel matte averaging about 82% copper and nickel, which is shipped to the company's refinery at Clydach, in Swansea Valley, South Wales, where the metals are separated and the nickel is refined by the Mond Process.

The copper-nickel matte from the smelter is dead-roasted and treated with dilute sulphuric acid, which permits the extraction of about 65% of the copper and 2% of the nickel. The residue, after drying, assays 45 to 60% nickel, and is treated in charges of 500 kgs. with water-gas, in a reduction tower, at a temperature of about 300° C. This tower has shelves and the ore is moved from shelf to shelf by automatic rakes, the lower shelves being cooled. After treatment in the reduction tower the charge is transferred to a volatilizing tower and treated with carbon monoxide at a temperature of about 100° C. The residue therefrom is returned to the reducing tower and the charge goes forward and back between the 2 towers for 10 to 15 days, and when 60% of the nickel has been volatilized, as nickel carbonyl, the residue of the charge is returned to the roasting furnace. The nickel carbonyl is treated in a decomposing apparatus, wherein the metal is recovered in granules, assaying 99.4 to 99.8% nickel, and the copper is turned out as bluestone.

All the Canadian plants are up-to-date and operated electrically by power from 3 hydro-electric plants, two of which are the property of the

Lorne Power Co., a subsidiary of the Mond Nickel Co. The growth of the company's operations within the past 5 years has been phenomenal.

The mine output for 1911 was 163,352 tons, 117,658 tons in 1912 and 408,638 tons in 1915.

Production is not reported by the company, but unofficial estimates two years ago placed the annual output at about 4,000,000 lbs. fine copper and 5,000,000 lbs. nickel, with a possible maximum production of 10,000,000 lbs. copper and 15,000,000 lbs. nickel.

MONETAIRE MINING CO.

UTAH

Office: 405 Newhouse Bldg., Salt Lake City, Utah. **Officers:** D. J. Williams, pres.; N. V. Jones, v. p.; B. F. Cummings, sec.-treas.; with W. H. King and D. W. Cummings, directors. **Inc.** Sept. 19, 1912, in Utah. **Cap.**, \$250,000; shares 25 cts. par; assessable; 885,000 shares outstanding. Annual meeting, third Tuesday in January. Listed in Salt Lake City.

Property: 2 patented claims, 6 acres, in Little Cottonwood mining district, said to show lead-zinc ore, with some molybdenum, in fissure veins in limestone and quartzite. Veins strike E. W. and dip almost vertical. Ore shipped said to have returned \$17 per ton. No recent shipments reported.

Development: 127' vertical shaft and tunnels, with about 1,000' of workings. Claim to have 20,000 tons of ore blocked out. **Equipment:** includes an electric hoist. No operations in 1915. Plans resuming work in 1916. Mine is a prospect.

MONITOR BELMONT MINING CO.

NEVADA

Belmont, Nye Co., Nev. Norman E. Smith, mgr. **Property:** 21 claims at Belmont, a number of which were extensively worked years ago. Claims show silver ore developed by 3 shafts, 600', 750' and 1,100' deep. There is said to be a considerable tonnage of milling ore in the old workings in addition to the dump ore. In Oct., 1915, company completed a 10-stamp 150-ton mill, equipped with a tube mill and flotation plant.

MONITOR CONSOLIDATED COPPER MINING CO.

IDAHO

Stockholders sold property to Montana-Idaho Copper Co., 1914, for \$102,000, payable in shares of new company at par, stock to be exchanged April 17, 1917. See Mont.-Idaho C. Co.

MONITOR SILVER, LEAD & ZINC MINING & MILLING CO.

NEW MEXICO

Offices: 115 Broadway, New York, and McLaughlin Bldg., Sante Fe, N. Mex. **Officers:** Chas. E. Berner, pres.; Chas. W. Berner, v. p.; Gustave F. Ettensperger, sec.-treas.; with Sidney H. Hirsch and Francis C. Wilson, directors.

Inc. Feb. 5, 1916, in N. Mex. **Cap.**, \$1,000,000; issued, \$753,025; shares \$1 par. Security Registrar & Transfer Co., New York, transfer agent and registrar. Listed on New York Curb. Financial statement, April, 1916, shows cash and accounts receivable, \$24,560.

Property: 5 groups, 30 claims, near Hermosa, Palomas mining district, Sierra county. Groups are ½ to 2 miles apart. Said to show lead, zinc, copper ores in a contact deposit in limestone; the intrusive is andesite.

Development: 200' Antelope shaft, inaccessible at present, 170' Austrian shaft, 390' Slater tunnel and the 480' Willow Creek tunnel. **Equipment:** includes a 20-stamp mill, hoist, air compressor, saw-mill, 2 boilers of 35-h. p. and 60-h. p. Property long idle before acquisition by new company. Management intends opening up the mine. Examined in 1916 by Ricketts & Co.

MONROE COPPER MINE.

ARIZONA

Address: John Curran, owner, Walker, Yavapai Co., Ariz. Mine, once owned by the Monroe Cons. Mines Co., long dead, is near the junction of Knapp gulch and Lynx creek, near Prescott. Formerly worked as a gold

mine and said to have a 50' dike carrying copper ore on the 300' level. Development work consists of various tunnels.

MONTANA-ARIZONA COPPER CO.

ARIZONA

Idle. W. D. Greenough, mgr., Greenough Bros., Spokane, Wash. **Property:** 26 claims, 520 acres, 30 miles north of Wenden, Yuma Co., Ariz., is said to show 5 veins of 3 to 100' width, traceable 7,000', one vein carrying gold values. **Development:** 300' two-compartment shaft and a considerable number of trenches. **Equipment:** includes 60-h. p. gasoline hoist.

MONTANA-BINGHAM CONSOLIDATED MINING CO.

UTAH

Office: 66-West Broadway, Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake Co., Utah. **Officers:** W. E. Hubbard, pres. and gen. mgr.; G. G. Schliep, v. p.; G. W. Kling, sec.-treas.; with V. Eckman, John Schneider and C. E. Adderley, directors. M. T. Miller, supt. **Inc.** July, 1910, as successor of Bingham-Butte Consolidated Mining Co. **Cap.**, \$1,500,000; shares \$1 par; issued, 938,026 shares. Owns 125,000 shares of Bingham Amalgamated C. Co. stock. Debentures, \$200,000, at 6%, due June 1, 1918; \$45,400 outstanding. Total assessments to date, \$18,164.

Property: 4 claims, patented, 60 acres, includes the Puritan and Eddie groups, carrying the Quinn fissure, near the Starless mine. Company was organized mainly for the purpose of driving a long tunnel known as the Montana-Bingham, or Miller tunnel, which will be the main transportation and drainage tunnel and eventually develop the eastern section of the camp. The tunnel was in 4,048', Feb., 1916, and has cut 5 veins.

The Congor vein, cut at 3,941', is said to show ore assaying 5.8% copper, 5.4 oz. silver, \$1.20 gold and 33% iron. The Cleveland vein, said to be 100' wide, mostly milling ore, is being developed.

Company has contracts with Bingham Amalgamated C. Co. and will receive 10% of net proceeds on all ore shipped through the tunnel; from Keystone Extension Mng. Co. 25c per ton of ore and 10c per mine car of waste; from Bingham-Congor C. Co., 15c p. t. of ore or waste; from Fortuna Mng. Co., 25c p. t. ore and 10c per car of waste; also an agreement with Col. E. A. Wall to handle Starless ores when drift from tunnel has been extended on one of Montana-Bingham veins into Starless ground; 220,000 gallons water per day is flowing from tunnel, which is valuable for milling, etc. When completed tunnel will cut 10 veins at 1,000'-2,200' depth on their dip and will drain them, allowing cheap mining. Tunnel mouth is near the D. & R. G. railway sidings.

MONTANA-CLINTON COPPER CO.

MONTANA

Office: Helena, Mont. **Mine office:** Elliston, Powell Co., Mont. **Officers:** E. H. Brandegee, pres.; W. K. Armstrong, v. p.; C. L. Friederichs, sec.-treas. and gen. mgr.; preceding, with Wm. Pope and C. O. Price, directors; John A. Friederichs, supt.; Arthur Ireland, mg. engr.; Fred Halroyd, purch. agt.; Goodall Bros., assayers.

Inc. April 16, 1909, in Montana. **Cap.**, \$1,500,000; shares \$5 par; assessable; issued, 142,874; 55,000 shares outstanding, \$1.55 paid, last call being 15 cts., Nov., 1912. First National Bank, Laurium, registrar and transfer agent.

Property: 7 claims, unpatented, 140 acres, known as the Julia mine, on Telegraph creek, 8 miles south of Elliston. Country rock is granite. There are numerous veins, 1 being 14' wide with a paystreak ranging from 6" to a maximum of 4', developed for 500'. Ores are mainly galena, sphalerite and tetrahedrite, with a high silver content. Surface ores carried considerable gold, decreasing with depth, while the silver content has increased.

Development: 210' shaft and 600' tunnel. **Ore reserves:** estimated at 2,000 tons, said to average 4% copper, 4% lead, 8% zinc, 35 oz. silver and

\$10 gold per ton. **Equipment:** includes 80-h. p. boiler, 30-h. p. steam hoist and 3-drill Rand air compressor. There are about 10 buildings.

Closed down Oct., 1914, and property will eventually revert to original owner, according to secretary's advice, 1915.

MONTANA CONSOLIDATED COPPER CO.

MONTANA

Operating address: M. K. Rogers, Boulder, Mont. **Office:** 51 Wall St., New York. **Officers:** Crawford Blagden, pres.; E. B. Haas, v. p.; Thos. F. Lee, treas.; W. E. Doyle, sec. **Inc.** 1902 in Utah. **Cap.**, \$1,000,000; shares \$1 par.

Property: includes the Comet and Grey Eagle mines, Deerlodge and various placers, millsites, etc., comprising 699.73 acres. The first named mines about 7 miles N. W. of Boulder, Jefferson Co., Mont., have been idle several years, except for work done by lessees. **Ores:** are mainly galena and sphalerite with associated pyrite and chalcopryrite, and the Comet is popularly credited with having yielded a gross output of \$13,000,000. **Ore reserves:** said to be 1,350,000 tons, averaging \$20 per ton.

In 1915 M. K. Rogers, of Los Angeles, Calif., took an option on 75% of the capital stock and began an active rehabilitation of the mine and mill. Soon afterwards the New York brokerage firm of Baruch & Co., since dissolved (bankrupt), acquired minority holdings and began advertising the venture; they succeeded in driving the stock up to nearly \$2 a share, in the belief that Rogers stock was securely escrowed, when suddenly a large block of stock was thrown on the market and quotations dropped to negligible levels.

The mine is not yet reopened, but doubtless will be, as the crosscuts from the 976' shaft have on the lower levels never been driven far enough to reach the main vein. The mill, now remodelled, is working steadily on the tailings concentrates being shipped daily.

The vein is a large one and the property promising enough to warrant deep development. Clark, Dodge & Co. are still interested in the property, but have publicly disclaimed any interest whatsoever in the stock on the market.

The company's holdings were acquired and exploration undertaken in 1907, on the report of A. A. Blow, in which the hope was expressed that copper ores in paying quantity would be found in depth. The present activity is the result of the abnormal price of zinc, and work at the mine is subordinated to the retreatment of the 100,000 tons of tailings from the old mill, for extraction of their zinc content. The geology is described in Bull. 527, U. S. G. S., p. 114, 1913.

The property has a speculative value as a mine, but the minority stock cannot be recommended as either an investment or a hopeful speculation.

MONTANA CONTINENTAL DEVELOPMENT CO.

BRITISH COLUMBIA

J. E. Oppenheimer, c/o Symons Dry Goods Co., Butte, Mont. Company leased and operated main holdings of Rocher Déboulé Copper Co., built tramway, equipped property and turned it over to the latter company in Jan., 1916. See Rocher Déboulé.

MONTANA COPPER-SILVER CO.

MONTANA

Idle. **Address:** E. R. Purnell, supt., Helena, Mont. Mine in Scratch Gravel hills, Lewis & Clark Co., Mont., 8 miles from Helena, shows quartz veins in quartz-monzonite, carrying ores with pyrite and chalcopryrite and gold-silver values. **Development:** by shaft and drifts. Equipped with hoist. Is not favorably regarded.

MONTANA CORBIN COPPER CO.

MONTANA

Reorganized as Corbin-Copper King Mining Co.

MONTANA-IDAHO COPPER CO.**IDAHO**

Office: 1325 Dean Ave., Spokane, Wash. **Mine office:** Saltese, Missoula Co., Mont. **Officers:** H. F. DeBowers, Chicago, pres.; W. J. Kirby, Spokane, v. p.; J. L. Dirks, sec.-treas., directors. Otis Hill, gen. mgr. **Inc.** 1914 to take over holdings of Monitor Cons. C. M. Co. on basis of \$102,000, payable in shares of Mont. Idaho C. Co. at par, to be exchanged April 17, 1917. **Cap.**, 6,000 shares; \$100 par. Stock listed on Spokane Exchange.

Property: 10 claims, patented, 6 miles west of Saltese, was the first copper location in the eastern Cœur d'Alenes. A fissure vein of 10 to 30' width, with N. E. strike and nearly vertical dip, has a paystreak carrying mainly massive chalcopryite ore, balance of vein carrying disseminated chalcopryite, mainly of concentrating grade. Occasional native copper is found. Shipment of selected ore returned 17 to 22% copper, 7 oz. silver and \$1.50 to \$2 gold per ton. The bottom levels of the mine, which is quite wet, show good ore. Owns 9 additional claims.

Monitor mine was closed down 1910 after the entire plant had been destroyed by forest fires. New company is driving tunnel 1,000' below 700' level of old shaft.

MONTANA-ILLINOIS COPPER MINING CO.**MONTANA**

Office: 450 Phoenix Blk., Butte, Mont. **Mine address:** Jefferson Island, Madison Co., Mont. **Officers:** J. W. Brown, pres.; Benj. W. Wilson, v. p.-sec.; W. G. McCormack, treas.; preceding, with L. H. Stanhope, Wm. Meyer, H. Sultzer and A. D. Clark, directors. P. E. Peterson, mine supt. **Inc.** 1907 in Montana. **Cap.**, \$2,000,000; shares \$1 par; nonassessable; issued \$2,000,000. **Bonds:** \$100,000 authorized, at 12%; issued, \$80,000. Annual meeting, first Thursday in July.

Property: the Bismark mine, 20 miles south of Jefferson Island, in the Ruby mountains; 10 quartz claims, patented; three 5-acre mill sites; a water right and 320 acres placer ground, contested by the forest reserve, total of 550 acres, including part of the former holdings of the Bismark Copper Mining Co. Claims show granite and gneiss carrying 3 fissure veins, under development, with N.-W. strike of about 4' average width. Veins carry chalcopryite and bornite estimated by management to average about 5% copper, 2 oz. silver and \$1 gold per ton.

Development: by tunnels of 400', 200', 500' and 1,900', with about 3,000' of workings.

Equipment: includes a 5' Pelton wheel and a 10x12" two-drill air compressor. There are 12 mine buildings. A concentrator, completed in 1914, has a Blake crusher, Chilean mill, rolls, 6 Wilfley tables, 4 vanners and a slime table.

In June, 1915, a 3-year lease on the property was taken by the Iowa Mont. Dev. Co. This company re-equipped the mill, installing a 100-ton flotation plant and started operations, but was soon compelled to shut down on account of insufficient water supply. Oil burning engines are now being installed and company expects to be producing early in 1916.

MONTANA MORNING MINING CO.**MONTANA**

A Spokane company, inc. by Andrew Laidlaw. **Cap.**, \$300,000; shares 20c par. Company took over the Montana Morning group of lead-silver-zinc claims, 6½ miles from the Great Northern R. R. at Troy, Mont., said to show a vein of lead ore from 1' to 4' wide. Reported to be doing development work.

MONTANA OREWAY MINING CO.**MONTANA**

Office: 522 Postal Telegraph Bldg., Chicago. **Mine office:** Briston, Beaverhead Co., Mont. **Officers:** W. P. Jahnke, pres.; J. B. Scott, v. p.; Fred W. Scott, sec.; J. D. Rankin, treas.; preceding, with Frank Kimball

and B. F. White, directors. Inc. 1909 in Arizona. Cap., \$1,000,000; shares \$1 par; issued, 950,000.

Property: 5 claims, patented, 100 acres, and a 25-acre mill site, known as the Straight Tip group, in the Big Hole basin. Claims show several fissure veins averaging 10' thick in quartzite and contact deposits between quartzite and serpentine. Opened by a 3,025' tunnel driven to cut a mineralized diorite dike carrying copper oxide ores, with lead and small silver and gold values.

Equipment: includes a 35-h. p. steam plant, with 1-drill air compressor. There are 6 small buildings.

MONTANA RADERSBURG MINING CO. MONTANA

Townsend, Broadwater Co., Mont. **Officers:** A. E. Spriggs, pres., Helena; Fred Allen, v. p. and supt., Townsend; B. E. Mathews, sec.-treas.; with Hugh Broderick, C. A. Whipple, Sol. Genzberger and L. A. Sarecky, directors.

Inc. Nov., 1914, in Mont. Cap., \$300,000; shares \$1 par; \$100,000 stock donated to treasury. Annual meeting, in November. Operating expenses in 1914-1915, \$10,000; receipts, none.

Property: 5 claims, unpatented, 100 acres, in Broadwater county, said to show gold, silver, lead, zinc ore in a fissure vein in lime and quartzite. Vein has a N.-S. strike, dips 20°, and is said to be 12' wide, with average assays per ton of \$2 gold, 50 oz. silver, 20% lead, 2% zinc.

Development: 500' incline shaft with 1,500' underground workings. **Equipment:** includes a 40-h. p. electric hoist. Management states the company is preparing to erect a mill.

Ore reserves: management claims 200,000 tons with 100,000 tons already blocked out. **Production:** none in recent years. Claims \$300,000 in gold and silver was produced up to the close-down of the property eight years ago.

MONTANA SCOTCH BONNET COP. & GOLD MG. CO. MONTANA

Idle. **Office:** 603 Jamieson Blk., Spokane, Wash. Mine office: Cooke, Park Co., Mont. **Officers:** S. A. Gibson, pres. and gen. mgr.; C. E. Mallette, sec.-treas. Inc. March, 1902, in Washington. Cap., \$300,000; shares 10 cts. par; nonassessable; fully issued.

Property: 17 claims, partly fractional, 200 acres, in the New World district, 65 miles from a railway. **Development:** by tunnel with about 1,500' of workings developing oxidized and sulphide ores of lead and copper, said to give small copper assays, an average of 3.7% lead, 4 to 5 oz. silver and \$3.10 gold per ton.

Under option early 1916 to John H. Wourms, Wallace, Idaho, chief counsel for the Day interests.

MONTANA SILVER-LEAD MINING CO. MONTANA

Jos. K. Williams, mgr., Libby, Mont.; H. G. Lougee, pres.; Commercial Bldg., Portland, Ore. Inc. in Wash. Cap., \$1,000,000; shares \$1 par.

Property: 6 claims on Leigh Creek, about 12 miles S. of Libby, said to show lead-silver ore with a little gold and copper in a fissure vein in limestone and quartzite; width of vein 4' to 6'; average assay 30-40 oz. silver, with good values in lead. **Development:** by tunnels; upper tunnel, 1,300', and one 1,100' below it, 900' long. Developing in 1915 and reported that a mill might be erected in 1916.

MONTANA-STATES MINING CORPORATION. MONTANA

Office: Bailey Blk., Helena, Mont. Mine office: Alhambra, Jefferson Co., Mont. **Officers:** R. A. Bell, pres. and gen. mgr.; R. Horsky, v. p.; Edward Horsky, sec.-treas. Inc. May, 1911, in Montana. Cap., \$5,000,000; shares \$5 par; issued, 80,000 shares.

Property: 38 claims, partly patented, 700 acres, in the Warm Springs district, 6 miles from a railroad. Country rock is a quartz monzonite of the Boulder batholith, cut by rhyolite dikes and showing quartz veins with mineralization along the walls.

Development: by numerous shallow shafts, and short tunnels, with about 2,300' of openings. Ores are mainly galena, sphalerite and tetrahedrite; with a chalcadonic quartz gangue reported by management to carry up to 22% copper, 10% lead, 8% zinc, 16 oz. silver and \$16 gold per ton.

Mine has no equipment. Idle in 1914 and 1915.

MONTANA-TONOPAH MINING CO.

NEVADA

Tonopah, Nev. **Officers:** Chas. E. Knox, pres., 300 First Nat. Bank Bldg., San Francisco; Henry D. Moore, v. p.; M. E. McCrate, sec.-treas.; with Hugh H. Brown, Dudley Baldwin, E. B. Waples, J. M. Wynn, Thos. J. Lynch and A. H. Lawry, directors. A. H. Lawry, supt.

Inc. in Utah in 1902, re-incorporated Jan. 31, 1912, in Del. **Cap.**, \$1,000,000; shares \$1 par; outstanding, 998,942. Seven dividends paid to April, 1914, total \$530,000; none since. Company is one of the oldest of the Tonopah district, and has had a very checkered career.

Property: 15 claims, about 190 acres, traversed by the Mizpah fault and showing silver ore. **Development:** 865' shaft and over 15 miles of workings. Mine was closed down and the 40-stamp mill ceased operating on Nov. 15, 1914, due to exhaustion of ore reserves. Since then a number of lessees have been working in the mine. Management controls the Commonwealth Mining & Milling Co. of Arizona.

MONTANA UNITED MINING CO.

MONTANA

J. G. Kirby, pres., Willimantic, Conn. **Cap.**, 150,000 shares; \$1 par; all issued. **Property:** 240 acres, patented, 9 miles east of Deer Lodge, adjoining the Emery mine, shows a fissure vein varying from a streak to 7', average width 3-4'. **Ore:** gold, silver, lead, zinc and much antimony. Said to have 20,000 tons ore blocked out that will average \$20 per ton, including zinc.

Equipment: includes 50-h. p. hoist, 300-cu. ft. compressor, and all necessary boilers, buildings, etc. The mine is idle, needing money for a mill and further development.

MONTANA YERINGTON CO.

NEVADA

Yerington, Lyon Co., Nev. **Property:** a group of claims said to show ore bodies in porphyry with 4-7% copper, unlike other Yerington deposits. **Development:** 400' shaft. The 160' level east was run 500' to daylight, making a main working tunnel. Crosscut on 400' level said to encounter ledge 6-7' thick, showing shipping ore in face. Under option to Geo. Wingfield, Goldfield, Nev., 1913, and Mason Valley Mines Co., in 1914, but was relinquished. Is being worked by Messrs. Archer, Ehrman and Kremmel, 1915-16. Reported shipping 25 tons ore daily, 1916.

MONTE CRISTO MINING & MILLING CO.

ARIZONA

Chief owner, Ezra W. Thayer, Phoenix, Ariz. Chas. B. Brann, supt. **Property:** Monte Cristo silver mine and the Arizona Copper Belt mine at Constellation, Yavapai Co. Recently bought the adjoining Torrette group. The Monte Cristo mine is said to show high-grade silver ore in addition to copper ore. Developed by 950' shaft with over 6,000' of workings, at last accounts. Company plans to develop to 1,100' level, and then erect a mill.

MONTE RICO MINING & MILLING CO.

NEW MEXICO

Office: 428 Washington Trust Bldg., Washington, Pa. Mine office: Lordsburg, Grant Co., N. M. **Officers:** Lawrence R. Boyd, pres.; F. B. Theakson, v. p.; Jas. V. Boyd, sec.-treas. **Inc.** in Arizona. **Cap.**, \$500,000; shares \$1 par; nonassessable.

Lands: 9 claims, 120 acres, on Lee's peak, in the Pyramid mountains, Virginia district, 4 miles S. W. of Lordsburg.

Geology: property shows diorite cut by andesite, and there is said to be a dike 100 to 200' wide mineralized throughout and forming the center of a network of veins. Ores at and near surface carry azurite and malachite, succeeded at depth by chalcopyrite, and there are also silver, lead and copper ores with small gold values.

Development: mine is reported to have upwards of 2,000' of workings, with ore in sight estimated by the company at 500,000 to 1,000,000 tons, which is probably as true as the statement that its ores can be mined and milled at an expense of \$1.50 to \$2 per ton. In 1916 a tunnel was being driven.

The prospectus of the company is replete with misinformation and untruths, and among other things states that "this formation, as well as the character of the ore, is identical with that found in the great copper mines at Bisbee, Globe, Jerome and Cananea," but as is well known, the orebodies of those localities differ greatly in occurrence. In view of the many questionable statements made, and the unreasonably large profits promised in the prospectus, the company must be regarded with much suspicion.

MONTEREY MINING, SMELTING & REFINING CO., S. A. MEXICO

(Compania Minera, Fundidora y Afinadora, S. A.) Monterey, Nuevo León, Mex. Juan M. Weber, general manager. Cap., \$8,000,000; shares \$100 par.

Property: includes the Ocampo and Santa Elena mines, at Mineral de la Mula, carrying gold, copper and lead ores; La Cruz y Anexas mines, at Pánuco de Coronado, carrying silver-lead and copper ores; the Cinco de Mayo group at Lampazos, Nuevo León, producing iron fluxing ores; and a mine at Naica, Chihuahua, Mex.

Company operates a lead smelter and silver-lead refinery, in direct competition with the American Smelting & Refining Co., at Monterey. The smelter also handles small quantities of copper, which is disposed of in the form of matte. **Production:** 1912, was 13,919,107 kgs. lead, 238,555 kgs. silver and 3,158 kgs. gold. Probably idle since revolution started in Mexico.

MONTEREY SMELTING & REFINING CO. MEXICO

Monterey, Nuevo León, Mex. Controlled by American Smelting & Refining Co., which see.

MONTEZUMA COPPER MINING CO. ARIZONA

Property sold to Southwestern Miami Development Co. See Vols. VII and IX, Copper Handbook.

MONTEZUMA & THE WHIZZERS MINE. SOUTH DAKOTA

Deadwood, Lawrence Co., S. D. J. T. Gillmore, manager. **Lands:** 13 claims, patented, 118 acres, on the divide between Deadwood and White-wood Cañons, and on Deadwood Creek and West Gold Run, near Lead City, S. D. Property shows Algonkian schists, slates and quartzite, and carries a strong gossan, of 45' estimated average width, traceable 3,000'. Principal claims are the Spiegel No. 1, formerly known as the Whizzers, and Brownie No. 5, carrying 2 parallel quartzite reefs, about 300' apart. The first named has chalcopyrite in a gangue of hornblende schist, surface ores carrying 0.5 to 1.5% copper, up to 1 oz. silver and \$1-\$2 gold per ton.

Brownie No. 5 claim has 2 tunnels, one 650' long, and has produced about 50,000 tons of low-grade fluxing ore, sent to smelters at Deadwood and Rapid City, until the latter were closed down. A 22' winze, below the water-level, gave picked samples assaying \$16.80 gold per ton.

The Montezuma claim, near West Gold Run, has 2 short tunnels, show-

ing ore assaying up to 1 oz. silver and \$53.70 gold per ton. Though low in average grade, the property is considered promising, because of the enormous tonnage assured, but needs big capital to develop. Examined and reported favorably on by Geo. Huston, of Mullan, Idaho, and Nicholas Treweek, of Salt Lake City.

MONTEZUMA LEAD CO. See *Mexicana*; *Cia. Metallurgica*.

MONZONITE SILVER & COPPER CO.

UTAH

Officers: S. S. Pond, pres.-gen. mgr.; D. Rigby, sec.; Geo. Baglin, treas. **Cap.**, \$50,000; shares 5 cts. par; assessable. In treasury Jan., 1916, 400,000 shares; bills receivable and cash, \$2,500. Stock listed in Salt Lake City.

Property: 7 unpatented claims, near Milford, Beaver Co., 6 miles from the railroad, surrounded by the Leonora, Hoosier Boy and Paloma Extension mines. **Ore:** silver and copper. **Development:** 100' shaft with 50' of crosscutting. Is a prospect.

MOONLIGHT MINING CO.

IDAHO

Burke, Idaho. **Officers:** Eugene R. Day, pres.; Jas. J. Murphy, v. p. and mgr.; E. Hedin, sec.-treas.

Property: 9 patented claims, adjoining the Hercules mine on the East. The main tunnel through which the property has been worked is an extension of the old Trade Dollar tunnel, 600' below the upper workings and 900' below the outcrop. The vein was cut in 1914 and drifting was started, but vein was found to be cut off by a fault. A crosscut was then started 1,400' back. About 800' of drifting has been done, but little ore has been found. Working, April, 1916.

MORGAN ARGENTINE MINING CO.

UTAH

Office: 22 E. Broadway, Salt Lake City, Utah. Mine at Peterson, Morgan Co., Utah. Herbert Pembroke, pres.-gen. mgr.; A. B. Pembroke, sec.-treas.; Earle R. Pembroke, engr. Inc. 1900 in Utah. **Cap.**, \$50,000; shares 1c par.

Property: 14 claims, 8 patented, 220 acres, in Argenta district, shows fissure veins in limestone carrying silver-lead ore. Annual assessment work done and company exploring in hopes of finding ore in commercial quantities.

MORNING GLORY MINE.

ARIZONA

Chas. B. Wilson, owner and manager, Patagonia, Santa Cruz Co., Ariz. **Property:** 11 claims, 220 acres, 12 miles from a railway, in the Harshaw district of the Patagonia mountains. Claims show a 6' fissure vein in limestone and porphyry, carrying sulphide ore, estimated by owner to average 3% copper, 3 oz. silver, 60c gold, 35% iron and 35% sulphur per ton. A shoot of zinc ore is also reported.

Development: 2 shafts of 80' and 200', with about 1,475' of workings, are estimated by owner to give 50,000 tons of 3½% copper ore blocked out for stoping. Ore is hand-sorted. **Equipment:** includes a small hoist. **Production:** 10,000 tons to date. Developing only in 1915, but plans to ship ore, 1916, and extend 400' crosscut tunnel 400' further. Mine has been worked for over 30 years.

MORNING GLORY MINE.

COLORADO

Jas. Harbaugh and A. B. Harbaugh, owners, Pitkin, Teller Co., Colo. **Property:** 12 claims, 120 acres, at the head of north fork of Quartz Creek, said to show a number of veins from 4' to 35' in width, developed by tunnels. A 400' tunnel is said to cut a 10' vein assaying up to \$107 per ton in gold and silver. An 800' tunnel is said to cut a 35' vein that will assay 4% copper, in addition to 4' of molybdenum ore, while a third tunnel 190' long cuts a 4' vein assaying \$8 per ton in copper, lead and zinc.

Lessees working on property and some shipments being made.

MORNING STAR MINE.

Owned by Curtz Consolidated Mines Co.

CALIFORNIA**MOROCOA MINING CO.****PERU**

Entire stock issue owned by Cerro de Pasco Corporation, and property described under that title.

MOSCOW MINING & MILLING CO.**UTAH**

Offices: 1020 Boston Bldg., Salt Lake City, and Moscow, Beaver Co., Utah. **Officers:** Matthew Cullen, pres.; J. L. Rawlins, v. p.; Athol Rawlins, sec.; L. H. Farnsworth, treas.; G. S. Wilkin, supt. Inc. May, 1907, in Utah. **Cap.**, \$1,000,000; shares \$1 par; assessable; issued, \$900,000. Listed on Salt Lake Exchange. Dividends: \$67,686 to 1916. Company does not reply to requests for information.

Property: 7 claims, including the Moscow mine in the Star district. 7 miles from a railroad, covers about one-half mile of the strike of an ore zone 50' to 60' wide. Ore mainly silver-lead, with some copper and zinc. The Moscow mine is one of the oldest in the district, having been worked over 30 years ago.

Development: tunnels and shaft to the 1,100' level. In 1914 a new shaft with collar 300' below the old was completed to the 800' level. Work was resumed in Jan., 1916, and it is the intention to sink to the 1,000' level with the hope of cutting the ore below the latest fault; the shaft was down 950', April, 1916.

Shipments: have been fairly consistent during the past year. In March, 1916, output was about 250 tons, while 200 tons were shipped during the first half of April.

Company employs 60 men. Electric power is used.

MOTHER LODE COPPER MINES CO. OF ALASKA.**ALASKA**

Offices: 45 Broadway, New York, and 902 Lowman Bldg., Seattle, Wash. Mine supt., W. Bertram Hancock, Kennecott, Alaska. **Officers:** Jas. J. Godfrey, pres.; J. W. Robinson, v. p.; C. L. Warner, sec.-treas.; with J. H. Rhodes, Edwin N. Ohl, Isaac Starr and Chas. M. Eaton, directors; Geo. E. Baldwin, gen. mgr.

Inc. Nov., 1907, in Washington. **Cap.**, \$5,000,000; shares \$1 par; 4,750,000 issued. Stock listed on New York Curb.

Property: 70 lode and placer claims, about 1,300 acres, including the Smith-Haglund-Sall group, adjoins the Bonanza and Jumbo mines of the Kennecott Copper Corporation, in the Copper River district, Kennecott, Alaska. Mine is 14 miles by wagon road from the railroad. Ore carries a high copper content with gold and silver values.

Geology: conditions at this property, according to Herman Keller, are similar to those of the Bonanza mine. The base of the mountain is formed of amygdaloidal basalt, highly altered and called the Nicolai greenstone. This is covered by thick beds of Chitina limestone, dipping north. The ore shoots occur in the limestone, and exploration has shown that, contrary to general belief, the ore does not occur along the greenstone contact, but in a favorable bed 90' above it, and then only in connection with the Bonanza fault, or shear zone. This shear zone, 20 to 24' wide, cuts both greenstone and limestone and the ore is found in chimneys and as irregular bunched masses along the zone and as impregnations in the limestone walls. The ore consists of nearly pure glance with minor and unimportant amounts of covellite and very little malachite, etc. Like the Bonanza ore, it carries gold and silver.

Development: by tunnels, known as the South, North, Regal, Marvelous and Pittsburgh; principal work is at the Marvelous tunnel. Development aggregated 5,401', Jan. 1, 1916.

Equipment: includes Sullivan air compressor, Otto gasoline engine, Lidgerwood hoist and a 7,300' aerial tramway, connecting main tunnel with the wagon road. Buildings include office, boarding house and several other log structures.

New work planned for 1916 includes crosscutting on 300' level of Bonanza incline; raise and winze from 200' Pittsburgh level.

Ore reserves: management estimates 49,501 tons ore developed with 10,684 tons in sight and in stopes, averaging 30% copper and 7 oz. silver; 21,367 tons of milling ore, 15% copper and 4 oz. silver, and 17,000 tons of ore on dump carrying 8% copper and 2 oz. silver per ton. This is exclusive of 23,000 tons probable ore estimated at 15% copper and 4 oz. silver per ton. Cost of mining is about \$3.50 per ton.

Production: March 4, 1914, to Feb. 9, 1915, 934,170 lbs. copper and 14,016 oz. silver. Shipments of 1,226 tons high-grade ore to Tacoma smelter, from March 4, 1915, to Feb. 9, 1916, averaged 48½% copper and 13 oz. silver per ton, with net smelter returns of \$124,477.

Company can pay expenses with its high-grade ore, but shareholders must look to the milling ore for dividends. The present problem appears to be how to get the \$500,000 needed for mill construction and mine development, when the treasury holds but 250,000 shares, whose market value May, 1916, was approximately \$80,000.

Property has been fully and favorably reported on by Herman A. Keller and by Arthur W. Jenks, and is a prospect of considerable merit.

MOTHER LODE SHEEP CREEK MINING CO.

BRITISH COLUMBIA

Sheep Creek, B. C. **Officers:** Alex. L. Smith, sec., transfer agent and registrar. Cornwall, Ont.; John McMartin, pres.; with L. H. Timmins, Duncan McMartin, John K. Erskine and Wm. Watson, directors. J. R. Rutherford, gen. mgr.

Inc. Feb. 1 in Maine. **Cap.,** \$1,250,000; shares \$1 par. A dividend of 11% was declared in Dec., 1915.

Property: at Sheep Creek, West Kootenay district, B. C., shows gold ore in an orebody said to have a maximum width of 35' on 6th level. **Equipment:** includes 10-stamp mill and cyanide plant, connected with the mine by a 3,600' aerial tram.

In 1914 ore mined and milled amounted to 20,000 tons; bullion recovered reported as \$100,000. Owing to lack of power the mine has been operating only about 9 months of the year.

MOUNT ANDREW IRON & COPPER CO.

ALASKA

Office: Empire Bldg., Seattle, Wash. W. J. Rogers, supt. **Property:** held under lease from the Mount Andrew Mining Co., on Kasaan peninsula, Prince of Wales island, Alaska. **Geology:** ore carries chalcopyrite disseminated in magnetite, with hornblende gangue, and is practically unaltered at surface, masses of sulphide ore even showing glacial striations. Ore averages about 3.75% copper and \$1 to \$1.60 per ton in combined gold and silver values. The orebody has been stripped for about 2 acres and developed by tunnels of 300' and 700', with a 70' blind shaft from the tunnel, and 10 small glory-holes, opened upwards to surface from the tunnels.

A 4,600' aerial tram of 40 tons hourly capacity leads from a 50-ton loading bin at the mine to a shipping bunker 500' from tide water. **Equipment:** includes two 50-h. p. boilers, with 5-drill and 7-drill Ingersoll-Sergeant air compressors. Buildings include office, boarding house, bunk house and smithy.

Under option, 1913, to Granby Cons. M., S. & P. Co., Ltd., but relinquished. Reported working 1914.

MT. CHAMPION MINING CO.**COLORADO**

Address: 60 India St., Boston, Mass., and Leadville, Colo. **Officers:** C. H. Huff, pres.; C. Q. Adams, v. p.; W. E. McKee, sec.; A. A. Wentworth, treas.; F. S. MacGregor, asst. treas.; all of Boston. Lucien Smith, mgr. Company is a close corporation, inc. in Maine, 1910.

Property: 10 patented, several unpatented claims, 500 acres, at Lackawana Gulch, near Leadville. **Ore:** principally gold with silver and a small amount of copper and lead in fissures in granite. High-grade ore is said to assay \$70 to \$100 per ton; milling ore, \$8.50 to \$10.

Development: by tunnels, almost entirely in ore, with 10,000' of workings. **Ore reserves:** said to be sufficient for 10 years' operations at present rate of production. **Equipment:** includes Ingersoll-Rand compressor, electric power and 75-ton amalgamating and concentrating plant.

Production: 4,615 tons ore treated in 1914, 8,137 tons in 1915. High-grade ore shipped in 1915 averaged \$77 per ton; concentrates \$100 per ton. Property is handicapped by its distance from the railroad.

MOUNT GAINES GOLD MINING CO.**CALIFORNIA**

Hornitos, Mariposa Co., Calif. Said to be financed by Los Angeles and Chicago capital. **Officers:** Wm. B. Davidson, pres.; A. L. Irish, v. p.; D. J. Hoge, sec.-treas.; with A. E. Rutherford and P. B. Ellis, directors; Samuel J. Paul, mgr. **Cap.**, \$150,000; shares 10c par. The new company has paid for the mine partly in stock and given a first mortgage trust deed for \$66,000.

Property: 200 acres patented and 300 acres unpatented land in Sec. 35, T. 4 S., R. 16 E., 4½ miles E. of Hornitos, on the west vein of the Mother Lode, said to show gold ore. **Development:** by 1,350' incline shaft with 11 levels and about 8,000' of workings. At present the mine is full of water, but old records are said to show a 5' vein assaying \$7 per ton.

Equipment: includes electric hoist, air compressor and 20-stamp mill with amalgamation and concentration tables. Electric power is obtained from the San Joaquin Power & Light Co.

Mine has been idle since 1910, but the new company, which came into full possession on May 10, 1916, plans to unwater it and put it in the producing class.

MOUNT ST. HELENS CONS. MINING CO.**WASHINGTON**

Office: 516 Selling Bldg., Portland, Ore. Mine office: Spirit Lake, Skamania Co., Wash. **Officers:** Thos. Prince, pres.; H. P. Christiansen, v. p.; E. L. Harmon, sec.; Dr. Henry Waldo Coe, treas. and managing director; Andrew Olson, supt.; Geo. W. Lilly, engr. **Inc.** 1902 in Oregon. **Cap.**, \$1,800,000; shares \$1 par.

Property: 65 claims, patented, 1,300 acres, estimated to carry 45,000,000' of standing timber, on the North fork of the Toutle river and on the shores of Spirit Lake, 50 miles from Portland. It includes the former holdings of the Sweden Copper Co., Calumet Copper Mng. Co., Bronze Monarch Mng. Co., Chicago Mng. Co., Yellow Metal Mng. Co., Earl Mng. Co. and Cascade Copper Mng. Co. The company also owns a three-fourths interest in the United mines. In addition to copper ores the tract contains gold veins, an ochre bed, a granite quarry and a deposit of pumice stone.

Claims are said to show syenite, diorite and slate with fissure veins carrying about 20 orebodies ranging from 5 to 100' in estimated width. The ores carry chalcocite, bornite and chalcopyrite and vary from 2 to 25% copper, some lead, 2 to 50 oz. silver and \$1 to \$40 gold per ton.

Development: by 5 tunnels, longest 2,300', and 50' shaft, with about 5,500' of workings, estimated by the management to show 125,000 tons of medium and high-grade ores with a greater tonnage of milling ore.

Lands are owned outright and the company has no bonds or debts, but the property has been practically idle for some years awaiting the construction of a much-needed railway. Mines fully described Vol. XI, Copper Handbook.

MOUNT SICKER & B. C. DEV. CO., LTD. BRITISH COLUMBIA

Idle. Office: 30 George Square, Glasgow, Scotland. Fred I. Smith, chairman; John D. Steel, sec. Inc. Oct. 20, 1898, in Great Britain. Cap., £125,000; shares £1 par. Lands are on Mt. Sicker, Vancouver Island, B. C.

MT. THOMPSON GOLD M. & M. CO. MONTANA

Officers: E. S. Rinehart, pres.-mgr., Stevensville, Ravalli Co., Mont.; J. W. Franks, v. p.; W. H. Rager, sec.; C. C. Franks, treas.; with Jos. Hunter, directors. Inc. Oct., 1909, in Mont. Cap., \$1,000,000; shares \$1 par; outstanding, 700,000. Annual meeting, February 10. Operating expenses for 1915 given as \$5,000.

Property: 10 claims, 200 acres, near Basin, in the Cataract district, Jefferson Co., 30 miles from Butte, said to have a vein 5' to 7' wide in granite. **Ore:** claimed to assay 8 oz. silver, \$1.50 gold, 8% lead, 1% copper and 22% zinc. **Development:** 900' tunnel, with 1,200' of workings, claimed by management to block out 30,000 tons ore. Plans continuing development work.

MOUNTAIN COPPER CO., LTD. CALIFORNIA

Secretary's address: 3 Lombard St., London, E. C., England. Operating office: 332 Pine St., San Francisco, Cal. Mine office: Keswick, Shasta Co., Cal. Works office: Martinez, Contra Costa Co., Calif. Capt. F. B. Lawson, chairman; Sir Andrew Noble, Henry J. Wenham, J. T. Middleton, E. T. McCarthy and A. N. Frewer, directors; Wm. F. Kett, gen. mgr.; W. L. Cole, mine supt. Jardine, Matheson & Co., Ltd., 74 Wall St., New York, American sales agents.

Inc. Dec. 1, 1896, in Great Britain, and reorganized May 10, 1902. Cap., £250,000; shares £1 par. In 1899 the company changed its capitalization of £1,250,000 into £250,000 in shares and £1,000,000 in 6% debenture stock; shares £4 par, on which a first payment of £1 per share was made Jan. 16, 1905, leaving £750,000 of stock outstanding. The change in 1899 was practically a complete amortization.

Dividends: before reconstruction. 1897-1901, aggregated 58½%. Profits were £150,255 in 1907; £28,112 5d in 1908; £24,557 12s 4d in 1909; a deficit of £3,042 in 1910; profit of £55,069 in 1911; £81,686 in 1912; £53,456 in 1913; £35,562 in 1914.

Property: is extensive, including the Iron Mountain and Hornet mines, 10 miles N. W. of Redding. The Iron Mountain mine was opened, 1880, for silver, and was given a 20-stamp mill, 1884, working the gossan in a small way for some years.

The Iron Mountain mine had a gossan of 100 to 300' width, covering a lens of ore, 100 to 400' wide, 800' long and 500' deep, in a shear zone of meta-rhyolite. The ore carries chalcopyrite associated with pyrite, averaging about 5% copper, 2 oz. silver and slightly under \$1 gold per ton. The orebody was worked pillar-and-stall, and stopes filled with waste, but pillars have been robbed and the mine now shows little high-grade sulphide ore, though there are reserves of 500,000 tons of silicious ore averaging 4 to 5% copper. The old orebody being pyrite, there was trouble from fires, but the application of the plenum system of ventilation, by Mr. Wright, restored normal conditions. Considerable cement copper was secured from the charged waters coming from the fire zone.

The Hornet mine, lying to the north of the Iron Mountain, developed about 5,000,000 tons of pyrite ore, averaging only about 1% in copper tenor, with patches up to 2.5% copper, and carrying 47 to 50% sulphur. Gold and

silver values are very small but the ore is valuable for the manufacture of sulphuric acid, saving the small copper and precious metal values as by-products.

The mines are connected with Keswick by an 11-mile narrow-gauge steam railway, traversing a rugged country, with an average grade of nearly 4%, the elevation gained being 2,000'.

In Dec., 1915, the company was said to be shipping about 12,500 tons of ore a month from its mines to the Martinez smelter. Employs about 400 men at the mines and 175 at the smelter.

The Keswick smelter, fully described in Vol. VIII, Copper Handbook, has been dismantled. A 250-ton oil flotation mill started operating in March, 1915.

The 350-ton Martinez smelter, on San Francisco bay, has one of the most extensive and best planned acid works in existence, built at a cost of approximately \$1,250,000. The Hornet ores, low in copper but rich in sulphur, are burned, the sulphur fumes collected in lead-lined chambers and transformed into sulphuric acid by the Meyer chamber process, the cinder remaining after the roasting is smelted for its copper contents. The acid is sold crude and also is used as the basis of commercial fertilizers for which there is a considerable demand in the rich fruit and agricultural districts of California and the other Pacific coast states. The Martinez works also do a general custom business and are fully equipped with steam, electric and pneumatic power.

Production: Dec., 1915, was at the rate of about 400 tons daily from the mines at Iron Mountain, and 200 tons daily from the Hornet. At one time, only a decade ago, this company was among the largest copper producers of the world, but has since greatly declined in output, production having been 29,727,040 lbs. fine copper in 1901; 19,116,160 lbs. in 1903; 6,814,000 lbs. in 1907; 3,638,619 lbs. in 1908; 2,775,197 lbs. in 1909; 2,987,815 lbs. in 1910; 5,400,000 lbs. in 1911; 5,614,000 lbs. in 1912; 6,890,000 lbs. in 1913; 5,454,000 lbs. in 1914.

Company has been managed with great prudence and marked success, both financially and technically and notwithstanding the depletion of an originally rich mine, has been able to make a successful change of base by which low-grade pyrite ores are utilized for the manufacture of acid.

MOUNTAIN DELL CONSOLIDATED MINING CO. UTAH

American Fork, Utah. Mine sold at sheriff's sale, 1914, to R. N. Baskin, former mine supt., for \$7,597. See Copper Handbook, Vol. XI, 1913-14.

MOUNTAIN KING MINING CO. CALIFORNIA

Office: 244 Kearney St., San Francisco. **Officers:** W. S. Miller, pres.; H. T. Harper, sec.; A. McMillan, managing director; B. C. Austin, supt., Mountain King, Mariposa Co., Calif.

Property was taken over some years ago and an assessment of \$60,000 levied within a year. Report for year ending March 31, 1916, shows the company had canceled an indebtedness of \$73,700, built a power plant and had a balance of \$36,229. An initial dividend of 3c per share was paid May 15, 1916. Net earnings for the year were \$87,303.

Property: 16 claims, patented, on the north fork of the Merced river on the Yosemite Valley R. R., in Sec. 31, T. 3 S., R. 18 E. **Ore:** gold in veins of quartz and slate from 1' to 12' wide, with slate walls, strike N. W.-S. E. and dip 54°. Average assay \$7 per ton. **Development:** 3,000' of tunnels with total of 9,500' of underground workings; greatest depth 1,100'. Development work done in 1915 amounted to 3,765'. **Ore reserves:** claimed to be sufficient to supply 20 stamps for two years.

Equipment: includes air compressor, hydro-electric plant, built in

1915, and a 30-ton stamp mill, with 20 stamps in operation. Power plant has one 350-kva. 3-phase, 4,000-volt generator direct connected to a turbine running at 600 r. p. m.

Production: for year ending March 31, 1916, 28,145 tons of ore. Extraction, 93.16%. Average value of ore crushed, \$6.86 per ton; total yield per ton, \$6.39.

MOUNTAIN LAKE MINING CO.

UTAH

In 1916 merged with Great Western Gold & Copper Co. and Thor Mining Co., under title of Great Western Mines Co., which see.

MOUNTAIN MINING CO.

COLORADO

See Salida Copper Co. Property is the Griffith mine.

MOUNTAIN MONARCH GOLD MINING CO.

CALIFORNIA

Office: 319 Yuba St., Redding, Cal. **Mine office:** Shasta, Shasta Co., Calif. **Officers:** W. F. Aram, pres. and gen. mgr.; J. H. Hunter, sec.; C. E. Armstrong, treas., at last accounts. **Inc.** Nov. 25, 1905, in California. **Cap.**, \$75,000; shares \$1 par, in \$25,000 preferred and \$50,000 common stock.

Property: 11 claims, unpatented, 220 acres, in the Whiskeytown district, north of Redding, 10 miles from the Southern Pacific railway, shows fissure veins in rhyolite, the main one said to be 140' wide, traceable 2,500'. Ore carries malachite, bornite and chalcopyrite associated with pyrite, and averages 7% copper, 1.5 oz. silver and \$3.40 gold per ton. **Development:** by tunnels of 200' and 750', with 1,200' of workings. **Equipment:** includes steam and gasoline power with a 6,000' sawmill and 5 mine buildings. Idle.

MOUNTAIN SILVER, LEAD & ZINC CO.

NEW MEXICO

Ricketts & Co., mgr., 80 Maiden Lane, New York. **Officers:** C. E. Berner, pres.; C. W. Berner, v. p.; G. F. Ettensperger, sec.-treas.; above with F. C. Wilson, Sidney H. Hirsh, directors. **Cap.**, \$1,000,000; shares \$1 par; 200,000 shares in treasury. Stock listed on New York Curb.

Property: 500 acres in Palomas mining district, Sierra Co., N. Mex., includes several silver producing mines. **Equipment:** includes concentration mill, steam power, hoist and compressor, sawmill, shops and houses.

MUDERSBACH MINE.

ARIZONA

Near Bouse, Yuma Co., Ariz. See Record Mines Co. Was under option to Clara Consolidated Co., but relinquished and has reverted to original owners.

MULOCK MINE.

MICHIGAN

Idle. **Office:** care R. P. Mulock, owner, Colfax, Ia. **Mine** near Matchwood, Ontonagon Co., Mich. **Property:** 240 acres, the N. W. $\frac{1}{4}$ of Sec. 9 and the N. W. $\frac{1}{4}$ of N. W. $\frac{1}{4}$ and S. W. $\frac{1}{4}$ of S. W. $\frac{1}{4}$ of Sec. 15, T. 49 N., R. 41 W., one-half mile N. W. of the Norwich mine. Exploratory work, 1903-05, showed 4 cupriferous anygdaloidal beds, of which two, about 400' apart, averaging 6' and 15' in width, were opened by several pits, showing copper.

MULTNOMAH MINING, MILLING & DEV. CO.

WASHINGTON

Idle. **Office:** 405 Kuhn Bldg., Spokane, Wash. **Officers:** M. J. Hills, v. p. and sec.; Dr. F. O. Hudnutt, asst. sec. and gen. mgr. **Inc.** 1901, in Washington. **Cap.**, \$2,000,000; shares \$1 par.

Property: about 600 acres, in 4 groups, including the River group of 260 acres, patented, carrying placer gold; the Mineral Hill group of 100 acres, 3 miles west of Nespelem, Okanogan Co.; the Ramsey group of 60 acres, adjoining the Nespelem Central Mining Co., 5 miles west of Nespelem, and the Multnomah group of 180 acres, 4 miles west of Nespelem, with a tunnel of about 1,100', said to cut a 15' vein, showing argentiferous lead ore. There are 5 buildings, and a dam built across the Nespelem river.

MUMME MINING CO.**ARIZONA**

Office: 1502 S. Flores St., San Antonio, Tex. **Mine office:** Patagonia, Santa Cruz Co., Ariz. **Officers:** T. E. Mumme, pres. and gen. mgr.; E. J. Mockert, v. p.; H. P. Mockert, sec.; Geo. F. Wieland, supt. **Inc.** Sept. 20, 1910, in Arizona. **Cap.**, \$100,000; shares \$1 par; issued 61,000 shares. Also has \$10,000 debentures authorized, but unissued.

Property: 7 claims, patented, in the Harshaw district, 6 miles from Patagonia, shows 2 veins of about 7' average width, carrying ore said to average 9% copper, 22 oz. silver and \$4 gold per ton. **Development:** 50' shaft and 3 tunnels, longest 320'. Mine has no power equipment.

MURDOCK MINING & MILLING CO.**ARIZONA**

Oatman, Mohave Co., Ariz. Officers: S. R. Porter, pres., treas. and supt.; L. P. Hansen, v. p.; D. Gibson, sec.; with F. L. Porter and C. W. Herndon, directors. **Inc.** Dec. 3, 1915, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; outstanding 630,000. **Transfer office and registrar:** Security Transfer & Registrar Co., New York. Listed on New York Curb as a prospect.

Property: near Oatman, shows a vein in andesite. Ore is gold bearing and of the usual dense quartz type.

MUTUAL CO-OPERATIVE MINING CO.**COLORADO**

Office: 409 Exchange Bldg., Denver, Colo. **Officers:** H. R. Steele, pres.; H. R. Adams, v. p.; Frank E. Wire, sec.; L. E. Johnson, treas.; W. F. Headley, supt., with A. M. Startzell and F. E. Gibson, directors. **Inc.** 1912. **Cap.**, 1,500,000 shares; \$1 par; 1,085,000 issued. Balance in treasury, Dec., 1915, \$814.

Property: 10 claims in Gold Hill district, Boulder Co., including the Hoodoo and Columbus claims, 2¼ miles from Salina. **Development:** by 600' of tunnels and an old shaft on the Hoodoo which was cleaned out and retimbered in 1916. Quantities of milling ore are said to exist in old workings and vein reported to be over 2' wide, carrying 2% copper with lead and gold-silver values. Driving a 140' drift S. W. on vein on the 55' level of the Hoodoo shaft.

NABOB MINING CO.**IDAHO**

Kellogg, Idaho. Officers: D. W. Price, pres.; Harry A. Holland, v. p.; Harvey M. Ross, sec.-treas.-mgr., with E. J. Lippert and W. Y. Clark, directors. **Inc.** April, 1897, in Idaho. **Cap.**, \$1,500,000; shares \$1 par; assessable; 15c called to date; 1,150,000 shares outstanding. Stock listed on Spokane Exchange. Annual meeting third Monday in May.

Property: 22 claims, about 440 acres, near Wardner, Shoshone Co., 2½ miles W. and S. of Bunker Hill and Sullivan mine, shows silver-lead-zinc ore in quartz vein, running E. W. and dipping about 85°. **Developed** by 2,000' tunnel and 100' vertical shaft, sunk from 500' level. **Equipment:** includes electric power, Cameron No. 6 pump, compressor and air hoist. Management estimates 30,000 tons of ore blocked out. Shaft being sunk to 600' in 1916. Extensive development work has so far failed to disclose ore of commercial value.

NACO CONSOLIDATED COPPER CO.**ARIZONA**

Idle. Unfavorably regarded. Described in Copper Handbook, Vol. XI.

NACAZARI CONSOLIDATED COPPER CO.**MEXICO**

Address: P. O. Box 64, Douglas, Ariz. **Mine address:** Pilares de Nacozari, Sonora, Mex. **Officers:** John G. Alexander, pres.-gen. mgr.; R. R. Humphrey, v. p.; B. R. Russell, sec.; Roy Hiatt, treas., with Geo. S. Howard, Geo. Motz and Y. Soto, directors. Swan Ferguson, mine supt. and purch. agt.; E. W. Evans, mill supt. **Inc.** July, 1907, in Arizona. **Cap.**, \$3,000,000; shares \$5 par; fully paid and nonassessable; issued, 490,000;

25,000 shares sold for \$1 each in Sept., 1913. Annual meeting, second Monday in July.

Property: 15 claims, 360 acres, lying in 2 groups, adjoining the Pilares mine of the Moctezuma Copper Co. on the S. E. The Galera group shows andesite and brecciated rhyolite cut by several veins carrying complex sulphide ores with gold-silver, lead and zinc values. The Copper King group, which adjoins the Pilares mine, shows a big red reef, 400' wide, of brecciated, silicious vein matter outcropping on the Copper King claim and supposed to be an extension of the Pilares deposit.

The Galera group is opened by a long tunnel driven on the vein developing narrow streaks of high-grade shipping ore. Company has spent much of its money on the main, or No. 1 tunnel (2,500' long, in Nov., 1915), driven towards the Red Hill to undercut the Copper King outcrop.

Development: to date, is 9,800', including 3 shallow shafts and a number of prospect tunnels. Management estimates 50,000 tons of ore blocked out with an average content of 1% copper, 12% lead, 8% zinc, 10 oz. silver and 50c gold per ton.

In Feb., 1914, company completed construction of a 250-ton concentration mill and in March, 1916, was planning to build a 500-ton smelter, claimed to be warranted by the ore developed, also to sink a 500' shaft on the San Pablo claims. Shipments of high-grade ore, said to average over \$100 per ton, were being made in March.

Property is in an excellent location, has promising ground and, apparently, will become a steady producer.

NAILDRIVER MINING CO.

UTAH

Is a subsidiary of the Ontario Silver Mng. Co., 163 So. Main St., Salt Lake City, Utah. **Officers:** W. Mont. Ferry, pres.; Herbert Cohen, sec-treas. Inc. Oct. 2, 1902. **Cap.**, \$600,000; shares \$2 par; assessable; 287,450 shares issued. Stock listed on the Salt Lake Exchange.

Property: 13 claims in Park City mining district, Summit Co., Utah, shows silver-lead-gold-copper ore, developed to depth of 600' by shaft and drifts. Shipped 120 tons of lead-silver ore in 1903-05, netting \$8,543. Developing in 1915.

NAPOLEON MINE.

CALIFORNIA

Idle many years. Mine near Copperopolis, Calaveras Co., Cal. Peyton Chemical Co., Mills Bldg., San Francisco, owner. This is the oldest copper mine in California and was a considerable producer in 1865. The property shows a 100' ore channel, ranging from diabase to talcose schist, with lenticular orebodies up to 20' in width, carrying mainly copper sulphides. **Development:** by a 430' new main shaft and a 325' old shaft, to the eastward.

NAPOLEON MINING CO.

MISSOURI

Joplin, Mo. Inc. in Missouri. **Cap.**, \$10,000. Operates a lease on 40 acres of mineral land owned by E. N. Perry in S. 22, T. 28, R. 33., Joplin, Jasper Co., Mo. Developed by 2 shafts to depth of 200'. Production in 1915 came from the 180' level. **Equipment:** includes 250-ton concentrating plant, 450' aerial tram, steam power, pump and hoist. Output is lead-zinc concentrate. About 35 men employed.

NASSAU COPPER CO.

CALIFORNIA

Office: 339 Bush St., San Francisco. **Property:** 2 patented claims, 40 acres, and 1,560 acres of agricultural lands, 4 miles north of Copperopolis, Calaveras Co., Calif., covering a length of 15,840' on the lode. Ore occurs in lenses and streaks as copper sulphides, pyrite, gold, silver and zinc in a 10' vein running N. 35° W. and dipping 65° N. E.

Development: by 280' shaft with 1,000' of drifting N. and S. on the

95' level and 1,100' of drifting N. and S. on the 200' level. Two oreshoots are under development. Ore is shipped to the Selby smelter from Angels. Total freight charges from mine to smelter are \$4.50 and smelter charges \$2.50 per ton. Shipments average 17.90% zinc, 5.22% copper, 4.60 oz. silver, 0.20 oz. gold, 11.90% iron, 39% silica. About 12 men employed.

NATICK COPPER CO.**MICHIGAN**

Office: Leopold Bldg., Houghton, Mich. Mine near Copper Falls, Keweenaw Co., Mich. W. Nichols, resident mgr. **Property:** 180 acres, the N. E. $\frac{1}{4}$ and E. diagonal $\frac{1}{2}$ of E. $\frac{1}{2}$ of N. W. $\frac{1}{4}$ of Sec. 28, T. 58 N., R. 31 W., surrounded by holdings of the Frontenac Copper Co. Property slightly explored in early days, has been idle many years.

NATIONAL BELL MINE.**COLORADO**

Property at Red Mountain, near Ouray, Ouray Co., Colo., is a small producer of copper-silver ore. Operated by 3 sets of lessees in 1916.

NATIONAL CONSOLIDATED MINING CO.**ARIZONA**

Presumably idle. Described in Vol. XI, Copper Handbook.

NATIONAL COPPER CO.**NEW MEXICO**

Idle. Chas. P. Laughlin, sec., Tyrone, Grant Co., N. M. Inc. Feb., 1902. Cap., \$1,200,000; shares \$100 par.

Property: 22 claims, 10 patented, 4 miles from the Chemung Copper Co., in Whitewater canyon, Burro Mountain district, has a fissure vein, in granite, of 60' estimated average width, carrying mainly chalcocite, opened by a 200' shaft and a 360' tunnel having a 214' blind shaft. The mine shows considerable bodies of copper ore, mainly in disseminated sulphides of 2 to 3% copper tenor, with some ore carrying up to 15 and 20% copper. **Equipment:** includes steam power and a Norwalk air compressor. Described in Copper-Handbook, Vol. XI.

NATIONAL COPPER MINES CO.**IDAHO & OREGON**

Office: 926 Chamber of Commerce, Portland, Ore. Mine at Cuprum, Idaho. **Officers:** L. C. Mackay, pres.; Wm. Trevor, v. p. and fiscal agent; Edward H. Hayes, sec.; W. F. Coffey, treas., with Dr. J. R. Marsh. Capt. Jas. Wolfs, Capt. Fred Hagstrom, directors. Inc. in Oregon. Cap., \$3,000,000; shares \$1 par; 1,500,000 shares "placed in treasury."

Property: 31 claims, surveyed for patent, in Cuprum Basin, Seven Devils district, Adams Co., Idaho; also the Gold Barr mine and Coad placer mine, in southern Oregon. The Idaho claims are near Cuprum, a few miles from Homestead on the Northwest, (Snake River) R. R. The ore, which contains gold and silver values as well as 5-17% copper, occurs in contact deposits, developed by over 3,500' of tunnels, shafts and opencuts. In 1915, 200 tons of ore were mined.

NATIONAL COPPER MINING CO., LTD.**IDAHO**

Address: August Paulsen, pres., Spokane, Wash. Mine at Mullan, Shoshone Co., Idaho. A. P. McCrae, v. p.; Chas. McKinnis, sec.-treas.; Jas. F. McCarthy, mgr.; foregoing with Harry White, H. H. Stambaugh and R. C. Steese, directors.

Inc. Sept. 22, 1906, in Wash. Cap., \$2,500,000; shares \$1 par; increased from 1,250,000 shares in July, 1913; 1,800,000 issued; 800,000 shares treasury stock were sold at 50c. Assessments of 17 $\frac{1}{2}$ c per share have been levied to date, a total of \$315,000. Deficit of \$11,064 at end of 1915. Stock listed in Spokane.

Property: 9 patented claims, 180 acres, in Deadman gulch between Mullan and Larsen, on the north side of the Coeur d'Alene valley. It is about 1 $\frac{1}{2}$ miles west of and in the same belt as the Snowstorm copper property, which it closely resembles in character. Ore occurs in a fault vein in thickly-bedded white Revett quartzite with talcose slips bordering

the ore. The vein runs nearly E.-W. and dips steeply to south. The surface gives no indications of the great orebody 1,700' beneath it and in fact the ore-bearing quartzite does not show in the upper workings.

During the "boom" days of 1906-07, the company sank a 400' shaft and drove an adit tunnel developing a fissure vein and a strong fault, but found no ore in commercial quantity. Dec., 1912, a large body of silver-bearing copper ore was cut at a distance of 4,800' from the portal, about 1,000' lower than the old tunnel and shaft. The crosscut tunnel is driven about 4,000' through very hard and tight Wallace slates and St. Regis quartzites to a fault separating the St. Regis from the more favorable Revett quartzite. This fault showed mineralization, but no commercial ore. Beyond this fault the beds of white Revett quartzite run N. W.-S. E., dipping steeply, 80° S. E. About 200' from the big fault zone just noted, there is a nearly vertical quartz vein, filling a fault in Revett quartzite, the beds north of this vein running slightly north of west and dipping at but 45° south. This vein carries copper ore and a drift east disclosed the orebody which gave the mine its shortlived prominence. A sample cut across the orebody where it was 85' wide showed an average value of 2½% copper, 5 oz. silver and 80c in gold.

Development: by a 1,200' upper tunnel, 4,800' lower crosscut tunnel with about 1,000' of drifting on the vein, a 400' shaft with 400' of drifting and a winze sunk to the 1,200' level. In Feb., 1916, company reported sufficient ore above the 1,200' level to run the mill 2 years. Leached areas on the 800' and 1,000' levels make the extent of orebody uncertain.

An estimate of 545,000 tons of ore available above the 1,000' level, made 1913, is now reported to have been changed to 170,000 tons, because of an unexpected barren streak.

A 500-ton concentrator, flotation plant, 2-mile trolley line and other works were completed in April, 1914. The dry crushing plant can handle 500 tons in 16 hours and crush the ore to ½". The storage bins have a capacity of 1,100 tons, receiving the ore over a 2-mile electrically driven railroad. The various motors at the mill total 615-h. p.

Mill was only operated in April and May, 1914. In Oct., 1915, operations were resumed, the mill crushing 4,243 tons of 0.83% copper ore carrying 1.99 oz. silver per ton; in Jan. making 22% concentrate valued at \$10,815, a loss of \$1,300 on operating expenses for the month.

Property represents an investment of \$400,000 without a dollar's profit, the mill having been built before a producing mine had been developed. Deep development alone can open up a large tonnage, but management announced this would not be done unless new work above the 1,200' level justified it. The mill is a costly blunder and the stockholders victims of bad advice.

In July, 1916, management decided to suspend operations, reasons stated by the secretary as follows:

"During June the property was given a fair try-out with the new equipment and under the best possible working conditions. The mining costs were low, but the milling costs were higher than expected, due principally to hard rock, which made machinery repair costs high.

"The decision of the directors is that the ore is too low-grade to pay a profit, even at the prevailing prices of copper. Different suggestions have been made by stockholders about sinking deeper, or driving a lower tunnel, on the presumption that richer ore might be found. No action has been taken on these suggestions.

"A complete statement of the June operations will be made to the

stockholders as soon as complete smelter returns are in, showing all costs in detail."

NATIONAL COPPER MNG. & DEVEL. CO. PENNSYLVANIA

Main office: Belvidere, Warren Co., N. J. Mine in Adams Co., Pa. **Officers:** Chas. O. Lane, pres.; Henry D. Deshler, sec.-treas. and gen. mgr.; Edw. March, Harry Bossard and John Paul, directors. **Inc.** Dec. 16, 1905, in New Jersey. **Cap.**, \$500,000; shares \$1 par, fully paid and non-assessable; issued, 118,985. Annual meeting, third Monday in March.

Property: 155 acres, said to show ore in veins in a schist formed from porphyry and marked by epidote; strike N. E.-S. W., with average dip of 85°. One vein under development said to average 16' wide, carrying 5% copper, 1.40 oz. silver and \$6.80 gold per ton. Development to date by open cut and shallow shafts. Presumably idle. Is unfavorably regarded.

NATIONAL GOLD & SILVER MINING CO. NEW MEXICO

M. H. Sherman, pres. **Property:** the Beck mine, near Steins, Grant Co., N. M., developed by 2 miles of workings with a 300' shaft, showing a 12-18" vein of gold-silver-copper ore. Has steam power and 5-drill compressor, hoist, and a 50-ton concentrator. Worked intermittently in 1915. Shipments made to the El Paso smelter.

NATIONAL LEAD CO. NEW JERSEY

Main office: 1 Exchange Place, Jersey City, N. J. Executive and transfer office: 111 Broadway, New York. **Officers:** Wm. W. Lawrence, pres., Geo. O. Carpenter, R. P. Rowe and E. J. Cornish, v. ps.; M. D. Cole, asst. to the pres.; Chas. Davison, sec.; Fred R. Fortmeyer, treas.; Chas. Simon, asst. treas. Executive committee: Wm. W. Lawrence, chairman, E. F. Beale, R. P. Rowe, E. J. Cornish and G. D. Dorsey. **Directors:** Edward F. Beale, Geo. O. Carpenter, Fred M. Carter, R. R. Colgate, E. J. Cornish, G. D. Dorsey, Chas. E. Field, Geo. W. Fortmeyer, E. C. Goshorn, Wm. W. Lawrence, R. P. Rowe, W. N. Taylor, Walter Tufts, J. R. Wettstein. G. W. Thompson, chief chemist; A. H. Sabin, cons. chemist; A. B. Hall, mgr. metal dept.

Inc. Dec. 7, 1891, in New Jersey. **Cap.**, \$25,000,000 common and \$25,000,000 preferred stock; shares \$100 par; \$20,655,400 common stock and \$24,367,600 preferred stock is outstanding. Listed on New York Stock Exchange. Bankers Trust Co., New York, registrar. Annual meeting third Thursday in April. Company has 6,788 stockholders.

Comparative General Balance Sheet:

Assets—	Plant Invest.	Other Invest's.	Stock on Hand	Other Current	Total
1915.....	\$23,785,822	\$17,520,916	\$6,267,772	\$5,884,460 (a)	\$53,458,970
1914.....	23,768,789	16,963,718	7,164,475	4,467,083 (b)	52,364,065

Liabilities—

	Capital Stock	Insurance Fund	Reserve	Current	Surplus	Total
1915...	\$45,023,000	\$1,100,000	\$300,000	\$1,298,608(c)	\$5,737,362	\$53,458,970
1914...	45,023,000	1,000,000	.....	988,835(d)	5,352,230	52,364,065

(a) Includes: subsidiary Co.'s, \$545,000. (b) Includes: subsidiary Co.'s, \$845,000. (c) Includes: subsidiary Co.s, \$1,048,285. (d) Includes: subsidiary Co.s, \$669,029.

Comparative Income Account:

	Net Income	Dividends— Pfd.	Com.	Surplus Year	P. & L. Surplus
1915.....	\$2,710,526	\$1,705,732	\$619,662	\$385,132	\$5,737,362
1914.....	2,476,293	1,705,732	619,662	150,899	5,352,230
1913.....	2,458,306	1,705,732	619,662	132,912	5,201,331

Dividends:

	1911-15	1910	1908-9	1907	1906	1901-5	1898-00	1896-7	1895	1894	1893
Pfd.....	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$	$\frac{7}{1}$
Com.....	3	4	5	4%	2	-	1	-	1	3	2

Present rate: preferred, 7%, payable quarterly, March 15, etc.; common, 3%, increased to 4% March, 1916, payable quarterly, March 30, etc.

The National Lead Co. owns all the capital stock of the following companies:

Carter White Lead Co., Heath & Milligan Mfg. Co., Magnus Co., Inc., Matheson Lead Co., St. Louis S. & R. Co., United Lead Co. It is a stockholder in the following companies: U. S. Cartridge Co., Baker Castor Oil Co., and River Sm. & Ref. Co. Company manufactures lead in various forms for commercial uses.

NATIONAL LEAD-SILVER CO.

WASHINGTON

Office: Hutton Bldg., Spokane, Wash. **Officers:** Geo. Ilse, pres.; J. M. Pelham, v. p.; E. H. Pattison, sec.; Albert H. Featherstone, treas., with John E. Orr, directors. **Inc.** 1915, in Wash., as successor to the Phoenix G. & C. M. & M. Co. **Cap.**, 2,000,000 shares; 5c par; assessable. Annual meeting, third Tuesday in Nov.

Property: 19 claims, known as the Anchor, Curlew and Panama groups, about 2 miles N. of Curlew, Ferry Co., said to show 4 veins carrying gold-silver-lead-copper-iron. Ore occurs as replacement deposits, in veins carrying quartz, lime and iron carbonate. The country rock is fine grained and syenite with large dikes of porphyry with strata of lime lying parallel, running nearly N. and S., with dip of 80° W. Ore was encountered on 3 different contacts in the first 500' of the tunnel. The first vein, about 40' wide was intersected 600' from the portal of the tunnel. A second vein cut 820' proved to be 5' wide.

Development: consists of a 1000' main lower tunnel, 225' Panama, and several shorter tunnels, numerous open cuts and prospect shafts. Property favorably reported on by G. Cleveland Taylor in 1914.

NATIONAL METALLURGICAL CO.

MEXICO

(A subsidiary of the American Smelting & Refining Co.)

Office: 165 Broadway, New York. Mine and smelter at Matehuala, San Luis Potosi, Mex. Geo. C. Kaufman, mgr. mining department of American Smelters Securities Co.; Samuel James, mgr. Matehuala plant.

Inc. Aug., 1901, in Colorado. **Cap.**, \$1,000,000; shares \$25 par. Debentures, \$500,000 authorized, at 6%; issued \$472,000. Annual meeting, last Tuesday in July. Holds title to property through the Compania Metalurgica Nacional, organized in Mexico.

The Dolores mine is situated a few miles from Matehuala, in the state of San Luis Potosi, Mex., in an isolated diminutive mountain range known as the Sierra del Fraile. The range runs N.-S., is less than 3 miles long and 1 mile wide and consists of Mesozoic blue limestone, which has been intruded by quartz-monzonite and the metamorphism and ore deposition in the range is connected with these intrusions. In the Dolores property the intrusive rock occupies a belt about 1,000 m. long. and 300 to 400 m. wide. Surrounding it, and lying between it and the limestone, is a practically continuous band of lime-silicate rock, plainly of metamorphic origin. Nowhere does this rock pass into the limestone far from the intrusion.

The ore deposits consist mainly of cupriferous pyrite, are intimately associated with the lime-silicate rock and occur largely at the very contact frequently with limestone as one wall. This cupriferous pyrite has usually a gangue made up largely of pyroxene and garnet. There are 2 intrusions, the Dolores on the south and the Cobriva on the north, the latter being irregular.

The company owns the ground about both of these intrusive masses and works the gold-copper ore in the Tiro General, Dolores, Trinidad, Azul, La Luz and El Angel mines. The copper ores as shipped average 5% copper, 50 to 80 grams silver and about \$2 gold per ton. The geology of the district is well described by Spurr, Garry and Fenner in *Journal of Geology*, Vol. VII, p. 444, 1912.

The principal mines are connected with the smelter by the 7-mile Matehuala narrow-gauge railway.

The smelter, connected by a spur with the Mexican Central railway, receiving ore by rail and burros, has 150-ton and 200-ton water-jacket blast furnaces for lead and copper, with a calcining furnace and a 30-ton reverberatory furnace used for flue dust. There also is a small sampling mill. Product formerly was matte, averaging 45% copper, 50 to 200 oz. silver and 1 oz. gold per ton, shipped to the Aguascalientes smelter for conversion.

Is a splendid property, well managed, with an adaptation of Mexican methods and labor to modern conditions. Mine development has utilized geological work to great advantage.

NATIONAL MINES CO.

NEVADA

Office: 39 Board of Trade Bldg., Chicago. Mine office: National, Humboldt Co., Nev. **Officers:** J. G. Snyder, pres.; L. G. Campbell, v. p.; C. V. Buckley, sec.; S. C. Scotten, treas.-mgr.; Perry G. Harrison, supt. **Inc.** in Wyoming. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; 817,427 shares outstanding.

Property: 6 patented claims and a fraction at National, Humboldt Co., shows gold-silver ore in quartz fissure veins, traversing a rhyolite-andesite formation. Orebody runs N.-S. and dips 45-70° W. Geology and vein system fully described in U. S. G. S. Bull. 601.

Development: by 10 adits from 150'-2,500' in length and 3 shafts, 450', 350' and 800' deep. Underground workings, April, 1916, total about 7 miles.

Equipment: includes 2 electric hoists, aerial tram, 10-stamp mill for amalgamation and concentration of ore. Mill treated 4,463.4 tons of ore in 1912; 47.3 tons in 1913; 2,763.5 tons in 1914; 18,662.2 tons in 1915; a total production to date of 36,000 tons, or \$6,000,000, mainly from the National gold shoot, intercepted at depth of 40' below the surface and which averaged \$20-\$30 to the pound.

NATIONAL MINES, LTD.

ONTARIO

Operating, under lease, the King Edward mine, which see.

NATIONAL MINES & SMELTERS CO.

MEXICO

Office: Magee Bldg., Pittsburgh, Pa. Mine office: Magistral, Durango, Mex. **Officers:** S. H. McKee, pres.; Wm. L. Curry, v. p.; John S. Eberman, sec.-treas.; Renald Ailes, financial agt.; E. A. Kennedy, supt. **Inc.** 1911. **Cap.**, \$2,500,000; issued, 1,700,000 shares. Authorized \$400,000 collateral income bond issue; issued, \$375,000. Company owns all the stock of the Santa Maria del Oro Mines Co., which company purchased property of the Lustre Mining & Smelting Co. from old stockholders, paying for same in stock and bonds of the National Mines & Smelters Co.

Property: 32 claims, 441 hectares, 1,089 acres of mineral lands, 397 hectares of mill and smelter sites, besides miscellaneous lands and leasehold timber lands. The Magistral mine is developed by 3 tunnels and 9 shafts and has a large body of slightly cupriferous pyrite with quartz and limestone gangue, carrying 0.5 to 5% copper, probably averaging under 1% copper, 1 oz. silver and 15 to 20 grams gold per metric ton.

The Cocinera mine has been developed by the new company since July

1, 1911, opening up an ore shoot 1,000' long, 15' wide and said to average \$10 in gold and copper with a little silver. Depth over 600'. Ore reserves in this and the Azurite mines are estimated by the management at 190,000 tons, developed in new ground since 1911. The old company claimed reserves of 185,000 tons in other and entirely distinct orebodies, in 1910.

Equipment is complete, including a central power plant having two 360-h. p. Koerting and two 350-h. p. Crossley gas engines, one 200-h. p. and three 400-h. p. gas producers, a 2,300-volt 3-phase generator, two 6-drill Ingersoll-Rand air compressors and 10 hoists of 100 to 300-h. p. The 40-stamp mill, 750-lb. heads, has Huntington mills, 1 Ball mill and 10 Frue vanners.

The smelter has 6 blast furnaces, including two 150-ton hot-blast furnaces and three 200-ton furnaces, air for blast being heated by waste gases in a specially-designed MacDonald hot-blast heater. Shipping matte sent to the A. S. & R. Co. at Aguascalientes amounted to 8,000 tons, averaging 15-17% copper, \$155 gold and \$4 silver per ton.

The old company apparently spent a million dollars or so for installation before the mines were sufficiently developed to provide the ores necessary to keep the various plants running and in 1907-08 became financially embarrassed. The mines are not yet on a profitable basis, but with the new concentration plant, built in 1915, as the result of tests made by Henry E. Wood & Co., of Denver, it is expected that the property will yield a satisfactory return on the investment.

NATIONAL MINING CO.

MICHIGAN

Idle. Office: 6 Beacon St., Boston, Mass. Mine office: Rockland, Ontonagon Co., Mich. B. T. Morrison, pres.; Harry Highley, sec.-treas.; Chas. M. Baker, Harry M. Howard and W. S. Warn, directors. Inc. 1848, in Michigan; rechartered 1878, cap. increased later to \$2,500,000; shares \$25 par; issued, \$1,875,000, and rechartered 1908. Paid dividends, 1861-72, of \$320,000, and levied a 40c assessment 1909. The company has no debts.

Property: 1,852 acres, having the Michigan on the north and east and the Victoria on the south and west, carries the western continuation of the contact vein of the old Minnesota mine, now owned by the Michigan Copper Mining Co. The property showed, when work was begun, remains of ancient mining operations, including a shaft of 50' depth, timbered and scaffolded, with a nearly continuous sheet of copper extending down one side. The company had considerable litigation with the old Minnesota company over the title to 115 acres of land, the National finally winning. The company stopped work 1893.

NATIONAL MINING & DEVELOPMENT CO.

IDAHO

Placerville, Boise Co., Idaho. Inc. Sept. 23, 1911. Cap., \$1,000,000; shares \$1 par; divided into 600,000 common and 400,000 preferred shares. Property: the Mountain Chief mine at Placerville, Boise Co., Idaho, shows gold-silver ore in a fissure vein, 1-3' wide. Ore averages from \$20-\$25 per ton. Developed by 3 tunnels. Equipment: includes a 5-stamp amalgamation and concentration mill with cyanide unit.

Producing since 1912. Property promising. Geology described 17th Annual Report of the Mineral Industry of Idaho, 1915.

NATIONAL RADIUM INSTITUTE.

COLORADO

Officers: Dr. Howard A. Kelly, pres., Baltimore, Md.; Dr. Jas. Douglas, 99 John St., New York, sec. Inc. 1913, in Delaware. Company has a lease on 16 carnotite claims in Paradox Valley, Montrose Co., Colorado, owned by a subsidiary corporation of the Crucible Steel Co. of America, on a 15% basis.

NATIONAL RADIUM MINES CO.**UTAH**

Henry Schwartz, Denver, Colo., pres. Inc. in Colorado. Cap., \$400,000. **Property:** in Green River district, Emery Co., Utah, shows uranium and vanadium ore in a 5" vein, said to run as high as 20% uranium. Developing in 1916.

NATIONAL RADIUM PRODUCTS CO.**COLORADO**

George Kunkle, pres., Grand Junction, Colo. Reported in July, 1915, that carnotite holdings in Utah would be developed. Enlarging its experimental plant to 200 milligrams of radium per month.

NATIONAL SMELTING CO.**MEXICO**

Idle. Office: 2030 Land Title Bldg., Philadelphia, Pa. Mine office: Chalchihuites, Zacatecas, Mex. Company has been without working capital for several years and conditions in Mexico have made a refinancing impracticable. Fully described in Copper Handbook, Vol. XI.

NATIONAL TUNGSTEN CO.**ARIZONA**

Acquired by International Tungsten Corp., which see.

NATIONAL ZINC & LEAD CO.**MISSOURI**

Office: 53 State St., Boston. John J. Hanners, treas. Cap., \$500,000; shares \$1 par; 300,000 shares issued. Stock is listed on New York and Boston Curbs. Company has paid dividends of 9%, or \$45,000, from Nov., 1915, to March, 1916.

Properties at Dixie, Neck City, and Webb City, Mo., are developed by several shafts, 85'-225' deep, reported sunk in pay ore. Company also operates 4 zinc concentrators on ore from its mines..

NATIONAL ZINC SEPARATING CO.**WISCONSIN**

W. N. Smith, Cuba, Wisc., gen. mgr. Operates a roasting and magnetic separating plant at Hazel Green, Grant Co., Wisc., producing a 60% zinc concentrate.

NATIVE COPPER CO.**MICHIGAN**

Idle since 1855. Office: 68 Devonshire St., Boston, Mass. Mine at Delaware Mine, Keweenaw Co., Mich. Officers: Ashley Watson, pres.; Chas. E. Adams, sec.-treas.; Ashley Watson, Frederick Hoitt and Frank L. Van Orden, directors. Inc. 1849, and reincorporated March 29, 1880, in Michigan. Cap., \$1,000,000; shares \$25 par; fully issued. Annual meeting, first Wednesday in March.

Property: 480 acres, being the S. ½ of Sec. 3 and N. W. ¼ of Sec. 10, T. 58 N., R. 30 W., all on the Keweenaw trap belt. A little work was done, 1852-55, on a fissure vein crossing the Ashbed, the company levying assessments of about \$39,000.

NATIVE COPPER MINING CO.**CALIFORNIA**

Inc. in 1911, to develop the Copper King, Native Copper and other claims on Table mountain, Monterey Co., Calif. W. H. Kerr, Coalinga, Calif., pres.

NAUMKEAG COPPER CO.**MICHIGAN**

Office: 61 Broadway, New York. Mine office: Houghton, Mich. Officers: J. Parke Channing, pres.; Sam A. Lewisohn, v. p.; E. H. Westlake, sec.-treas., with Adolph Lewisohn, I. J. Sturgis, F. L. Van Orden, Theo. L. Herrmann, J. H. Susmann and Chas. J. Paine, Jr., directors. Sidney S. Lang, supt.

Inc. March 21, 1912, in Michigan. Cap., \$5,000,000; shares \$25 par; \$10 paid in; issued 102,000 shares. U. S. Mortgage & Trust Co., registrar. Annual meeting third Wednesday in March.

Company ended 1915, with a cash balance of \$26,858; investments \$142,254; development expenses, \$84,032.

Property: 1,200 acres, in Secs. 34 and 35, T. 55 N., R. 34W., and Sec. 3,

T. 54 N., R. 34 W., just west of Houghton, on the south shore of Portage lake, carries practically all of the Ashbed amygdaloidal beds, including the Atlantic and the Quincy-Pewabic lodes.

Development: property was slightly explored under former owners, but efforts were sporadic and altogether unimportant. Operations by present owners were begun July 10, 1912, in the horizon of the Hancock lodes. Drill borings yielded good showings of copper at depth of 513' in what is presumed to be an extension of Hancock No. 3 lode, and again at a depth of 1,301' where a 6" streak of coarse copper was encountered.

In 1914, the main, or Dakota Heights adit on the old Pewabic lode was extended 126', encountered the lode at 100', and drifts No. 2-A north and south were continued for 70' and 63'. A total of 1,936' of drifting was done during the year. This work indicated a lode, 6-8' wide, for 700', showing copper ore, but not of commercial value. During 1915 exploratory work was confined to the workings from the Dakota Heights, or No. 4 adit; a total of 1,172' of drifting on the Pewabic lode showed considerable copper on the No. 2 North drift. A 200' winze was sunk from this drift and 1602' of drifts and crosscuts driven from the lower level. About 1,000' of drifts and crosscuts were driven in crosscuts No. 4 East, No. 3 West and drift No. 2 South. No beds of value were found in the southern part of the property.

Equipment: includes hoist, compressor, pump and electric power.

The property is considered promising and the management is excellent.

NAVY GROUP M. & M. CO.

ARIZONA

Office: 1029 Higgins Bldg., Los Angeles, Calif. **Officers:** Dr. Geo. P. Waller, pres.; F. M. Townsend, sec.-treas.; R. E. Zuver, agent at Gold Road, Ariz. Inc. 1915. Cap., \$1,000,000; shares \$1 par.

Property: 3 claims, 48.26 acres, in Tom Reed-Gold Road district, Mohave Co., developed by 750' tunnel. A prospect.

NEBRASKA & ARIZONA COPPER CO.

ARIZONA

Paradise, Cochise Co., Ariz. W. K. Morrow, supt. at last report. Inc. Jan., 1910, and merged June 25, 1910 with the California & Paradise Mng. Co., in the California & Paradise Cons. Mng. Co. **Property:** 13 claims, known as the Morrow & Chamberlain group, developed by a shaft on the Malachite claim.

The old 200' Malachite shaft was deepened to 600' in 1913, and cross-cutting done on the bottom level without satisfactory result.

NEDERLAND-BEAVER TUNGSTEN MINING CO.

COLORADO

Office: Mining Exchange Bldg., Denver, Colo. **Officers:** D. D. Shirley, pres.; W. M. Scott, v. p.; R. Woodworth, sec.-treas. To be incorporated in Colorado with capitalization \$200,000; shares 10c par; nonassessable. Pre-organization certificates offered to public early in 1916, at 3c per share, with 5% discount for cash.

Property: company claims to own 8 claims, 80 acres, in Nederland district, Boulder Co., Colo., and that, "the surface showing is excellent and orebodies should be opened with a small amount of work. The stock is to be sold to provide a development fund to open the tungsten ore." Careful investors will certainly refrain from investing in this "Tungsten opportunity."

NEEDLES MINING & SMELTING CO. ARIZONA & CALIFORNIA

Is a subsidiary of the U. S. S. R. & M. Co. **Office:** 55 Congress St., Boston, Mass. Mine office: Chloride, Mohave Co., Ariz., Works office: Needles, San Bernardino Co., Calif. A. P. Anderson, gen. mgr.; D. R. Muir, mgr. of this and the Gold Roads Mines Co., Needles, Calif., and Gold Road, Ariz.

Inc. 1909, in Me., as successor of Arizona-Mexican Mng. & Sm. Co. Cap., \$5,000,000; shares \$5 par; entire stock issued is owned by United States Sm., Ref. & Mng. Co. Company does not publish a separate report.

Company owns the following properties:

First: the Tennessee mine, at Chloride, Ariz., the terminal of a branch line from Kingman on the main line of the Santa Fe R. R. The mine consists of the Empire No. 2, Tennessee, Great Lead and Tennessee South patented claims. The group has been operated since 1909 under a bond and lease running ten years.

The ore contains gold, silver, lead and zinc in varying proportions and occurs in a fissure vein between pegmatite and schist, striking north and south. The ore shoot averages about 300' in length and 6' in width and has been followed down to the 1,170' level. The ore is being extracted through a shaft which up to date has reached a depth of 1,400'. Indications are that the ore shoot will be followed in undiminishing strength to a much greater depth than has been yet achieved.

The mine is equipped with hoists run by steam power and is well equipped with shops, compressors and all necessary accessories.

The output is about 100 tons of ore a day, carrying 5% lead and 10% to 14% zinc, shipped to the company's plant at Needles where two products are obtained, a lead concentrate carrying gold and silver which is shipped to the company's smelter at Midvale, Utah, and a zinc concentrate which is under contract with the American Metals Co. The present output is about 800 tons of lead concentrates and 1,200 tons of zinc concentrates per month.

Early in 1916, the Empire mine was unwatered and the shaft deepened as exploration at the Tennessee has shown that the orebodies are persistent downward. The company is also operating the Comanche and Durango mines, the latter showing 7' of zinc ore in the bottom of a 70' shaft.

Second. Champion mines, 12 miles north of Kingman, consist of the following unpatented claims: Champion, Champion No. 2, and Primrose, 52.75 acres. These claims, like the Banner group, were acquired as a prospect and some development work was done which yielded a small tonnage of gold, silver, lead and zinc ore, which was shipped to the company's mill at Needles. They are now being worked by lessees.

Third. the Stockton Hill group of mines, at Stockton Hill, Mohave Co., Ariz., 290.5 acres. No work is being done on this group at present.

Fourth. the milling plant at Needles, Calif., a concentrating plant of 125 tons daily capacity, equipped with crushers, jigs, tables and a flotation plant, the latter for the recovery of zinc values from tailings. This plant treats mainly the ore from the above-mentioned Tennessee mine. It also treats small tonnages of custom ores. The plant is thoroughly modern and well-equipped for economic work.

NELLIE BLOOM MINING CO.

IDAHO

M. E. Hopkins, supt. Property: the Nellie Bloom mine, about 2 miles from Horse-shoe Bend, Boise Co., Idaho, shows a shoot of oxidized gold ore, 3-5' wide, 500' long at depth of 300', said to carry average milling values of \$10 per ton.

Equipment: includes a 10-stamp mill and electric power. Employs 16 men. Management estimated six months' supply of free milling ore blocked out Jan., 1916.

NELLIE MINING CO.

ARIZONA

Office: 538 Merchants Nat'l. Bank Bldg., Los Angeles, Calif., and Colorado Springs, Colo. Mine office: Oldtrails, Mohave Co., Ariz. Officers:

F. M. Woods, pres.; R. C. Wilson, v. p.; E. T. Walmsley, sec.-treas., with H. E. Woods and C. S. Buck, directors.

Inc. July 3, 1906, amended Aug. 4, 1915, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; 605,000 shares in treasury. Stock is listed on the San Francisco and Salt Lake Exchanges. Registration Surety Co., 205 Russ Bldg., San Francisco, registrar. Annual meeting first Wednesday in June.

Property: 11 claims, 190 acres, in Tom Reed-Gold Road mining district, 5 miles S. of Oldtrails, shows a fissure vein in andesite and andesite tuff, with gangue consisting principally of fine grain quartz and adularia and calcite. The values are exclusively gold, although traces of copper stain are found in the 2 altered dikes which strike out from the main lode, having a general strike N. 52° W., with dip about 55° N. E. Assays said to average \$5.90 gold per ton. Developed by 85' 2-compartment vertical shaft, being sunk to 500'.

Equipment: includes 32-h. p. gas hoist, 55-h. p. compressor, 3,600' water pipe line, bunk and boarding houses. Property reported on by A. G. Keating.

NELLIE MINING CO.

IDAHO

Owned by Jack Alger and Capt. A. P. Horton of Osborn and O. R. Young of Wallace, Shoshone Co., Idaho. Ernest Kelly, supt. **Property:** 1½ miles from Osborn, on O. W. R. & N. R. R., has a fissure vein with gray copper ore (tetrahedrite) in quartz, the ore being said to carry 100 to 240 oz. silver per ton.

Developed by 3 tunnels, shafts and 10,000' of stoping and raises. In 1914 a crosscut on the 500' level opened up a vein 3' wide, showing good milling ore. Shipped 20 tons of high-grade ore in Sept., 1914, from leasing operations. Has water power plant for pumping and hoisting work, and a small mill, built in 1915. Company plans active development.

NELSON MINING CO.

ARIZONA

Office: 609 Land Title Bldg., Philadelphia, Pa. Mine near Crown King, Yavapai Co., Ariz. P. R. Brown, sec.; Geo. P. Harrington, supt. Property is half way between town of Crown King and mine of that name. Has fissure vein 3' wide, developed by 2 adits, 225' apart vertically, the lower one 3,000', the upper 1,000' long, and 300' incline shaft on vein. Assays of 2,000 lbs. samples in 1915 showed 25% zinc, 32 oz. silver, 7.40% copper, 3.51% lead and 0.90 oz. gold per ton. Reported in Dec., 1915, development work in progress and would soon ship.

Equipment: includes 25-h. p. gasoline hoist and air compressor. Company is reported to employ an average force of 15 men.

NENZEL CROWN POINT MINING CO.

NEVADA

Office: 702 Mutual Bank Bldg., San Francisco, Calif. Mine office: Rochester, Humboldt Co., Nev. **Officers:** Jos. F. Nenzel, pres.; Chas. E. Stevens, v. p.; Rudolf Nelson, sec.-treas.; with Jos. H. Hutchinson, directors. O. G. Stevens, supt.

Inc. Jan. 15, 1913, in Nev. **Cap.**, \$1,250,000; shares \$1 par; 395,117 shares held in trust. Registration Surety Co., San Francisco, registrar and transfer agent. Stock is listed on San Francisco Exchange. Annual meeting, second Wednesday in February.

Property: 7 unpatented claims, 110 acres, in Rochester mining district, shows gold-silver ore as contact deposit and in fissures traversing rhyolite and felsite formation. Orebody, from 4-12' wide, strikes N.-S. and dips westerly. **Development:** to depth of 180' by 430' tunnel and Stevens vertical shaft, which is said to have been in 4' of ore to depth of 107', reported to assay from \$12-\$75 per ton.

Equipment: includes 20-h. p. electric hoist, Cameron pump, and com-

pressor. **Ore reserves:** estimated at \$100,000, Feb., 1916. Management plans building flotation mill in 1916 and sinking shaft to 650' with crosscuts and drifts every 100'.

NEST EGG GOLD & COPPER MINING CO.

NEVADA

Letters returned from former office. Unfavorably regarded. See Copper Handbook, Vol. XI.

NESTOR MINING CO.

ALASKA

Dead. Land relocated by John Wick, Hadley, Alaska, includes the Nestor, Pelaska and other claims, about $1\frac{1}{4}$ miles from the Mamie and Stevenstown mines near Hadley, Ketchikan district, in southeastern Alaska. Property shows a copper-bearing contact between a diabase dike and limestone, whose garnet-epidote rock carries chalcopyrite. Developed by 2 tunnels at 110' and 180' above tidewater, with over 600' of work on Nestor claim.

NEVA MINING CO.

UTAH

Office: 400 Boyd Park Bldg., Salt Lake City, Utah. Mine office: Brighton, Utah. **Officers:** A. H. Rock, pres.; C. E. Cole, v. p.; Walter Steadman, sec. **Inc.** 1906 in Utah. **Cap.**, \$75,000; shares 15 cts. par. Last assessment $\frac{1}{8}$ ct. levied March, 1915. Stock is listed on Salt Lake Exchange.

Property: 5 unpatented claims, adjoining the Cardiff on the W., show silver-lead-gold ore in a fissure vein, running E.-W. along a quartz-lime contact and said to give assays of 45% lead, 30 oz. silver and 0.1 oz. gold. Developed by incline shaft and tunnel. Operations were resumed in 1915 and shaft is being sunk to intercept the Cardiff contact lode.

NEVADA-ARIZONA MINES CO.

ARIZONA

Office: 510 Odd Fellows Bldg., St. Louis, Mo. Mine office: Hackberry, Mohave Co., Ariz. **Officers:** John Schmoll, pres.; Chas. E. Hamilton, v. p.; A. E. Louis, sec.; J. Wm. Seller, treas.; with J. Phillips, Aug. Richter, Jr., C. D. Morley, Edw. J. Ryan and Wm. Burmeister, directors. F. G. Uthoff, supt. **Cap.**, \$1,500,000; shares \$1 par. Operating expenses for 1915 were \$51,717.

Property: 17 patented claims, about 340 acres, in the Music mountains, said to show gold and silver values. Ore occurs in fissure veins, 4-10' wide, in granite formation. Average assays reported at from \$10-\$50 per ton. **Development:** includes the 500' Lucknow shaft and 700' Roosevelt tunnel, latter in milling ore for 200'.

Equipment: includes compressor and gas hoist. Company has erected a small concentrator which started work in Oct., 1913. Operations in 1915 resulted in gross earnings of \$22,262 and a 95% recovery. **Production:** is at the rate of 25 tons per day. Management plans retimbering and deepening the Lucknow shaft in 1916.

NEVADA BONANZA COPPER CO.

NEVADA

Main office: 159 S. Main St., Salt Lake City, Utah. Mine at Morningstar City, Lyon Co., Nev. **Officers:** Freeman Morningstar, pres. and gen. mgr.; Sereno B. Tuttle, v. p.; Fred C. Dern, sec.-treas.; Walter C. Tuttle, asst. sec.-treas.; preceding, with Robt. J. Deighton, H. P. Clark, W. D. Mathis, Thos. J. N. Nippur, M. S. Woolley and P. L. Williams, directors. **Inc.** 1906. **Cap.**, \$2,100,000; shares \$1 par; issued, 1,448,000 shares.

Property: 12 claims, 7 patented, 250 acres, adjoining the Nevada Douglas ground, about a third of a mile from Ludwig, on Nevada Copper Belt railroad, in the Yerington district. J. C. Dick, E. M., of Salt Lake City, reports 3 fissure veins crossing property; the Green Dutchman vein being about 5' wide and assaying well in gold and copper. The vein on the Copper King claim has been developed by a 3-compartment, 115' shaft, said to show copper ore its entire depth.

Property is still in the prospect stage, but management plans further development.

NEVADA BRITISH MINING CO., LTD.**NEVADA**

Idle and probably dead. Cherry Creek, White Pine Co., Nev. See Copper Handbook, Vol. XI.

NEVADA-BULLION MINES CO.**NEVADA**

Address: Moe & Dougherty, San Francisco, Cal. Mine near Bullion, Elko Co., Nev. Company often called the Bullion-Nevada Mines Co., owns a group of claims adjoining the Nevada-Bunker Hill Mining Co. holdings and a half interest in the Kerr & Peterson lease on that company's ground.

Development: by a 1,970' tunnel, which will be extended 200' further to cut the vein opened in old mine workings. Lessees were shipping ore, 1916, but is now tied up in litigation.

NEVADA-BUNKER HILL MINING CO.**NEVADA**

Office: Elko, Nev. Mines at Bullion, Elko Co., Nev. **Officers:** J. A. McBride, pres.; R. H. Mallett, v. p.; John Henderson, treas.; Frederick Davis, sec.-mgr.; preceding, with W. W. Booher and Otto T. Williams, directors. Inc. April 28, 1905, in Nevada. **Cap.**, \$2,000,000; shares \$1 par; fully paid and nonassessable; 800,000 shares reserved in treasury for sale for development. Annual meeting, first Wednesday in May.

Property: 16 unpatented claims and two patented claims, owned by the company, and 7 patented claims under bond and lease for \$109,000 on royalty of 20% of net returns, which applies upon the purchase price of said mines. The country rock is a limestone, cut by intrusive porphyry dikes. The ore occurs in the dikes, on the contact, and also in chimneys at cross-fissuring in the limestone. There are 7 known orebodies, all of which are being worked by lessees above the No. 5 adit of Elk mine, which is 800' above level of main crosscut tunnel. This tunnel, 2,400' long, must be driven 600' further to cut the first known producing ore vein. Veins run nearly N. and S. and are cut by system of E.-W. fissures; veins are nearly vertical and are from 3 to 30' wide, are proven from 50 to 500' in length and to a depth of 600'. Smelter returns said to show average ore values of 3% copper, 15% lead and 30 oz. silver per ton. Camp is an old one, having been discovered in 1869 and worked in a crude way till 1893.

Development: by adits with connecting winzes and raises, aggregating over 15,000' of work, including the main working tunnel, driven for the purpose of opening the mines at an additional depth of from 500 to 800' below the present workings.

Production: during 1914 was 2,349 tons of gross value of \$50,821, on very low metal market; in 1915, 1,147 tons of gross value of \$40,145. Company claims production for 1916 will greatly exceed that of 1914-1915.

Company plans to complete tunnel to the 3,000' station as soon as possible, thus opening the Tripoli vein at an additional depth of 500'.

NEVADA-BUTTE MINING CO.**NEVADA**

Martin Benson, pres. Inc. 1913. **Cap.**, \$1,000,000; shares 25 cts. par. **Property:** 15 claims in Dolly Varden and Mizpah districts, Elko Co., Nev., 75 miles from Ely, said to be on the northern end of a great belt of mineralized porphyry and to carry fissure and contact deposits. **Development:** by several shallow shafts, shows mineralization, but property still in prospect stage. Drilling on neighboring areas has shown commercially mineralized porphyry.

NEVADA-CALUMET COPPER CO.**NEVADA**

W. H. Bray, mgr., Battle Mountain, Elko Co., Nev. F. D. Nowell, pres.; J. A. Beck, v. p.-sec. Inc. 1913. **Property:** the Boyd-Martin group, 30 claims, in heart of the monzonite-porphyry belt of Battle Mountain, shows

copper-stained patches thought to represent the outcrop of a big disseminated glance deposit.

NEVADA-CALUMET COPPER MINING CO. NEVADA

Office: 423 Banigan Bldg., Providence, R. I. Mine office: Wabuska, Lyon Co., Nev. Officers: Thos. Malcolm, pres.; John L. Washing, v. p.; with Arnold Schaer, John D. Kazar, William E. Blanchard, Chas. E. Hayes, Everett C. Elwood, Geo. E. Crawford, Thomas Malcolm, John L. Washing, J. Frank Cox, Francis E. Higgins and J. O. Brigham, directors; Philip J. Stacey, supt. Inc. May 4, 1907, in Arizona. Cap., \$2,000,000; shares \$5 par.

Lands: 17 claims, patented, 340 acres, 4 miles N. E. of Buckskin and 8 miles N. W. of Yerington. Property shows diorite, porphyry and silicious limestone, and has 3 contact deposits, .3-4' wide, showing cuprite, malachite, azurite, chalcocite and chalcopyrite, giving assays of 2-4% copper.

Development: by 2 main shafts, 1,200' apart, connected on the 500' level; No. 2 on the Yellow Metal claims, 60' deep, shows 9' of 2.75% ore. About 225' of laterals, on the 500' level, show small bunches and stringers of ore, in a leached zone, with fair indications of workable values at greater depth. Equipment: includes two 25-h. p. Witte gasoline hoists, and a 20-room boarding house. Property reported on by T. M. Hammond and Arthur Prill.

NEVADA CENTRAL COPPER CO. NEVADA

Office: Room 1012, 122 So. Michigan Blvd., Chicago. Mine office: Cedar, via Palisade, Eureka Co., Nev. Officers: at last accounts (all requests for information ignored): Robert L. Benson, pres. and treas.; Geo. Leighton, v. p.; A. F. Bordwell, sec.; Harold A. Linke, M. E., mine mgr. Inc. Dec. 20, 1904, in District of Columbia. Cap., \$1,000,000; shares \$10 par; in \$250,000 non-cumulative 7% preferred stock and \$750,000 common stock; issued, \$750,000 common. Annual meeting, second Tuesday in January at Washington, D. C.

Lands: 32 claims, about 700 acres, near Cedar, in the Antelope district. Litigation over titles was settled in the federal court of appeals, San Francisco, the Nevada Central securing clear title to the former property of the Whalen Consolidated Copper Co. Development: by a 900' incline shaft, with 1,000' drifts in Prince of Wales mine, said to cut an 8' vein on the 100' level, showing copper of good average assay tenor. Two carloads of ore gave returns of 11% copper. There is also a vertical double-compartment shaft on the Henry claim. Equipment: includes one 60 and one 12-h. p. gasoline hoist, air compressor and electric drill. Mine has been worked intermittently during past few years.

NEVADA CHAMPION COPPER CO. NEVADA

Office: 617 Pacific Bldg., San Francisco, Cal. Wm. Miller, pres.; C. N. Miller, sec.-mgr. Inc. 1907 in Arizona. Cap., \$1,500,000; shares \$5 par. Owns 130 acres patented land, 3 miles from Luning, Nev. Developed by a 3-compartment shaft, 400' deep. Claims to have large bodies of 3% copper ores and to be shipping 6% copper carbonate ore.

NEVADA CONSOLIDATED COPPER CO. NEVADA

Controlled by Utah Copper Co.

Office: 120 Broadway, New York. Operating office: McGill, White Pine Co., Nev. Mine near Ruth, White Pine Co., Nev. Officers: Silas W. Eccles, pres.; Col. Daniel C. Jackling, v. p.; W. E. Bennett, sec.; preceding, with S. R. Guggenheim, Judd Stewart, Murry Guggenheim, J. N. Steele, Col. Chas. Hayden, Wm. B. Thompson, Chas. M. MacNeill and W. Hinckle Smith, directors; C. K. Lipman, treas.; C. B. Lakenan, gen. mgr.; C. V. Jenkins, business mgr.; Robt. Marsh, Jr., gen. mine supt.; Geo. C. Riser, mill supt.; R. E. H. Pomeroy, smelter supt.

Inc. Nov. 17, 1904, in Maine, as a merger of the Boston & Nevada Copper Co. and White Pine Copper Co. Cap., \$10,000,000; shares \$5 par; non-assessable; original cap., \$5,000,000, increased Feb. 5, 1908, to \$8,000,000, and again increased Nov., 1909, to present figure. A former issue of \$3,000,000 first-mortgage 6% convertible gold bonds, due April, 1918, has been retired. Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, registrars; Boston Safe Deposit & Trust Co., Boston, and D. A. Crockett, 120 Broadway, New York, transfer agents. Shares listed on the New York and Boston stock exchanges. Annual meeting, third Friday in April.

Comparative General Balance Sheet: Nevada Cons. Copper Co. and Nevada Northern Ry. Co.—

Assets:	Property & Equip.	Def'd Chgs. to Oper's	Metals on Hand	Other Current	Total
1915.....	\$13,027,219 (a)	\$4,136,970	\$4,998,829	\$2,512,438	\$24,675,456
1914.....	13,361,672 (b)	3,739,988	3,114,863	1,229,737	21,446,260

Liabilities:	Capital	Current	(c)	Earned	Total
1915.....	\$9,997,285	\$2,404,785	\$7,071,850	\$5,201,536	\$24,675,456
1914.....	9,997,285	1,756,982	7,071,850	2,620,143	21,446,260

(a) After deducting \$6,129,738 for depreciation and ore extinguishment.
 (b) After deducting \$5,289,208 for depreciation and ore extinguishment.
 (c) Amount realized from Capital Stock and Securities sold in excess of par value or cost less extra dividends paid.

Comparative Income Account:

	Operating Revenue	Operating Expenses	Net Op't'g Profit	Total Income	Total Deduct's	Balance Dec. 31
1915....	\$11,685,276	\$6,544,593	\$5,140,683	\$5,905,602	\$3,346,672	\$4,849,556
1914....	7,052,499	6,335,522	716,977	1,763,021	2,542,037	2,290,626

Dividends: Begun Oct., 1909, rate 37½ cts. per share quarterly; paid \$1.50 in 1910 and 1911; \$2 in 1912; \$1.50 in 1913; \$1.12½ in 1914; \$1.50 in 1915; \$1.25 in 1916, to July 1.

Company absorbed the Cumberland-Ely Copper Co., paying \$7,554,084 cash therefor, Aug. 30, 1910. Shareholders of the Cumberland-Ely were given the opportunity of exchanging stock on the basis of 3¼ shares for 1 share Nevada Consolidated. The Nevada Consolidated is controlled through stock ownership, amounting to 1,000,500 shares by the Utah Copper Co. The Nevada Cons. Copper Co. controls through stock ownership the Nevada Northern Railway Co.; also owns, through purchase and absorption, the physical assets of the Steptoe Valley S. & M. Co., which was dissolved Oct., 1914.

Property: 111 claims, patented, 1,379 acres, including the former holdings of the Cumberland-Ely, 48 claims, 523 acres. Holdings include the Copper Flat or Eureka group of 355 acres; the Ruth group of 455 acres; the Lane group of 46 acres; the Veteran group of 14 claims; the Jupiter group

NEVADA CONSOLIDATED COPPER CO.

Our Statistical Department will furnish complete information
on application.

HAYDEN, STONE & CO.

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25 Broad Street, NEW YORK

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of 22 claims, and a group of 12 claims near the Giroux Consolidated. Mineral lands include properties formerly held by the White Pine Copper Co., Cumberland-Ely Copper Co., and sundry other corporations and individuals.

Geology: the geologic features of the property are somewhat similar to those of Morenci, Ariz., and Bingham, Utah. An area of Paleozoic limestone is intruded by a great mass of monzonite porphyry tilting the sedimentary rocks and forcing its way into them in dikes and sills, heaving them up in great irregular lacoliths. At the surface the monzonite porphyry, which is the principal ore-bearing rock, is sparingly stained with small quantities of copper carbonates, not exceeding 0.5% in copper tenor and 25 cts. in gold, hence is worthless. Below the thoroughly oxidized zone, varying from 20 to 162' in thickness, the rock is no longer leached, but carries specks of copper glance in white altered porphyry. This disseminated chalcocite also occurs in tiny seams in partially brecciated material and as patches disseminated through the rock mass.

The zone of payable ore extends 200 to 300' below surface and below that depth the chalcocite impregnations become too lean for commercial use, the bottom limits of payable ore depending somewhat upon commercial factors, mainly the market price of the metal, as there is a gradual shading out of ore values with depth. The altered limestone also carries occasional impregnations of chalcocite, of commercial tenor. One portion of the property shows an extreme width of about 2,000' of ore.

A considerable part of the property is covered by a rhyolite capping, part of a lava flow that poured out over the district long after the monzonite intrusion and subsequent faulting and erosion. Two orebodies are mined by steam shovels, at Liberty and Copper Flat pits. The capping between these two orebodies has been removed and in time they will be mined as one.

The Copper Flat pit, formerly called the Eureka mine, and the Liberty pit are now practically one mine working and extraction is all open-cast. This mammoth pit is now about 3,800' long, 1,400' wide and 500' deep, the ore being removed in benches of about 50' each. The ore is soft and friable, but requires blasting, holes being put down by churn drills to average depth of about 55', drilled at intervals of about 20' and fired singly or in series, each blast breaking tremendous quantities of ground. The Copper Flat property, including both Eureka and Liberty pits, is working 8 Bucyrus steam shovels, partly on overburden and partly on ore, these having capacities of $3\frac{1}{2}$ cu. yd. capacity, averaging about 5,000 tons of material per shovel per 24-hr. day.

The Copper Flat mine lies on a low rounded hill, with summit only about 150' above the flat through which the railroad enters the mine, and the rail line reaches the bottom of the pit by 4 spirals along the benches, having a length of about 5 miles. The railway track in the pit has a grade of 3 to 4%, and as depth is gained transportation becomes more difficult. The Copper Flat has four 60-ton and nine 45-ton locomotives, one 30-ton crane with 50-ton and 60-ton ore cars.

Carbonate ores from cappings of the Copper Flat pit are produced far in excess of the requirements of the Steptoe smelter, though a considerable tonnage is used for converter flux and a small amount is employed in the reverberatory furnaces, but the greater part of the carbonate ore is stored in a ravine northeast of the works, where a railroad fill of considerable size has been built entirely of ore to be leached at some future time. Water from the Copper Flat pit has been raised by a small electric pump.

The Ruth mine includes the Ruth and Star Pointer shafts, connected by a 2,700' tunnel, with an extensive electric haulage system hoisting

through the Star Pointer shaft. The Ruth shaft, $1\frac{1}{4}$ mile from the Copper Flat pit, is 610' deep, sunk at an angle of 45°, with 2 compartments, 200' of its depth being in limestone, with levels opened at 120', 310', 520' and 610', and is equipped with a small electric hoist. This shaft, now used for ventilation, has been replaced by the Ingersoll shaft, 445' deep, which corresponds with the 520' level of the Ruth shaft, with which it is connected on this level. Water is cared for by a 50-gal. pump. The average grade of ore in the Ruth mine is somewhat above that of the Copper Flat and the mine has developed about 14,000,000 tons of ore of 2.3% average grade, with small gold and silver values. The ore is soft and the mine is to be operated on the caving plan.

The Star Pointer, the main shaft of the Ruth mine, is located about 250' west of the lime-porphry contact, is 7' 6"x25' 6" in the clear and has 4 compartments. The shaft has a 140' steel headgear on concrete foundations. The main hoist is geared to a 300-h. p. General Electric induction motor, and has drums with 72" face running independently or in balance, raising 5-ton ore skips, working in guides, and there is a 200-h. p. geared electric hoist for the timber cage.

The Veteran mine, taken over from the Cumberland-Ely, is not producing, operations at this property having been discontinued indefinitely.

Miscellaneous holdings include a number of small mines and groups, on which more or less work has been done. The Kimberley group shows a promising area of mineralized porphyry, but is not extensively developed and the capping is too thick for opencast work. The Wedge mine has a shaft showing some ore of about 3.5% copper average assay tenor. The Jupiter mine has 4 shallow shafts showing ore assaying up to 9% copper, but with an average of probably about 3%. The Turkey shows a comparatively thin bed of cupriferous porphyry, apparently of no particular promise, and the August and Boss of Nevada groups have not given indications of much value.

Ore reserves: extensive churn-drill borings on the Copper Flat, Liberty, Veteran, Ruth and other properties, have proven a tonnage estimated Jan. 1, 1916, to be 50,525,289 tons of ore, averaging 1.65% copper and representing an ore supply of about 16 years, of which the major portion is in the Copper Flat and Liberty groups.

Comparative Table of Recoverable Developed Ore:

	Tons	Copper		Tons	Copper
Sept. 30, 1907....	14,432,962	1.97%	Dec. 31, 1912....	38,853,551	1.67%
Sept. 30, 1908....	20,000,000	1.94%	Dec. 31, 1913....	39,108,590	1.65%
Sept. 30, 1909....	29,000,000	1.94%	Dec. 31, 1914....	41,020,296	1.68%
Sept. 30, 1910....	40,360,823	1.70%	Dec. 31, 1915....	50,525,289	1.65%
Dec. 31, 1911....	40,853,371	1.66%			

Electric power is used throughout, current being brought from the Steptoe smelter, at 40,000 volts, and stepped down to 600 volts by seven 200-k. w. transformers in a concrete station.

Buildings include a machine shop and warehouse at the Copper Flat mine, engine houses at the various shafts and an office, boarding house and bunkhouse and numerous dwellings at the Ruth mine.

Ore is shipped to the Steptoe smelter, at McGill, separately described below, over a 27-mile standard-gauge railway, equipment including 400 self-dumping ore cars. This line is a part of the Nevada Northern railway, having a standard-gauge line of 168 miles in length, running from the mines and Ely to a junction with the Southern Pacific railway at Cobre station. The Nevada Northern Railway Co. controlled through stock ownership by the Nevada Consolidated, is capitalized at \$2,000,000, with a \$1,000,000 bond

issue, at 5%, the line doing a general business in addition to handling the traffic of the Nevada Consolidated Copper Co.

Costs: the cost of stripping overburden was given at 28.87 cts. per cu. yd. for the fiscal year ending Dec. 31, 1915, with actual mining costs for ore of 15.24 cts. per dry ton, with an additional charge of 15 cts. per ton made to cover stripping redemption at the Eureka pit, 22 cts. at Liberty pit and 30 cts. at the Hecla pit. Ore mined and treated during the fiscal year 1915 averaged 1.542% copper, by assay, with an average extraction of 70.18%. The cost of production for the fiscal year 1915 was given as 8.23 cts. per lb. of copper and 8.93 cts., covering all charges, including depreciation charges on Steptoe plant. It is not probable, however, although the Nevada Consolidated is one of the largest and best mines in the world, that the mine can continue to produce copper, for any great length of time, at much less than 8 cts. per lb., and, when all factors are taken into consideration and due allowance is made for the cost of improvements, that ultimately must be charged against costs, a net cost of 9 cts. per lb. for finished copper laid down at the seaboard, would be a fair estimate. Production is marketed through the American Smelting & Refining Co., on a 1% commission basis.

Production: was 33,283,348 lbs. fine copper in the fiscal year ending Sept. 30, 1909; 62,772,340 lbs. in the fiscal year 1910; 78,541,270 lbs. for the 15 months ending Dec. 31, 1911; 63,063,261 lbs. for the year ended Dec. 31, 1912; 64,972,829 lbs. in 1913.

Recent Production:

	Tons Treated	Cu. %	% Rec.	Ratio Conc.	% Cu. in Cncta.	Cost in p. Ton Mng.	Net Prod. Lb. Cu.	Cost p. Lb. Cts.	Sell. Price Cts.
1915.....	3,081,820	1.54	70.18	7.18:1	7.77	15.24c	62,726,851	8.23	17.65
1914.....	2,840,294	1.48	68.48	6.08:1	6.14	15.17c	49,244,056	9.82	18.89

Production of gold and silver amounted to \$615,605 in 1915, compared with \$455,810 in 1914. Copper production for first five months in 1916 amounted to 34,696,082 lbs.

The property has been splendidly developed and is being managed with ability and success.

Steptoe Smelter:

The ore reduction works, concentrating mill and smelter owned by the company are at McGill, White Pine Co., Nev. Lands cover 8 square miles, with water rights. The property is on the eastern side of Steptoe valley, on the slope at the foot of the Schell Creek range, 14 miles N. E. of Ely and 22 miles from the mines, on the line of the Nevada Northern railway. The smelter site proper comprises 320 acres, 1 mile long and one-half mile wide, on a hillside with 10% grade, permitting the works to be terraced, and handling material by gravity throughout. Lands carry water rights to Duck creek, and to the McGill ranch, estimated as capable, jointly, of furnishing water for a 15,000-ton plant.

The reduction plant is one of the largest and best in existence. The present average capacity is 12,000 tons daily, but the plant is so designed that it can be increased easily to a much greater capacity. All main buildings are of steel frame and the plant is built on the unit system, with allowance for expansion.

The ore bins of timber, about 800' long, are in four 6,000-ton units. Ore is drawn from the bottoms of the bins by belt conveyors, which carry it over automatic weighing machines and thence to distributing bins of 40-ton capacity, located at the head of each section of the mill.

The mill, nearly a mile from the smelter, is 378x756' in size. There are 8 sections, treating a total of nearly 11,000 tons of ore daily. Each section can be operated independently, but the plant is run in 4 units of 2 sections each.

The mill handles a moderately hard silicified altered porphyry ore containing tiny specks of chalcocite, pyrite and some chalcopyrite and averaging 1.5% copper. This is concentrated 8 into 1, with a recovery of about 70% of the assay value, the product containing 8% copper.

The ore treatment is as follows: From the distributing bin ore passes through a belt-driven feeder to a set of 36x15" rolls set for one-half-inch product and run dry, water being introduced underneath, washing the product to a pair of bucket elevators having 8x8x18" buckets. These elevators deliver to 2 trommels 42" diam. x 8' long, having 1 section of $\frac{1}{8}$ " and $\frac{1}{4}$ " perforations, the oversize of $\frac{1}{8}$ " returning to a second set of rolls, 36x14", which deliver to the same elevators. The undersize of $\frac{1}{8}$ " returns to a third set of rolls, 36x14", also delivering to the same elevators. The undersize of $\frac{1}{8}$ " passes to eight 2-mm. trommels, 36" diam. x 8' long. The oversize of 2mm. passes to a fourth set of rolls 36x15", set to produce a 2-mm. product and delivering to the same elevators as the preceding rolls.

The undersize of the 2-mm. trommels passes to 4 Yeatman hydraulic classifiers designed and made at the plant, each one delivering 5 spigot products and an overflow, each separate class of spigots feeding a separate group of Wilfley tables. The first spigot product goes to 10 Wilfleys, making finished concentrate, middlings, which are treated on 2 Wilfleys following, the reject of which is reground. The second spigot product is also treated on a group of 10 Wilfleys, making finished concentrate, middlings and tailings to waste. The third spigot product is similarly treated on another group of 8 tables, making products the same as those of the preceding group. Middlings from these 2 groups, together with all reject from the 2 tables treating middlings, also tailings from first group of Wilfleys, are reground in two 6-ft. Chilean mills. Several sections are fitted with 2 sets of 36x15" rigid rolls for this purpose, all reducing through .029" slot mesh wire screen.

The product of regrinders is elevated by a pair of 8x8x18" belt elevators to 4 classifiers of the same type as the preceding, but making 4 spigot products and an overflow. The first spigot product is screened through a pair of trommels 36" diam. x 8' long, with same screen as used on Chilean mills, as a guard against accidental leakage or breakage of screens on the latter. The oversize of these returns to the mills. The undersize joins the product of the second spigot and is treated on 10 Wilfleys making a finished concentrate, a middling and a tailing to waste. The product of the third spigot is joined with that of the fourth spigot of the primary classifiers and is treated on another group of 10 Wilfleys, making products similar to the preceding group. The product of the fourth spigot is joined by that of the fifth spigot of the primary classifiers and is treated on a group of 20 Wilfleys making a finished concentrate, middlings and tailings which are retreated.

The middlings of the first 2 groups of 10 tables each following the regrinders, are retreated together on 4 Wilfleys. All middling of the group of 20 Wilfleys following the regrinders, is treated on a group of 12 six-foot vanners. All tailing of the group of 20 Wilfleys following the regrinders is treated on a group of 16 six-foot vanners. All classifier overflows are treated on a group of 16 six-foot vanners. All feed to concentrating machines following the regrinders, is dewatered by cone tanks or by "Dorr" thickeners.

Automatic samplers are used to determine the grade of all material leaving the mill. All concentrates are sluiced to steel tanks having a capacity of approximately 225 tons, dried by suction through a filter bottom.

and loaded by means of a Blaisdell disc excavator, into cars running on a track underneath.

Water is secured from Duck creek, which has an average flow of 8,000 gals. per minute, water being collected in the hills in reservoirs and brought by gravity for 9 miles through a 32" iron-banded wooden pipe line and delivered at the highest point of the works under a pressure of 10 to 20 lbs. per sq. in. An electrically-driven pumping plant in Steptoe valley, immediately below the works, has a capacity of about 5,000 gals. per minute. By means of a system of settling tanks, ponds and pumps, approximately 10,000 gals. of water per minute is recovered from mill tailings for re-use. Approximately $4\frac{1}{2}$ tons of fresh water to 1 of ore are used in the process.

The smelter is about one mile from the concentrator, and is connected therewith by a standard-gauge railway line. The works have about 12 miles of railway track, equipped with 9 small locomotives, a switch engine and 100 cars.

The smelter includes separate buildings for calcining, reverberatory smelting, blast-furnace smelting and conversion, all of steel frame, with corrugated iron sheathing. Each department has independent flues and chimneys.

The roaster building, 250' in length, has 4 floors, with eighteen 18' six-hearth McDougal roasters, set in 2 rows. Concentrates are delivered to the calcining building in 8-ton standard-gauge cars, entering over a trestle built of timbers, the feed floor being on a level with the railway trestle. All the roasters have air-cooled rabbling arms, and center columns supplied with air under a pressure of about $3\frac{1}{2}$ " of water by a National Blower Co.'s fan of about 22,000 cu. ft. capacity. The roasters are driven by 30-h. p. electric motors. Hot calcines, carrying 7.5 to 10% sulphur, are discharged into hoppers beneath the roasters and trammed directly to the reverberatories, or to nine 150-ton calcine storage bins, built of brick and steel, which serve as a balance-wheel between the roasting and smelting departments. Each roaster discharges gases through two 32" elbows to a brick flue running between the 2 rows. This flue discharges fumes into the main flue, which is in 2 parts, each of 312' square cross-section, permitting either to be cut out for cleaning. The flue is 1,070' long, including the dust chamber, which is 150x50x30', and leads to a brick stack 250' high and of 18' internal diameter at the top. Dust from the flue in the roaster building is piped to the ground floor, for loading into cars, and for about 500' the flue has tracks underneath, permitting the collection of dust from steel hoppers in cars, which are hauled by small locomotives.

The reverberatory building has five 600-ton furnaces, each 19' wide x 111' to 130' long, fired with California crude oil, atomized by air at 40-oz. pressure from a Connersville blower and fed through 5 burners per furnace. From 250 to 350 bbls. of oil per day are used by each furnace, varying with the nature of the charge smelted. Each furnace is connected with two 400-h. p. boilers arranged in parallel, instead of tandem, in the flue between the furnace and the dust chamber. These boilers develop about 85% of their normal rated capacity under oil firing. Each furnace has bypasses with dampers giving a direct passage for the gases from furnace to dust chamber, when boilers have to be cut out. The equivalent of about 35% of the fuel value of the oil used in the furnaces, is recovered as steam by these boilers. As the gross oil used per ton of charge is about 0.543 bbl., the net, after deducting these waste heat credits, is about 0.35 bbls. per ton of charge.

The reverberatory furnaces are charged with calcines mixed with limestone, dumped through slide gates, from hoppers suspended from the

charge floor. Each furnace has 2 tap holes on one side, from one of which matte is drawn off into matte cars of about 30-ton capacity. These cars are tilted and contents poured into the converters by an electrically-driven mechanism mounted on the car frame. Slag is skimmed twice every shift, the skimmings going to a cast-iron box leading to a lined launder, in which a jet of water granulates the slag and washes it to the dump. Slags carry 40 to 45% silica, 6 to 12% calcium oxide, 25 to 35% iron oxide and 4 to 6% alumina. The reverberatory building has a dust chamber of 1,000' square section, 155' long, leading to a 300' brick chimney, 15' in diameter at top.

The blast-furnace building, located between the reverberatory and converter departments, has a single blast furnace, 42x240" at the tuyeres, and 84x240" at the shaft, with a capacity of 300 to 500 tons of charge per day, the furnace being so planned that it can be enlarged if desired to 80' in length. The furnace is 13' above the ground level, with a height of 16' from the tuyeres to the charging floor, operating with a 10' column charge and 40-oz. blast pressure. There are 4 steel water jackets on each side, and 1 at each end, and each side has 24 four-inch tuyeres, 10" apart, receiving blast from a 30" bustle pipe. The water jackets each have separate blast boxes and independent air and water connections, so that any jacket may be removed by breaking 3 simple connections. Charging is done by cars dumped pneumatically, matte is tapped into ladles on cars and slags granulated and sluiced, as in the reverberatory building. Fumes discharge through a 108" downtake to a 12x15x250' brick flue, terminating in the main roaster flue. The blast furnace is not in operation.

The converter building is about 600' from the reverberatory furnaces, and receives molten matte from cars, behind and above the converters, the contents being poured into a launder, while the shells remain in position for blast. The building has two 5-motor Shaw electric cranes, each with a hoist capacity of 60 tons besides 2 auxiliaries of 25 tons each. There are 2 of the old stalls with 96x150" shells of the barrel type built for acid linings, but now used with magnesite brick linings. There are also 2 Pierce-Smith barrel-type converters, both originally 25' 10" long by 10' diameter shell. One of these was lengthened at the smelter to 33' 11". They originally had 30 tuyeres each but these have been increased to 35 and 46, respectively. The blast pressure used is nominally 10-lb. gauge at an altitude of 6,327'. The Pierce-Smith converters produce about 60 and 50 tons of copper per day on 40% matte.

Blister copper is poured into ladles and transferred into a brick-lined steel cylindrical receiver. This is mounted on rollers and rotated on its own axis by an electrical motor, so that the molten blister copper is poured through a tilting pouring spoon into moulds on a horizontal straight-line chain and sprocket conveyor. These moulds discharge on a submerged apron conveyor which after traveling in the water horizontally for a few feet turns on an incline and raises the copper ingots out of the water and lands them on the loading platform. They contain 99.5% copper, weigh about 400 lbs., and after trimming and being weighed on accurate scales, they are shipped in box cars.

The converter's slag is taken back to the reverberatory furnaces in 10-ton side-tilting pots operated by compressed air. Flux for the converters consists of concentrator slimes and a silicious carbonate ore from the Copper Flat pit, mixed and dried in 2 oil-fired rotary driers at the converter building and handled and charged by boats. The hoods from the converters lead to a balloon flue running along over the charge floor for the extent of the converter building covered by stalls. It is then connected

by a circular flue 10' diam. to a brick dust chamber which in turn connects to a brick stack 100' from the ground, 10' diam. at top.

The power plant has 4 batteries of two 400-h. p. Babcock & Wilcox water-tube boilers each and one battery of two 600-h. p. Stirling water-tube boilers. Two batteries have Foster and 3 others have Babcock & Wilcox internal superheaters, and there is a separate Foster superheater for the steam supplied by the reverberatory waste heat boiler plant of ten 400-h. p. boilers. Steam is generated at 160-lbs. pressure and can be superheated 100° F. All boilers are fired by Green chain grate stokers, coal being fed from overhead bins by chutes direct to the stoker hoppers. Each double battery of boilers has a 9x40' steel stack with induced draught, furnished by 5 Sturtevant fans, each connected to a 30-h. p. Sturtevant slide-valve engine, running at 150 to 175 r. p. m.

Each battery of boilers is equipped with fuel economizers of about 3,360 sq. ft. heating surface, set between the boilers and the induced draught fan; they are dampered so that they can be cut out for cleaning while the boilers are in service. A 3,000-gal. capacity Kennicott water purifier supplies make-up water for all boilers.

The engine-room, main floor, contains the generating engines, blowers, 3 exciters and a switchboard, and the basement contains condensers, air pumps and oil filters. The electrical equipment consists of two 1,100-h. p. 22x48x48" Allis-Chalmers Corliss cross-compound engines, with 800-k. w. Bullock a. c. generators mounted on the shafts; two 2,000-h. p. 31x66x48" Nordberg Corliss cross-compound engines with 1,500-k. w. Bullock a. c. generator mounted on the shafts, and one 2,500-k. w. steam-driven Westinghouse turbo-generator. Current is generated at 600 volts and carried to a concrete transformer station, equipped with 7 200-k. w. Bullock water-cooled transformers, stepping the current up to 40,000 volts, for transmission to the mines; four 750-k. w. Westinghouse water-cooled transformers, and four 1,000-k. w. General Electric water-cooled transformers, stepping current up to 13,200 volts for transmission to the mills; 13,000 and 40,000-volt choke coils and lightning arresters.

The smelter blast plant, in the engine house, includes a 350-h. p. 14x28 x36" Nordberg tandem-compound engine direct-connected to a No. 10 Connersville blower with capacity of 300 cu. ft. of air per revolution, making 120 r. p. m. This is for the blast furnace. For the converters air is supplied at 10-lbs. gauge pressure by 1 Allis-Chalmers blowing engine, 16" and 24" diam. steam, 34" and 34" diam. air by 48" stroke of 6,000 cu. ft. capacity, 1 Nordberg 25" and 54" diam. steam, 52" and 52" diam. air by 48" stroke of 12,000 cu. ft. capacity, and 1 Nordberg 26" and 56" diam. steam, 54" and 54" diam. air by 48" stroke of 18,000 cu. ft. capacity. These are all of the cross compound steam, tandem, air and steam type.

A Laidlaw-Dunn-Gordon cross-compound air compressor with steam cylinders 11" and 21" diam. and air 21" and 12" diam. and 18" stroke of 1,080 cu. ft. displacement, compresses air to 100-lbs. gauge. This was originally for tamping converter linings but is now used for pneumatic tools of various kinds at the shops and the mill.

In connection with the works are a number of thoroughly appointed shops, including a boiler, machine and carpenter shop, foundry, warehouse and roundhouse.

The Steptoe works were started in April and the finished copper shipped in Aug., 1908. Nearly 1,500 men are employed at the plant.

NEVADA CONSOLIDATED MINES & SELLING CO. NEVADA

Idle. Mine address: Hawthorne, Mineral Co., Nev. Alex. Brown, pres.; Chas. L. Newton, v. p.; C. C. Matthews, sec.; F. G. Carey, treas. Lands: about 1,000 acres, including a gold property formerly owned by the

Huntoon Valley Mining Co., 45 miles south of Hawthorne, and copper claims 10 to 20 miles S. W. of Hawthorne. The copper property, developed by 3 crosscut tunnels to 440' below the outcrop, is said by the company to have a vein carrying disseminated pyrite and chalcopryrite, averaging 2½% copper and \$4 gold. This vein has apparently been lost in the lowest tunnel. Country rock is granodiorite. The mine has 1,500' of workings. Officers are said to stand well, but the company's past advertising is not liked.

NEVADA CO-OPERATIVE MINING CO. NEVADA

Goldfield, Nev. **Officers:** Chas. S. Sprague, pres.; R. M. Byars, v. p.; S. A. McCandless, sec.; J. K. Turner, cons. engr. **Inc.** 1913. **Cap.**, \$2,000,000; shares \$1 par; assessable; 1,500,000 shares in treasury. Company is a reorganization of Goldfield Mines Operating Co.

Property: 11 claims, 150 acres, including the Nevada Empress, in Gold Mountain mining district, Esmeralda Co., 37 miles S. E. of Goldfield, shows 3 well-defined quartz veins, from 1-6' wide with numerous quartz stringers, running N. E. The formation is Cambrian sedimentary rocks, quartz-monzonite porphyry, granite, rhyolite and basalt. **Development:** total work to June, 1915, was about 3,000', of which 2,000' is on the Central or Liberty vein. A crosscut tunnel, driven 800', exposed ore averaging \$8.17 across a width of 1½'. Drifts run from a raise on the hanging-wall from the 800' level, encountered a quartz vein, assaying \$26.40 gold and 54 cts. silver per ton. Management plans developing from surface. **Equipment:** includes several buildings and an old 10-stamp mill, which is to be re-modeled.

NEVADA COPPER CO. NEVADA

Office: 572 Bullitt Bldg., Philadelphia, Pa. **Operating office:** Tonopah, Nev. **Mine office:** Mina, Mineral Co., Nev. **Officers:** Jas. S. Austin, pres.; J. H. Whiteman, v. p.; C. A. Higbe, sec.-treas. Company is controlled by the owners of the Tonopah Mining Co. Owns the Dunlap mines, 12 miles east of Mina, which sec. Letters neither returned nor answered.

NEVADA COPPER CO. UTAH

Smyths, Beaver Co., Utah. A. J. McMullen, v. p.; A. D. McMullen, sec.-treas. **Inc.** April, 1907, in Utah. **Cap.**, \$1,000,000; shares \$1 par; assessable; issued, \$650,000. **Lands:** 14 claims, 4 patented, in the Beaver Lake district, show limestone cut by monzonite, with disseminated ore and replacements. The claims have several pits and shafts, deepest 175', with about 200' of laterals, said to show a vein assaying 8.5% copper and 111 oz. silver per ton.

Presumably dead. Described in Copper Handbook, Vol. XI.

NEVADA COPPER HILLS MINING CO. NEVADA

Office: 18 South Mulberry St., Mansfield, Ohio. **Mine office:** Luning, Mineral Co., Nev. **Officers:** at last accounts: A. H. McCullough, pres.; F. W. Lenhart, v. p.; T. J. Foster, sec.; Chas. Ritter, treas.; Rowland Lea, gen. mgr. **Inc.** Oct. 24, 1907, in Nevada. **Cap.**, 1,500,000; shares \$1 par; nonassessable; issued, \$745,000. Farmers Savings & Trust Co., Mansfield, Ohio, registrars. Annual meeting, first Monday in December.

Lands: 10 claims, 200 acres, in the Fitting district, 9 miles north of Luning. The property is reported, by Mr. Lea, to have replacement ore-bodies in limestone over a width of about 600', with N.-S. a strike, and a dip of 6°. **Ore:** oxidized, with occasional native copper and some bornite with chalcopryrite in the bottom workings. Orebodies average 2' thick and 28 of them are opened up for a length of 400' and a depth of 100', according to the company's secretary. Ore is stated to assay 1 to 70% copper, from a trace to 8 oz. silver and from a trace to \$3 gold per ton.

Development: by 225' shaft and a 330' tunnel. **Equipment:** includes a

25-h. p. hoist, and 6 buildings. Presumably pursuing a "watchful waiting" course; has ignored all requests for information.

NEVADA COPPER MINING, MILLING & POWER CO. NEVADA

Office: Tacoma, Wash. Mine at Contact, Elko Co., Nev. **Officers:** E. F. Messinger, pres., Tacoma, Wash.; Henry Smith, v. p. and gen. mgr., Contact, Nev.; E. S. Price, sec.-treas.; M. K. Price and C. Smith, all of Tacoma, directors. Inc. May 5, 1905, in Arizona. **Cap.**, \$1,500,000; shares \$1 par; nonassessable; issued, \$1,500,000.

Property: 52 claims, patented, in Salmon River district, better known as Contact district, shows Paleozoic sediments cut by granite with ore-bodies along the contact. Several hundred tons of high-grade ore are at the Alice mine awaiting shipment by auto truck to Rogerson, Idaho, 40 miles away. In 1915 a 100-ton flotation plant was erected, following extensive diamond-drill explorations. Property and geology fully described Bull 497, U. S. Geol. Survey.

NEVADA DOUGLAS CONSOLIDATED COPPER CO. NEVADA

A. J. Orem & Co., 79 Milk St., Boston, Mass. General office: 222 S. W. Temple St., Salt Lake City, Utah. Mine office: Ludwig, Lyon Co., Nev. **Officers:** A. J. Orem, pres.; James G. Berryhill, L. H. Curtis, vice-presidents; F. M. Orem, sec.-treas.; W. C. Orem, gen. mgr.; preceding officers, J. J. Corum, H. I. Moore, F. J. Curtis and J. G. Berryhill, Jr., directors; Archie J. Orem, supt.; H. L. Burbridge, mine supt.; R. M. Mitchell, Salt Lake City, purch. agt.

Inc. March 4, 1915, in Utah. **Cap.**, \$5,000,000; shares \$5 par; assessable; \$158,990 unissued. Bonds, \$2,000,000; \$404,600 outstanding. Federal Trust Co., Boston, registrar; Paul Revere Trust Co., Boston, transfer agt. Stock listed on Boston Curb.

The company is a reorganization of the Nevada Douglas Copper Co. at the time of its consolidation with the Moore Mng. Co. The new company assumed liabilities of the old companies, \$525,000 of Nevada Douglas and \$57,000 of Moore Co. Nevada Douglas stockholders received share for share in stock of new company and the Moore Co. received 10,000 shares of stock. To date 7 assessments of 10c a share have been levied, the last one in June, 1916. The old Nevada Douglas Copper Co. paid a dividend of \$125,000 in 1913.

The report of the old Nevada Douglas Copper Co., Feb. 28, 1915, showed a property investment of \$4,670,152, exclusive of the Ludwig leaching plant, \$51,992; current assets, \$35,060; profit and loss, \$581,660; current liabilities, \$101,905; accrued liabilities, \$17,150; deferred credit items, \$367,548.

Report of Nevada Douglas Cons. C. Co., dated Dec. 31, 1915, shows receipts \$494,407, inclusive of \$375,910 received from 4 assessments and \$36,073 from ore sold. Disbursements include \$147,151 for mill construction; \$138,350 loaned Nevada Copper Belt R. R. Co.; \$38,068 spent on development and equipment of mine; \$14,535 general and office expenses; \$26,657 interest on bonds; \$80,000 notes payable with sundry other items to balance.

Balance sheet shows \$163,209 current working and \$5,935 accrued (not due) liabilities.

Property: about 700 acres, with 2 mill sites, 80 acres, and miscellaneous lands, including water rights, giving total holdings of about 800 acres on the western slope of the Mason mountains. Lands include former holdings of the Ludwig Copper Mng. Co., the Douglas C. Mng. Co., which succeeded the Douglas M. & S. Co., the Nevada Douglas Copper Co. and the Moore Mng. Co. Holdings of the Nev. Douglas C. Co. consisted of 4 separate and distinct mines, the old Douglas mine, the Amalgamated group

and the Casting Copper mine, being the original holdings of the company, and the Ludwig mine. Country rock consists of limestone intruded by granodiorite with large contact orebodies and fissure veins. There is also one claim at Buckskin, 7 miles distant, which carries fluxing ore.

The Moore Mng. Co. owned the Moore group of claims, a prospect with about 450' of development work and "considerable oxidized ore blocked out in a way that it cannot be measured." It also had a bond and lease on the property of the old Western Nevada Copper Co., described in Vol. X.

The Ludwig mine, about 1 mile N. W. of the Douglas, includes 2 claims, on which the mine is opened, and a 40-acre tract in Smith Valley, on which there is a well and pumping station. The Ludwig was opened 1865, and was a shipper for some years of small quantities of high-grade ore, production including some very handsome malachite and azurite, a portion of which was sold to lapidaries, and considerable bluestone was produced also for the mines of the Comstock Lode.

The ore occurs in a fissure vein with a white limestone footwall and a silicious limestone hanging wall, which changes to a garnetiferous limestone, heavily impregnated with sulphides in places. Where crushing has permitted surface waters to work downward, large bodies of carbonates and copper glance ores are found as replacements in the footwall limestone. The vein proper has an average width of about 30' and has been developed along its course for 1,300' and to a depth of 800' by levels, along hanging wall, every 100'. The orebody on the 700' level is 50' wide and 300' long and runs 6% copper. The shoots, or pipes, of high-grade secondary ore, running from 16 to 30% in copper, form chamber deposits in the limestone near the porphyry contact, proven down to 800' level. Ore reserves are estimated at 200,000 tons of 2% copper ore.

In addition to copper ore, the Ludwig has a very large deposit of gypsum, on the footwall, said to be 3,000' long, 500' wide and 400' deep, which figures seem high. This deposit of gypsum is of commercial value, and some has been mined and shipped.

The Douglas mine is working a typical contact metamorphic deposit in which garnetized limestone carrying copper sulphides and their resultant oxidized ores occur in very irregular orebodies in limestone which have a tendency towards a horizontal rather than a vertical extension. The mineralized area is about 700' wide and 2,000' long with numerous parallel fissures which seem to control the mineralization. This mine has been developed by a main working tunnel and a deeper haulage tunnel with numerous crosscuts and drifts netting the property. The working tunnel, 4,290', has an average depth of 120' beneath the surface and the ore is in places continuous to the surface. Four 50' winzes show the downward extension of the ore. Claimed to have 75,000 tons of ore blocked out.

The Casting Copper mine shows a large area of garnet-epidote limestone constituting low-grade carbonate ore, which will be extensively mined. This mine has a vertical 350' shaft and a 500' tunnel. Claimed to have 100,000 tons blocked out. When shipments were being made to the smelter the ore averaged 5% copper as compared with 3% in the Douglas mine.

At the Amalgamated mine very little development work has been done, but the surface exposures indicate the existence of similar large contact metamorphic deposits.

Property as a whole has about 5,000' of workings.

Equipment: includes four 100-h. p. hoists, good for 1,000' depth each, with a 52-drill Imperial air compressor. Electric current is taken from the

Truckee River General Electric Co. Water is secured from artesian wells in Smith valley, brought to the mine by a 17,000' pipe line.

A 250-ton leaching plant, begun 1914, was in partial operation early in 1916. The sulphide and oxidized ores are treated separately and by entirely different methods. The chief value in the process lies in the fact that not only the copper, but the iron and sulphur as well, are made use of as valuable marketable products, and that in the treatment of 50 tons of sulphide ore, enough sulphuric acid is obtained at an abnormally low cost to treat 200 tons of oxidized ores.

A brief outline of the process is as follows: sulphide ores are submitted to an acid treatment under pressure in a closed receptacle, in which operation the sulphides of copper and iron are converted into the sulphates of the metals and taken into solution. This solution is then decanted off and passed through the electrolytic cells or over scrap iron, where the copper is removed. The remaining iron sulphate solution is then carried to an evaporating tower, where the water is evaporated off and the ferrous and ferric sulphuric crystals are allowed to crystallize out. These iron sulphate crystals are then introduced into a dryer and submitted to a temperature sufficiently high to drive off all the water of crystallization, after which the dried sulphates are submitted to a roast in the Wedge muffle furnaces; sufficient heat being applied to decompose the sulphates. The greater portion of the gases coming off in the form of sulphur trioxide, which is collected in the absorption towers and made into sulphuric acid to be used in the leaching of oxidized ores. The remaining residue of ferric oxide is then drawn off and prepared for market. The leaching of the oxidized ores is carried on in Pachuca tanks, where the ore is agitated with air and leached with the sulphuric acid obtained from the preceding sulphate roast. The solution is then decanted and passed through electrolytic cells, where the copper is taken out, after which the water is evaporated off and the sulphate crystals dried and roasted in the muffle furnace, as before outlined. The total cost per ton for mining and treating sulphide ores is \$5.18. As the general average of the ore to be treated is a little above 3% in copper, the ore will have a gross valuation of \$12 per ton in copper. The total cost of producing a ton of iron and sulphuric acid by this method should not exceed \$2, and with sulphuric acid at this price, oxidized ore running as low as 1% in copper can be treated as a profit. Company claims that there is blocked out, and available, on the property, about 550,000 tons of ore averaging better than 3% in copper. Development work during the last few months has been productive of excellent results, as some 30,000 tons of ore, averaging 5% in copper, have been added to the reserves already blocked out.

Production: last reported is for 1912, when 120,908 tons of 4.25% copper were mined, producing 9,020,640 lbs. copper.

Employs 175 men at the mines alone.

If the leaching plant is a success it will prove the salvation of the company. The policy of handling the property has not met with favor in the East and as a result financing and development have been slow. Management is believed to be competent and making every effort to put property on a dividend basis.

NEVADA GOLD MINES CO.

NEVADA

J. S. Madden, Austin, Lander Co., Nev., mgr. Inc. 1915, in Nevada. **Property:** 16 claims, including the Gold Park, La Crux, San Pedro, May-Do-So and Cottonwood groups, at Austin, said to show gold-silver-copper ores in well-defined veins. Systematic development work started Nov. 1915.

NEVADA HILLS MINING CO.**NEVADA**

Reno, Nev. Officers: Geo. Wingfield, pres.; H. M. Hoyt, v. p.; E. A. Julian, gen. mgr.; C. F. Burton, sec.-treas., with J. H. Carstairs, Chas. E. Knox and L. A. Gibbons, directors. A. H. Westall, supt. Inc. April 19, 1906, in South Dakota. Cap., \$6,250,000; shares \$5 par; 1,065,687 shares issued. Reno Nat'l Bank, registrar. Stock is listed on San Francisco Exchange.

The report for 1915 shows a net operating profit of \$39,142, against which there are charges totaling \$28,338, leaving a surplus for the year of \$10,803. The surplus for 1914 was \$147,457, making a total for the two years of \$158,261. Net resources at the close of the year were \$289,285; convertible assets approximately \$280,285, something less than 28c per share on the outstanding stock.

Property: the Fairview Eagle mine, about 107 acres, at Fairview, Churchill Co., Nev., shows several well-defined veins. The main or Nevada Hills vein, 1-15' wide, carrying argentite, stephanite, pyrite, chalcopyrite, galena, tetrahedite, sphalerite, silver and gold, runs N.-S.; dips 70° S.; has gangue of quartz, calcite and partially replaced andesite. This vein produced % of the year's tonnage. The Eagle vein, running parallel to the Nevada Hills vein, at a distance of 1,100' and averaging 16' in width, is practically worked out.

Developed: by the 580' Nevada Hills shaft, 935' Webber shaft, and 315' Eagle shaft. Total development work in 1915 was 1,812', at a cost of \$11,186. The mill averaged 179 tons per day, making an average extraction of 81.7%.

Production: for 1915—		Amount per Ton	
64,030 Tons ore milled.....	\$363,100.85	\$5.671	
1,418 Tons tailings milled.....	2,516.90	1.775	
<hr/>			
65,448 Tons milled.....	\$365,617.75	\$5.586	
Loss in tailings.....	66,790.75	1.020	
<hr/>			
Recovery	\$298,826.99	\$4.566	
Less ore purchased.....	1,095.49	.017	
<hr/>			
Production	\$297,731.50	\$4.549	
Net expenses.....	258,589.20	3.951	
<hr/>			
Net profit.....	\$ 39,142.30	\$.598	

The life of the mine is limited and the company a liquidating proposition unless new properties are acquired. The company has an option to purchase the property of the Oro Fino Development Co. at Railroad Springs, a few miles north of Lida in Esmeralda county, which is now being developed to determine the extent of the orebodies.

NEVADA HILLS MINING CO. (Tungsten).**NEW MEXICO**

Chas. Starr, mgr., Gage, Luna Co., N. M. **Property:** 8 claims, purchased in 1916 for \$15,000, in Victoria mining district, near Gage, said to show a vein 20' wide of tungsten ore in lime formation with quartz gangue, opened on the 40' level. Developed by 2 shafts, 130' and 90' deep. The property was formerly worked for silver values. Developing in 1916, and milling plant to be built.

NEVADA LINCOLN MINING CO.**NEVADA**

Reno, Nev. Officers: J. Parker Lewis, pres.; Murray K. Scott, v. p.; T. J. Flynn, sec.-treas.; Frank Wilson, supt., with Zeb Ray, directors. Inc. Dec., 1915. Cap., \$1,250,000; shares \$1 par; 750,000 shares were issued to Wilson and Scott for the property.

Property: 5 claims, covering 3,000' on the strike of the ore channel at Lincoln, Churchill Co., Nev., shows gold-silver ore in 3 veins traceable for over 400' on the surface. Developed by 500' crosscut tunnel. About 600' west of the portal a 6' vein is said to have been encountered, giving assays of from \$24-\$59 per ton. Ore occurs in bands and seams in a broken formation of quartz and talc. Company also owns a mill-site and water rights. Considered a promising prospect.

NEVADA METALS EXTRACTION CO.

NEVADA

See Florence Goldfield Mining Co.

NEVADA NEW MINES CO.

NEVADA

Office: 146 No. Virginia St., Reno. **Mine office:** Rawhide, Mineral Co., Nev. **Officers:** E. W. King, pres.-gen. mgr.; Thos. J. Flynn, mine supt.; H. Davis, mill supt.

Company took over the property of G. G. Rice's promotions, the Rawhide Coalition M. Co., Rawhide Queen M. Co. and the Black Eagle M. & M. Co., in Regent district, said to carry free gold and ruby silver, in a 4" vein, opened on the 500' and 600' levels. Developed by shafts and crosscuts.

Equipment: includes 10-stamp amalgamation and concentration mill, 35-ton cyanide plant, compressor, and gasoline power. Reported treating 60 tons of \$22 ore per day in 1914. Recent production figures not available; company has not replied to requests for information.

NEVADA ORE COPPER CO.

NEVADA

H. H. Hill, supt., Acme, via Mina, Mineral Co., Nev. **Property:** a group of claims in the Fitting district, said to show copper ore in replacement deposits. Developed by shaft and extensive workings, opening up lead ores. Reported in April, 1916, that a mill would be built.

NEVADA PACIFIC MINES CO.

NEVADA

L. P. Patrick, pres., Goldfield, Nev. **Mine office:** Mina, Mineral Co., Nev. **Property:** the Mayflower group in New York canyon, N. E. of Mina, shows copper ore 150' wide, exposed by surface work, from which 15 tons daily were shipped to the Wabuska smelter in 1913. **Development:** work is in progress. Reported under bond and lease to the U. S. Smelter Co.

NEVADA PACKARD MINES CO.

NEVADA

Office: 998 Phelan Bldg., San Francisco, Calif. **Mine at Rochester, Humboldt Co., Nev. Officers:** Mark Walser, pres.-mgr.; R. L. Ray, v. p.; Frank Margrave, sec.; K. Freitag, mine and mill supt. **Inc.** 1913, in Nev **Cap.**, \$1,250,000; shares \$1 par; fully paid; nonassessable. Stock listed in San Francisco.

Property: 4 claims, about 80 acres, in the Rochester mining district, reported to show silver ore in silicified schist netted with quartz stringers. Ore occurs along shear zones in rhyolite, associated with quartz. Orebody said to be 46'x22' and 600' long. Average assays about \$10-\$15 per ton. Gold contents run from 80c to \$2 per ton.

Development: by 5 tunnels, longest over 600'. A 100-ton cyanide mill, erected at cost of \$65,000, started operations Dec., 1915, using Merrill precipitation system. Power obtained from Nevada Valleys Power Co., at \$8 per h. p. **Production:** reported to be over \$114,000 to 1916.

NEVADA PROGRESSIVE GOLD MINING CO.

NEVADA

Mine office: Wellington, Lyon Co., Nev. **Officers:** C. M. Woodbridge, pres.; F. H. Woodbridge, sec.-treas.; Ed. Parr, supt.

Property: 400 acres mineral land and 600 acres miscellaneous land at Wellington, shows gold-silver-lead ore, said to assay from \$10-\$147 per ton. Developed by 2 shafts, 100' and 300' deep. At last accounts, July, 1915, management planned systematic development at depth and addition of air compressor.

NEVADA QUEEN COPPER CO.**NEVADA**

Idle. **Office:** 405 Mining Exchange Bldg., Colorado Springs, Colo. Mine near Yerington, Lyon Co., Nev. **Officers:** Duncan Chisholm, pres.; John Matthew, v. p. and treas.; R. G. Riddett, sec.; preceding with H. Hironemous and D. P. Randall, directors. **Inc.** Oct. 5, 1906, in Colorado. **Cap.**, \$1,500,000; shares \$1 par; nonassessable; issued, \$1,107,350. Is operated as a close corporation. Annual meeting second Monday in October.

Property: 28 claims, patented, 467 acres, lying immediately north of the Nevada Douglas and Yerington Central Copper companies. Developed by shafts of 186' and 210', showing copper ore said to assay 1.5 to 28%. Management plans operating in 1916 if arrangements can be made with the Nevada Douglas Co. to treat the ore in its leaching plant.

NEVADA REGENT MINES CO.**NEVADA**

Provo, Utah. **Officers:** Jesse Knight, pres.; J. H. Miller, v. p.; W. Lester Mangum, sec.-treas.; P. H. O'Neil and A. S. Proskey, directors. **Inc.** June, 1915, in Utah. **Cap.**, 1,000,000 shares; 10c par. **Property:** in Regent district, Mineral Co., Nevada.

NEVADA SMELTING & MINES CORP.**NEVADA**

Has no operating property.

Office: Room 515 E., 30 Church St., New York. Mines near Tybo, Nye Co., Nev. **Officers:** Max E. Bernheimer, pres.; L. A. Dessar, v. p.; Werner Mueller, sec.; A. W. Joseph, treas.; preceding with M. Eisenberg, Chas. Lee, L. E. Marsden, N. P. Payne, H. Rawitzer, C. J. Roberts, directors. **Inc.** May, 1906, in South Dakota. **Cap.**, \$5,000,000; shares \$5 par. Stock listed on the New York Curb. Empire Trust Co., New York, registrar. Balance on hand, March 31, 1914, was \$860.

Company realized \$4,090 on 80,000 shares of Greenwater Copper Mines & Smelter Co. stock in 1914, retaining 272,000 out of the 3,058,775 issued shares of the Greenwater Co.; also owns a controlling interest in the Tybo Cons. Mining Co., owning silver-lead properties at Tybo, Hot Creek district, Nev.

NEVADA STANDARD COPPER CO.**NEVADA**

Officers: Wilbert E. March, pres., P. O. Box 24, Mina, Nev. C. E. Korthe, v. p.; L. H. Marsh, sec.-treas.; with B. H. Wyant and Matthew W. King, directors. **Inc.** 1912, in Nevada. **Cap.**, 100,000 shares; \$1 par; nonassessable; 75,340 issued.

Property: 12 claims and a mill site, in the Santa Fe or Luning district, Mineral Co., Nev., 8 miles N. E. of Mina, on the Goldfield branch of the S. P. R. R. Claims cover low rounded hills at about 6,000' elevation. The rocks are leached porphyries underlain at 20' depth by low-grade oxidized copper ores. Ore contains azurite, melaconite, malachite, cuprite, and native copper, and at 192' shows some chalcocite. Assays reported from 1.90 to 24% copper, with small gold and silver values.

Development: by 192' shaft on the Green Mystery claim, which at 45' cut a fault plane fissure that widened to 20' on the 104' level. Cross-cutting in 1915 on the 192 level to the North opened up 11' of low-grade copper ore. A level at 104' cut a 24' shear zone carrying low-grade ore. Management considers it a typical porphyry, or disseminated copper deposit, and is drifting on E. W. vein to intersection of N. S. vein series. **Equipment:** includes a 4-h. p. gasoline hoist, pump, blacksmith shop, and buildings for men. There are 3 springs, 2½ to 5 miles distant.

NEVADA STEWART MINING CO.**IDAHO**

Wallace, Idaho. **Directors:** A. J. Devlin, Dr. C. R. Mowery, Dr. Herbert Mowery, M. J. Sinclair and H. E. Huemann. **Inc.** Nov. 19, 1915, in Idaho. **Cap.**, \$150,000; shares 10c par.

Property: 7 claims in Pine Creek district, near Kellogg, Shoshone county, adjoining the Highland Surprise on the west, shows lead, silver, zinc ore in veins. A 500' crosscut tunnel is being driven, 1916. **Equipment:** includes electric power and air compressor.

NEVADA SUPERIOR MINES CO.**NEVADA**

Office: 625 Dooly Bldg., Salt Lake City. Mine office: Jungo, Nev. **Officers:** Otto Grantz, pres.; E. R. Reitsch, v. p.; John W. Geiger, sec.-gen. mgr.; Dr. Allen C. Eakin, treas., with D. R. Peterson, directors. Inc. 1905, in Utah. **Cap.**, \$300,000; shares \$1 par; assessable; 155,000 shares outstanding. Income for 1915 was \$164 from royalties.

Property: 21 claims, 420 acres in Humboldt Co., 23 miles from Jungo on the W. P. R. R., shows gold-silver-lead-zinc ore in fissure veins traversing schist and slate. The main orebody, from 2-20' wide, strikes N. W. and is said to give average assays of 8.6 oz. silver, 11.2% lead, 1% copper, 8% zinc. Shipments of crude ore made by lessees in 1915 ran \$15-\$24 per ton. Developed by 2 tunnels, 1,000' and 2,500' long, and 330' vertical shaft.

Equipment: includes 75-ton concentrating mill, steam power, compressor, pump and hoist. Company has been inactive since 1913 owing to lack of funds.

NEVADA TUNGSTEN MINES CO.**NEVADA**

Office: care G. S. Johnson Co., Clay Peters Bldg., Reno, Nev. E. W. Orr, pres.-gen. mgr. Inc. 1916, to operate a 2-year lease on the Beeson tungsten mine, about 125 miles from Lovelock. **Cap.**, 1,000,000 shares; 10c par; 300,000 shares issued to E. W. Orr for the lease and 700,000 shares in the treasury; 50,000 shares were offered to the public at 7½c, April, 1916, for development purposes. Property said to show a vein, 20-30' wide, all pay ore. A 50' shaft is being sunk.

NEVADA UNITED MINING CO.**NEVADA**

Oliver G. Jennings, pres.-treas., 49 Wall St., New York. An inactive corporation. Fully described Vol. XI, Copper Handbook.

NEVADA-UTAH MINES & SMELTERS CORP.**NEVADA**

See Consolidated Nevada-Utah Corporation.

NEVADA WONDER MINING CO.**NEVADA**

Office: 572 Bullitt Bldg., Philadelphia, Pa. Mine office: Wonder, Nev. **Officers:** C. A. Higbee, pres.; J. S. Austin, v. p.-treas.; J. H. Whitman, v. p.-gen. counsel, with C. A. Daniel, Barton Hooper, Jr., Chas. R. Miller and Wm. M. Potts, directors. P. S. Bickmore, sec.; J. A. Burgess, mine supt.; E. E. Carpenter, mill supt.

Inc. 1906. **Cap.**, \$1,500,000; shares \$1 par; 1,086,639 shares outstanding. **Dividends:** paid at the rate of 20% annually. Last dividend paid May 20, 1916.

Company owns the Wonder Extension, Hidden Treasure and Reorganized North Star Mining companies. Balance sheet fiscal year ending Sept. 30, 1915.

	Assets:	
Property and Plant.....		\$1,667,649
Total Stock Owned.....		251,760
Accounts Received, and Unexpired Insurance.....		440,608
Total		\$2,360,009
	Liabilities—	
Capital Stock.....		\$1,500,000
Accounts Payable.....		245,169
Surplus		614,840
Total		\$2,360,009
	Income Account—	
Gross Value Ore Milled.....		\$ 812,145
Expenses		503,335
Net Earnings.....		\$ 308,810

Combined and condensed cash receipts and disbursements of Nevada Wonder Mining Co. and Churchill Milling Co. for year ending Sept. 30, 1915, showed: cash on hand, Sept. 30, 1914, \$55,230; receipts, \$505,894, which included: loans, \$220,000, Selby Sm. & Lead Co., mill products \$188,145; total, \$561,124. Disbursements total \$550,851, including two dividends of 5%, \$140,808; cash on hand, Sept. 30, 1915, \$10,273.

In June, 1916, company acquired a 25-year lease on the Jack Pot mine, from Atlas Leasing Co.

Property: 328 patented and 73 unpatented acres at Wonder, Churchill Co., Nev., shows gold-silver ore in fissure veins 5-6' wide in rhyolite with occasional dacite. The gangue consists of quartz, feldspar and kaolin. The rock is mined by the waste-filling system as the walls in the lower levels are insecure, caving in large masses, thus making the shrinkage system of stoping used above the 400' level, inadvisable in the lower workings.

Development: by 1,300' shaft and winze 300' deeper. There is a total of 36,141' of underground workings, consisting of 1,948' of shafts, 22,122' of drifts, 7,024' of crosscuts, 4,701' of raises and 344' of winzes. Total work for fiscal year, 1915, was 6,224'.

The Jack Pot mine, recently acquired, extends the company holdings to the northward on the vein system.

Work during the past year was mainly confined to the exploitation of the Extension ore shoot on Last Chance No. 1 claim, which has been opened on the 300', 500', 800', 1,000', and 1,300' levels. A south drift on the 800' level showed 3' of \$20 ore. Exploration work below the 1,300' level is now under way through a new 3-compartment inclined winze, which had reached the 1,600' level, June, 1916.

Production: for 1915, was 58,124 tons of ore, yielding 1,199,245 oz. silver and 10,279 oz. gold, making a total value of \$812,119. Total cost for mining and milling was \$7.45 per ton as compared with \$8.94 the previous year. The average value of the ore was \$13.97, leaving a net profit per ton of \$5.70.

The 100-ton mill is operated by the Churchill Milling Co., whose entire stock issue is owned by the Nevada Wonder Co.

NEVADA ZINC CO.

NEVADA

L. N. Morrison, Tobar, Elko Co., Nev., gen. mgr. **Property:** the Polar Star group near Tobar, has a zinc-lead deposit, 40' wide and opened for 600' on surface. Ore said to average from 30-35% zinc and from 4-5% lead. Developed by tunnel and incline shaft. Producing at the rate of 600 tons per month in 1916. 70 men employed by company and lessees.

NEVERSWEAT MINE.

NEVADA

Owned and operated by E. C. Watson and C. F. Bachman of Luning, Nev. **Property:** 3 unpatented claims, about 50 acres in Santa Fe mining district, New York canyon section, Mineral Co., Nev., shows copper-silver ore in a contact deposit in limestone monzonite formation. The orebody from 2'-20' wide and from 50'-200' long, strikes N., dips W. and is said to give average assays of 9% copper and 1-7 oz. silver.

Development: to date consists of several shallow shafts. Property has been worked since 1914 with total production to date of 1,200 tons. Two men employed. Examined by engineers of the U. S. Sm. Ref. & Mng. Co. and Hayden Stone & Co. Considered promising prospect.

NEW ARCADIAN COPPER CO.

MICHIGAN

Houghton, Mich. **Officers:** Robt. H. Shields, pres. and gen. mgr.; Col. Sylvester T. Everett, v. p.; Wm. F. Miller, sec.-treas. **Directors:** Wm. B. Anderson, John Merton, John C. Shields, L. W. Killmar, Jas. W.

Shields, Allen F. Rees, R. H. Shields, S. T. Everett, and Herman W. Fesing, engr. Otto Lieber, mg. capt.

Inc. April 27, 1909, in Michigan. Cap., \$3,750,000; shares \$25 par; assessable; paid in, \$12.50. Last assessment, 50 cts., was paid Dec., 1915. This company succeeded the Arcadian Copper Co., a corporation organized in New Jersey that had nonassessable stock, and exchanged shares, *pari passu*, levying an assessment of \$1 per share, 1909. Property was transferred, by deed, from the old company to the new, May 30, 1909. Company owns 10,000 shares of stock of the New Baltic Copper Co. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in May.

Property: 3,500 acres, includes 5 old mines worked at various periods in the past. The Arcadian Copper Co., predecessor of present company, operated the property with great vigor, 1898-1901, and equipped it with machinery, and a 3-stamp mill at Grosse Point. Operations on the Isle Royale bed proving unsatisfactory, all work was suspended June 15, 1903; the hoist, machinery and shaft houses were sold to the Trimountain Mining Co., the stamp mill to the Centennial Copper Mining Co., and the property dismantled. The floating debt of the old company was liquidated by the sale of 800 acres of land, for \$750,000, to the Quincy Mining Co. The old mine and equipment were fully described in Vols. I and II of the Copper Handbook.

Development: exploratory work was resumed Oct., 1905, by the old company, on an amygdaloidal bed about one-fourth mile east of the Isle Royale amygdaloid previously worked, and crosscutting from the 200' level of the exploratory shaft disclosed 5 cupriferous beds in a distance of 110'. Work was suspended March, 1908, until organization, and was resumed Aug., 1909, by diamond-drill boring from the bottom of the 200' exploratory shaft, which is in the S. W. $\frac{1}{4}$ of Sec. 29. Exploratory work, 1910-13, included considerable trenching and test pitting, but was devoted mainly to securing 3 cross-sections, nearly 1 mile apart, by diamond drilling, and 26 holes, aggregating over 26,000', have been drilled. Drill hole No. 22 cut a promising amygdaloid lode, in the north area. A shaft started June, 1912, on this lode, was 1,250' deep in June, 1916, and is to be sunk to a depth of 1,500 to 2,000'.

Crosscutting was done on the 750' level to explore the 2 copper-bearing amygdaloid beds disclosed by diamond drilling, one 300' east, the other 150' west of the shaft. On this level an amygdaloid vein of great promise has been opened up 150' east of the shaft. Crosscuts and drifts have also been driven on the 250', 600', 900' and 1,050' levels and disclosed good copper contents. The 600' level has 600' of drifting on this lode. On the 900' level, No. 8, conglomerate was cut and found to be well mineralized at this point. During the year 1,245' of drifting was done and 980' of crosscutting.

Three mill tests were made during the summer of 1915 at the Franklin stamp mill. About 4,000 tons of rock were stamped yielding better than 20 lbs. of refined copper per ton.

Equipment: includes a steam plant, with boilers, a hoist good for 1,500', a 15-drill air compressor, and necessary mine buildings.

The plant is being superseded by a much larger one and the vein opened up extensively. Owing to its immense acreage on the mineral belt, the property is considered promising and management is good.

NEW BALTIC COPPER CO.

MICHIGAN

Houghton, Mich. R. H. Shields, pres. and gen. mgr.; Herman W. Fesing, v. p.; John Edwards, sec.-treas.; other directors, S. T. Everett, J. W. Shields and John Merton; Herman Fesing, engr. Inc. Dec. 14, 1909, in

Michigan. Cap., \$2,500,000; shares \$25 par, assessable; issued, \$1,750,000; \$9 paid. Beacon Trust Co., Boston, transfer office; American Trust Co., Boston, registrar. Company succeeded the New Baltic Exploration, giving stockholders therein share for share, giving 30,000 shares to the Edwards estate and 10,000 shares to the New Arcadian Copper Co., for lands, and selling 20,000 shares to the public, at \$8. Company began operations with \$120,000 cash, and in June, 1915, called an assessment of \$1; Dec. 31, 1915, had cash on hand, \$24,624. All officers with exception of general manager serve without pay. Annual meeting third Wednesday in April.

Property: 640 acres, Sec. 16, T. 55 N., R. 33 W., with mineral rights to the N. W. $\frac{1}{4}$ of the N. W. $\frac{1}{4}$ reserved by the New Arcadian Copper Co. Exploratory work, begun June 10, 1909, included extensive trenching in the horizon of No. 3 conglomerate, supplemented by boreholes put down by a Calyx shot drill, cutting a $3\frac{1}{2}$ " core, considerable trouble having been experienced in getting down stand pipes. No. 3 borehole, at a depth of 330', cut 2' of exceptionally good copper-bearing rock, with 6" of heavy copper, and a drill core fairly charged with copper was taken, Sept., 1909, from what was thought to be the western Baltic bed, at depth of 300'. In Nov., 1909, a drill hole pitched at an angle of 60°, cut an amygdaloidal bed estimated to pitch at 60° in opposition, giving cores of 105' aggregate depth, showing copper at various points, the final 7' being well charged with fine stamp copper and a considerable amount of very coarse stamp copper. The drilling also disclosed an unidentified amygdaloidal bed of about 75' width, carrying considerable copper in masses approaching barrel-work size. Deepest hole bored was 1,200'.

Ground was broken June, 1910, for an exploratory shaft, which was started about 35' in the footwall trap, and sunk to a depth of 500'. Although the shaft was started in the foot, the formation rolls so that the bed was cut at 3 points in the depth of 310'. At 200' the shaft cut the footwall of the amygdaloidal bed, carrying much calcite but devoid of copper. At depth of 310' the bed was cut again, carrying extremely heavy copper of a grade materially better than the average of the payable mines of the district. Drifts on the 350' and 500' levels disclosed exceedingly bunched ground, with occasional pockets of rich copper, and a crosscut on the 500' level showed further copper ground in an unidentified amygdaloidal bed underlying No. 4 conglomerate bed, distant about 1,500' from the shaft. This crosscut was continued to a point over 1,900' from the shaft. The company is now putting down a diamond drill hole, preparatory to sinking a shaft on the New Arcadian vein. Facts concerning this vein were obtained from work done on it by the New Arcadian, the adjoining property.

Equipment: includes a steam plant with hoist, good for 1,500', and a 6-drill Ingersoll-Sergeant air compressor. Property considered promising and management good.

NEW CANADIAN METAL CO.

S. S. Fowler, Nelson, B. C., mgr. **Property:** the Bluebell lead-silver mine and concentrating mill at Riandel, near Ainsworth, B. C. Operated intermittently.

NEW COPPER SILVER CO.

Helena, Mont. **Officers:** W. C. Bardon, pres.; Z. B. Melborn, v. p.; E. J. Dower, sec.-treas. Company acquired the holdings of the defunct Copper-Silver Montana Mining Company at receiver's sale in 1914.

Property: 7 claims, 130 acres, adjoining the Lexington and Sacajewea, in the Scratch Gravel district, 1 mile from Great Northern railway, and 5 miles north of Helena. Claims show granite and monzonite, reported to carry numerous fissure veins, dipping N. W. and S. E. All veins are re-

ported mineralized at surface, carrying melaconite, azurite and malachite. Mine has a 500' shaft, cutting at 300', a vein estimated to average 4.5% copper, 12 to 100 oz. silver, and \$1 to \$55 gold per ton. **Equipment:** includes a 30-h. p. steam hoist and a gasoline engine. Operations have not yet been resumed by the new company.

NEW CORNELIA COPPER CO.

ARIZONA

Gordon R. Campbell, sec., Calumet, Mich. Operating office: Ajo and Warren, Ariz. Same directorate as the Calumet & Arizona Mng. Co., with Dr. L. D. Ricketts and Geo. H. Augustine.

Inc. Sept. 28, 1909, in Delaware, as a reconstruction of the Cornelia Copper Co. **Cap.**, \$8,000,000; shares \$5 par; nonassessable; issued, \$6,000,000.

Company authorized an issue of \$4,000,000 6% 12-year sinking fund gold bonds, dated Sept. 1, 1915, maturing Sept. 1, 1927, convertible into stock at \$10 per share, to finance the purchase of necessary equipment and construction work. All subscribed at par. 76% of the stock and \$3,100,000 bonds owned by C. & A. Co.

History: company's early history and its experiments with new processes are fully described in Vols. VI, VIII and X, Copper Handbook. In 1910, the General Development Co. bought 20,000 shares of stock for \$20,000, spending the money under an option for a stock control, putting down 5 diamond-drill holes, deepest 188', which showed the ground to be oxidized to a depth of about 30', followed by sulphides, estimated by the company to average 2 to 2.75% copper. The option was forfeited 1910 and property was leased to H. C. Chamberlain who shipped concentrates from 800 tons of 4% ore to the Copper Queen smelter.

Property: 23 patented and 68 unpatented claims and 15 mill sites, near Ajo, 43 miles south of Gila Bend, Ariz. Eighty-four diamond drill holes of an average depth of 300', and other work on the property by the Calumet & Arizona Co. has proved the existence of 11,954,400 tons of carbonate ore carrying 1.54% copper and 28,303,600 tons of sulphide ore carrying 1.50% copper, or a total of 40,258,000 tons carrying 1.51% copper. The gold and silver values in the carbonate ore are negligibly small but the sulphide ore carries between \$0.30 and \$0.50 per ton in commercial values. Of this tonnage all of the carbonate ore and 20,526,800 tons of the sulphide ores are available for steam shovel mining. The occurrence of ore at the surface obviates stripping and loss of ore or vitiation of grade through admixture of ore with capping. Nineteen drill holes stopped in ore at from 400 to 600' depth.

Geology: claims cover an area of rhyolite, lava, breccia and tuff beds, intruded by a huge mass of monzonite porphyry which cuts and uplifts the rhyolite. There were subsequent intrusions of diorite and diabase porphyry, probably connected with the great mass of Tertiary basalt and andesite lava flows which cover the surrounding country. Mineralization has formed a low-grade disseminated deposit with high-grade veins in monzonite and narrow rich veins in the adjoining rhyolite. The disseminated orebody, covering about 55 acres, has a pear-shaped outline. The depth of the ore varies from less than 50' on the outskirts to more than 600' in the center of the orebody.

The original mineralization was chalcopyrite and bornite with comparatively little pyrite. Surface alteration has converted the primary sulphide minerals to malachite to a depth of about 20' below the deepest arroyos and 150' below the highest hills. The plane of demarcation between carbonates and sulphides is almost horizontal, agreeing with the present ground water level. Chalcocite is rare except in thin films just below the water level.

Equipment: a 40-ton experimental plant, completed Jan. 31, 1915, treated 12,222 tons of ore, to Dec. 31, 1915, attaining an average extraction of from 74-79%. A 4,000-ton plant to cost \$4,200,000 is being constructed, which is expected to put the mine on an annual production basis of 36,000,000 lbs. copper and should be completed by July, 1917. Equipment will include an electrolytic plant with 152 lead-lined tanks, a power plant, 126'x200', built of steel and concrete, with five 822.6-h. p. boilers and two 7,500-k. w. steam turbines, a leaching plant with 11 lead-lined leaching tanks, 88'x15', having a capacity of 5,000 tons of ore each, each tank having pumping equipment for circulating and advancing its solution at the rate of 8,000 gallons per minute.

The development of a water supply sufficient for the mill was accomplished by two deep wells drilled in the valley N. E. of the mine. Water in quantity was found in both wells at depths of from 550 to 750'. Property promises to make a big and profitable producer.

NEW CRYSTAL MINING CO.

WASHINGTON

Office: 8-9 Fall City Blk., Spokane, Wash. **Mine office:** Miles, Lincoln Co., Wash. **Officers:** John O'Connor, pres.; H. F. Snamiska, v. p. -treas.; C. L. Colby, sec., with John Gray, Ray E. Stevens, directors. C. S. Batchelder, mgr. **Inc.** in Washington. **Cap.**, \$1,500,000; shares \$1 par: assessable; 1,100,000 shares outstanding. Annual meeting May 12. Operating expenses in 1915 amounted to \$4,000.

Property: 2 patented claims, 40 acres, near Miles, an old time producer, shows gold-silver-copper-zinc ore in shoots, said to assay from \$15-\$50 per ton in lead and silver. Ore occurs as contact deposit or in fissure veins, from 4-7' wide, in granite formation. Developed by 1,000' of underground workings. Operations were resumed June, 1915, and management reported planning erection of a 50-ton oil burning smelter.

NEW CURRENCY MINING CO.

WASHINGTON

Organized to take over the property of the Jay Gould Mining Co., at Chewelah, Stevens Co., Wash., said to show copper-lead-silver ore.

NEW DOMINION COPPER CO., LTD.

BRITISH COLUMBIA

Office: 42 Broadway, New York, N. Y. **General office:** Greenwood, B. C. **Works office:** Boundary Falls, Boundary district, B. C. **Officers:** Lucius W. Mayer, pres.; Newman Erb, v. p.; C. A. Starbuck, v. p.; preceding with Hon. Warren W. Foster, John A. Sleicher and Chas. H. Burke, directors. H. B. Blanchard, sec.; R. H. Eggleston, treas.; Oscar Lachmund, gen. mgr.

Inc. June 9, 1909, in British Columbia. **Cap.**, \$1,750,000; shares \$5 par; issued, \$1,178,320; treasury holds \$499,800 in stock for conversion of like amount of bonds. Debentures: \$500,000 ten-year 6% gold income bonds, convertible into stock at par; outstanding March 31, 1914, \$483,650. Empire Trust Co., New York, transfer agent. Annual meeting, first Monday in June.

The annual report for the year ending March 31, 1914, last one issued, shows a loss on operations for the year of \$111,471. Cash in bank amounted to \$34,293, accounts receivable \$135,354 and accounts payable \$28,387. Company made payment of coupon No. 4 of its bonds in Oct., 1913, holders releasing company from payment of coupons Nos. 1, 2 and 3, as income was not earned.

This company is a drastic reconstruction of the Dominion Copper Co., Ltd., originally the Montreal & Boston Mining Co. The property was acquired at foreclosure sale for \$347,999.85. Is controlled, through ownership of about 155,000 shares, or 64% of the issued stock and one-third of the bond issue by the British Columbia Copper Co., Ltd.

The mines were operated by the British Columbia Copper Co. and the ore smelted by that company under a contract providing for the payment of actual smelting charges plus 50 cts. a ton for interest and depreciation. A change was made which provided for a fixed profit of 15 cts. a ton guaranteed by the British Columbia Copper Co., regardless as to whether such amount be realized from the ore or not.

Property: 15 claims, 500 acres, fractional interests in 94 claims additional, also a 32-acre mill site, an 80-acre town site, a water-power plant at Boundary falls and a 1,000-ton smelter. Mining lands are in 4 groups, in the Phoenix, Deadwood, Wellington and Summit camps. Country rocks are limestone and greenstone, orebodies occurring largely as replacements in greenstone. These deposits are all more or less developed, of about 25' average width, a generally N.-S. strike and average dip of about 40°. The ores are low in average grade and the mines, though showing large orebodies, have a comparatively small amount of ground blocked out.

The mines at Phoenix, 366 acres, include the Brooklyn, Idaho, Rawhide, Stemwinder, Montezuma and Standard mines.

The Brooklyn mine, which was for years the principal producer of the company, has a 430' main shaft, with a steam hoist and about 8,000' of workings, showing a 40' vein, estimated to average 1.43% copper, 25 cts. silver and \$1.32 gold per ton. The orebody was relatively high-grade, but is faulted or cut off by a cross fracture and not recovered beyond it.

The Idaho mine, connected with the Brooklyn on the 250' level, is developed by tunnel and shaft, latter having an electric hoist.

The Stemwinder mine, opened on a vein parallel with and about 1,000' east of the Brooklyn, has a 400' shaft, with about one-half mile of workings. Ore averages about 1.4% copper, 25 cts. silver and \$1 gold per ton.

The Rawhide mine adjoins the Gold Drop mine of the Granby. The property was thoroughly prospected by diamond drilling in 1913-14 and shipped ore averaging 1% copper, .27 oz. silver and 80 cts. gold per ton.

Development: by a 180' shaft, 6 tunnels and various open cuts; 1,700' of drifts and crosscuts, with 2,008' of raises, besides enlargement of former openings, was done in 1913-14 and 500' of diamond-drilling exploration. **Production:** 1913-14, 217,386 tons. Remaining available ore calculated to be 20,000 tons March 3, 1914, provided the mine does not cave, which is likely to occur at any time.

The Montezuma and Standard claims, but slightly developed, show low-grade ores similar to those of the other mines of the Phoenix camp.

The Deadwood group, 110 acres, includes the Sunset, Morrison, Crown Silver, Little Buffalo and C. O. D. mines.

The Sunset mine has shafts of 200' and 412', and large opencast workings. The orebody is valuable chiefly for flux as it carries excess of iron, silica and lime, with only small copper, silver and gold values. Reserves of positive and possible ore estimated at 80,000 tons.

The Crown Silver mine adjoins and is practically a part of the Sunset. Development is by a 265' shaft and an 880' tunnel.

The Morrison mine has a 364' shaft with 4,300' of tunnels, showing ore averaging about 0.6% copper, 1.5 oz. silver and up to \$4 gold per ton. Equipment includes a 110-h. p. steam plant with a 7x9" hoist and 5-drill compressor.

The Athelstan or Wellington group includes the Athelstan and Jackpot mines, 34 acres, showing a large outcrop of oxidized ore carrying very low values in copper, about 1 oz. silver and up to \$7.50 gold per ton, but expected to carry somewhat better copper values below the oxidized zone. The Jackpot was a considerable producer 1910, but was abandoned 1912. The

Athelstan mine produced 6,388 tons in the year ending March 31, 1912, but mine was shut down Dec., 1911, as vein is narrow and prospects for more ore are unpromising.

The Summit group includes a one-half interest in the Lancashire mine, having a vein carrying silver ore, and a three-fourths interest in the Mountain Rose mine. The Mountain Rose, developed by 2 tunnels, has a vein about 15' wide, carrying pyritic ore, low in silica, with small gold and silver values for fluxing purposes.

Equipment at the Brooklyn mine at Phoenix includes electric hoist and a 25-drill Canadian-Rand air compressor, driven by a 450-h. p. Canadian Westinghouse electric motor.

Ore was transported 4 to 25 miles by rail from the various mines to the smelter, at a freight rate of 17 cts. for Deadwood ore and 30 cts per ton on ore from the mines of the Phoenix and Summit camps.

The 1,500-ton smelter, 4 miles from Greenwood, is now idle. Described Vol. X, Copper Handbook.

Production:

Fiscal Year	Ore Tons	Copper Lbs.	Silver Oz.	Gold Oz.	—Rec'd per—	
					Lbs. Copper	Oz. Silver
1912-13.....	294,300	7,304,713	79,450	10,862	16.65c	61.74c
1913-14.....	210,394	4,565,402	57,613	8,252	12.22c	55.99c

Property is a low-grade deposit, workable when the price of copper is high. Its future depends upon the Canadian Copper Corp., which controls it through the British Columbia Copper Co.

NEW DOMINION MINES CO.

ARIZONA

Globe, Gila Co., Ariz. Inc. 1905. Cap., \$1,000,000. Lands: about a half mile north of the Gibson mine, are said to show a 12" vein in schist, opened by 240' shaft. After 2 years of work, this vein, carrying chalcopryite ore averaging 23% copper, was struck in a crosscut from the tunnel face. Idle. No recent returns.

NEW ELY CENTRAL COPPER CO.

NEVADA

Main office: 907 Market St., Wilmington, Del. Business office: 16 State St., Boston, Mass. Officers: John G. Gray, v. p.; Jonathan H. Brown, sec.; H. E. Lodge, treas., with J. Pearce Cann, directors. Inc. Feb. 19, 1912, in Delaware. Cap., \$8,000,000; reduced to \$2,500,000; shares \$5 par; fully paid, nonassessable; issued, 500,000 shares. Bonds authorized, \$500,000, 6%; \$175,000 issued. American Trust Co., registrar; Federal Trust Co., transfer agent. Annual meeting, second Monday in February.

This corporation was reorganized from the wreck of the Ely Central Copper Co. by about 1,600 of its stockholders. All the stock and bonds that have been issued are to the stockholders of the corporation which participated in the reorganization plan, except stock of the par value of \$5,550,000 which was issued in trust for treasury purposes.

At a special meeting of the stockholders held Dec. 20, 1913, it was voted to deed to the Consolidated Coppermines Co. the entire property of the New Ely Co., and in pursuance of this vote a deed was executed and delivered, the Cons. Coppermines Co. thereupon taking possession of all the property of the former company. The stock and bondholders deposited for exchange 464,182 shares of the 500,000 outstanding shares and \$164,000 of the \$175,000 outstanding bonds up to Dec. 31, 1915. The New Ely Central Copper Co. will be dissolved when all stock and bonds have been exchanged.

NEW EMPIRE GOLDFIELD MINES CO.

NEVADA

Goldfield, Nev. Officers: C. D. Terwilliger, pres.; Chas. Wittenberg, v. p.; Fred J. Amigo, sec.-mgr.; F. M. Manson, treas., with E. Marks, directors. Inc. 1915, in Nevada. Cap., \$1,500,000; shares \$1 par.

Property: 3 claims and a fraction, 50 acres, adjoining the Lone Star on the E. and Commonwealth property on the N. at Goldfield, formerly owned by the Empire Gold Mining Co. **Development:** by an old 150' shaft and 150' crosscut said to have disclosed a 16" streak of \$20 ore. Shaft is being sunk to 500' to reach the latite-shale contact. **Equipment:** includes electric power and 40-h. p. electric hoist.

NEW ENGLAND & CLIFTON COPPER CO.

ARIZONA

Sold to Phelps-Dodge interests Described in Copper Handbook, Vol. XI.

NEW ENGLAND EXPLORATION CO. (THE)

COLORADO

Office: 14 Ashburton Place, Boston, Mass. Controls the Smuggler Union Mining Co., Colo., which see, and has in the past conducted mine exploration and development work in Mexico and several of the western States. Company is controlled by Calumet & Hecla interests.

Officers: T. L. Livermore, pres.; Bulkeley Wells, v. p.; with R. L. Agassiz, H. L. Higginson, Q. A. Shaw, directors. T. E. Sherwin, treas.

Inc. 1898, in Maine. **Cap.,** \$2,000,000; shares \$100 par; outstanding, \$1,875,700. Annual meeting first Wednesday in June, at Portland, Me. Stock transferred at company's office.

NEW ENGLAND GOLD & COPPER MINING CO.

UTAH

Office: 67 Milk St., Boston, Mass. Mine office: Bingham Canyon, Salt Lake Co., Utah. **Officers:** Jas. S. Williams, pres.; E. E. Abercrombie, v. p. and managing director; Geo. F. Bradstreet, sec.-treas.; preceding, with Woodford Yerxa, Francis H. Dowse and Geo. Bancroft, directors. **Inc.** June, 1899, in Colorado. **Cap.,** \$2,000,000; shares \$10 par; issued, \$1,294,467 **Bonds:** \$500,000 authorized, at 6%; issued, \$390,000. Paid a 10% stock dividend, Oct., 1908. Federal Trust Co., Boston, registrar; Geo. F. Bradstreet & Co., transfer agents. Annual meeting, first Monday in June.

Property: the Bingham group of 9 fractional claims, 18 acres, in the Bingham, or West Mountain district, Utah, lying south of the Boston Consolidated, next to the Last Chance group and near the Utah Metals property. The company also owns a group of 4 claims at Goldfield, Nev.

The old Nast mine of the Bingham group shows porphyritic country rock carrying 3 fissure veins, of 30" average width, opened by the 1,600' Nast tunnel and the 1,670' Benton tunnel, both in ore, and 2 shafts, 1 of 159', with a total of about 6,000' of workings. Veins are said to widen at depth and ores are said to give average assays of 30% lead, 10% zinc, 15 oz. silver and \$4.50 gold per ton, with small and variable percentages of copper, some of the monzonite country rock carrying copper values that may prove workable at some later date.

Equipment: includes a steam plant with 2 hoists, 1 of 30-h. p., good for 800' depth. The concentrator has a 4x12" Sturtevant crusher, 2 rolls, 2 Hartz jigs and 1 Wilfley table, operated by commercial electric current.

Production: was 2,108 tons of lead concentrates and 165 tons of copper ore, 1907, but property was closed down, late 1907, and mine was worked on only a small scale, 1908 to 1910, securing 936 tons of ore, giving net smelter returns of \$36,986. In 1910, the Utah Metal Mining Co. sued this corporation for \$700,000 damages, alleging trespass and illegal ore-extraction. A survey proved that company was not guilty of trespassing and suit was canceled.

In 1911 the mine produced milling silver-lead ore, yielding 150 tons high-grade concentrates per month, netting the company \$25,874. In 1913 output was reduced to \$8,360 and the mine was shut down by reason of western creditors forcing their claims. The Trust Co. holding mortgage securing the bonds, foreclosed same, Dec., 1915, at request of the bond-

holders and a reorganization of the company is contemplated. Interest, amounting to \$46,800 on bonds has not been paid since Feb. 1, 1914.

NEW ENGLAND MINING CO.**MASSACHUSETTS**

Idle. Office: 35 School St., Greenfield, Mass. Mine office: Charlemont, Franklin Co., Mass. Othello A. Fay, pres.; E. Forrest Sweet, sec.; Capt. Geo. H. Davenport, treas. and gen. mgr., at last accounts. Inc. 1902. Cap., \$500,000; shares \$5 par.

Owens about 1,000 acres 2 miles west of the Davis pyrite mine. Vein traceable 700', is approximately vertical, conforming closely in dip and strike with the Savoy schist in which it occurs. Deposit apparently is a fahlband, lacking well-defined walls, ore occurring scattered through 15 to 20' of the schist, with 6 to 12" of quartz, well mineralized, on the south wall, and a heavy impregnation of chalcopryite, 1 to 2' wide, on the north wall. Property has been partly stripped, and vein trenched across.

NEW ENGLAND ZINC CORPORATION.**MISSOURI**

Joplin, Mo. Inc. in Connecticut. Cap., \$100,000. Operates a lease on 160 acres of mineral land owned by C. W. Edwards in S. 23-24, T. 28, R. 34, Joplin, Jasper Co., Mo. Developed by 3 shafts to depth of 150'. Equipment: includes 150-ton concentrating plant making a mill recovery of from 20-25% zinc; pumps, air drills, steam hoists, and compressor. Employs 11 men. Company also reported operating a lease on the Leckie land at Klondike, Mo. Output is lead-zinc concentrate.

NEW ERA MINES.**COLORADO**

Office: 31 State St., Boston, Mass. Mine office: Idaho Springs, Clear Creek Co., Colo. Officers: Benj. A. Howland, pres.; E. M. Sanger, sec.; Robt. H. McLaughlin, treas.; W. A. Gilman, mgr. Inc. Nov. 8, 1915, in Maine. Cap., \$500,000; shares \$1 par; 100,000 shares held in trust for treasury. Stock listed on Boston Curb. Paul Revere Trust Co., Boston, transfer agents. Annual meeting second Monday in January.

Property: 15 claims, 3 patented, about 75 acres, and a millsite, 5½ miles from Idaho Springs, formerly owned by the Trail Mining Co., and worked during 1913-14 by the Calumet-Corbin Mining Co.

Ore: consists of a mixture of coarse galena, chalcopryite and pyrite, containing gold-silver values, with a quartz gangue and much siderite. Gray copper is abundant, while zinc blende is occasionally found. Five veins have been developed, with main workings on the Great Western and New Era veins. Selected smelting ore averages from \$50-\$60 per ton, mainly in gold and lead values.

Mine is said to have the extension of the Lamartine and Oneida veins, and is credited with a lead and gold-silver production of 2,361,000 lbs. and \$650,000 respectively. Developed by 4,000' of tunnels, crosscuts and shafts. Benj. F. Hall in 1914 estimated 64,330 tons of ore in sight, valued at \$415,382, based on an 85% extraction. Property reported on by Forbes Rickard in 1914.

Equipment: includes 15-h. p. electric hoist and a 50-ton 10-stamp mill. Shipments: from Nov., 1910-1913, amounted to 4,219 tons of net value \$84,558, or \$20 per ton. About 40 men employed in 1916.

NEW GOLD KING MINES.**COLORADO**

See Gold King Leasing Co.

NEW GOLDEN WEST MINES CO.**SOUTH DAKOTA**

Mine near Rochford, Pennington Co., S. D. Officers: Otto E. Freund, pres.; S. T. White, v. p.; Geo. H. Williams, v. p.-gen. mgr.; Wm. Matthews, sec.; E. M. Pridmore, treas. Inc. Oct., 1915, in South Dakota, as a reorganization of the Golden West Mining Co. Cap., \$2,000,000, in \$1,000,000 7% preferred and \$1,000,000 common stock.

Property: in Black Hills district, near Rochford, is to be developed and fully equipped, as soon as necessary funds are available.

NEW GOLDFIELD SIERRA MINING CO. NEVADA

Office: 107 Boston Bldg., Denver. **Inc.** 1915 in Nevada. **Cap.**, \$1,500,000; shares \$1 par; assessable. Is a reorganization of the Goldfield Sierra Mining Co.; 750,578 shares of the old company were exchanged for stock in the new company.

Property: 3 patented claims, about 42 acres, at Goldfield, Esmeralda Co., Nev. Active development planned by management.

NEW GOLDFIELD SIMMERONE MINING CO. NEVADA

Harry C. Cutler, Reno, gen. mgr.; F. B. Knickerbocker, supt. Inc. 1915 in Nevada. Stock listed on San Francisco Exchange.

Property: the Simmerone Fraction at Goldfield, Esmeralda Co., and a 3-year lease and bond on the adjoining Blue Bell group, worked through the Simmerone workings. The Simmerone, acquired 1914 at sheriff's sale, is developed to 250'. A raise from the 100' level disclosed an 18" quartz vein in July, 1915, said to have assayed from \$42-\$117 gold per ton. Plans developing to the 500' level in 1916.

NEW HAVEN COPPER CO. CONNECTICUT

Property at Seymour, Conn., shows a copper-bearing band of hornblende schist, carrying chalcopyrite with some bornite. Operations have been carried on intermittently for several years, the last work being done in Oct., 1911. Company has power plant on the border of the Naugatuck river.

NEW IDRIA QUICKSILVER MINING CO. CALIFORNIA

Office: 141 Milk St., Boston, Mass. **Officers:** Edw. H. Mason, pres.; W. B. Buckminster, v. p., treas., gen. mgr.; H. C. Buckminster, sec.-asst. treas.; with Francis Flint, S. Harwood, Andrew Adie, K. Hass, Robt. B. Stern, I. H. Locke and Jas. E. Simpson, directors; H. W. Gould, supt. at Jamestown, Cal.

Inc. 1896 in Wyoming. **Cap.**, \$500,000; shares \$5 par; all issued. Stock listed on Boston Curb. American Trust Co., Boston, registrar. Annual meeting, third Wednesday in January, at Cheyenne, Wyo. Company has been a regular dividend payer since 1897, with total disbursements to date of \$19.60 per share.

Comparative Balance Sheet:

Assets:	Plant	Deprec.	Supplies	Cash	Quicksilver	Total
Dec. 31, 1915....	\$234,979	\$254,209	\$19,482	\$24,448	\$98,850	\$631,970
Dec. 31, 1914....	258,170	231,019	20,651	6,823	73,200	589,863
Liabilities:	Capital Stock	Unp'd Drafts	Profit & Loss	Total		
Dec. 31, 1915.....	\$500,000	\$33,078	\$98,892	\$631,970		
Dec. 31, 1914.....	500,000	.....	89,863	589,863		

Comparative Income Account: year ending Dec. 31—

	1915	1914
Net proceeds sales quicksilver.....	\$405,991	\$223,405
Quicksilver on hand.....	98,850	73,200
Total	504,841	296,605
Decrease in supplies.....	1,168	3,206
Balance	503,672	293,399
Interest	2,315	1,962
Total	505,987	295,361
Total expenses	346,959	340,371
Net profits for year.....	159,028	*45,010
Dividends	150,000	10,000

* Loss.

Property: the New Idria and San Carlos mines at Jamestown, San Benito Co., Calif. **Development:** in 1915 consisted of 10,842' of drifts and tunnels, mainly on the upper levels of the New Idria. New work in 1916 to be concentrated on the San Carlos.

The 60-ton fine-ore and the two 80-ton coarse-ore furnaces were in operation throughout 1915.

Operating results:		Flasks	Net	Cost per	Average
		Quicksilver	Earnings	Flask	Price
1915.....		6,250	.....	.....	.....
1914.....		6,550	Loss \$45,010	\$52	\$48.31
1913.....		9,700	65,012	30	39.54
1912.....		9,600	73,763	31.60	42.46
1911.....		9,750	136,809	26.50	46.54
1910.....		10,800	186,939	26	47.06
1909.....		8,900	109,639	27.50	46.30
1908.....		9,600	147,289	25.50	44.84
1907.....		7,675	89,650	25.50	41.50

Production in 1916 up to April, 1916, had been increased to 800 flasks per month. Employs 200 men.

NEW JERSEY METAL REFINING WORKS, LTD. NEW JERSEY

Elizabeth, N. J. See Mountain Copper Co., Ltd.

NEW JERSEY MINES CO.

NEVADA

Offices: 628 Hudson St., Hoboken, N. J., and Goldfield, Nev. **Officers:** Henry V. Broeser, pres.; L. A. Opdyke, v. p.; J. H. Stegman, treas.; Geo. H. Snyder, sec., Jersey City; above, with 14 others, form the directorate; Harry Ernest, mgr.

Inc. Jan. 15, 1912, in Nev. **Cap.**, \$1,250,000; shares \$1 par; outstanding, 1,010,850 shares; assessable 1c per share per year. Registrar & Transfer Co., New York, registrar. Listed on San Francisco Exchange and New York Curb as a prospect.

Treasurer's report for year ending March 31, 1916, shows receipts of \$14,314, which includes assessments, \$7,901, and 4 months' note, \$5,000. Disbursements amounted to \$9,207, leaving balance on hand, \$5,107.

Property: 5 claims, 3 patented, 53 acres, several miles N. E. of Goldfield, said to show gold-silver ore. **Development:** 507' shaft, with work done in 1915 on the 330', 400' and 500' levels. President's report for year ending April, 1916, states: "During the year our property has been developed to the stage of a preferred prospect; that is, we have everything toward a producing mine, minus the shoot or body. Values have been with us for the past year, and some marketable ore has been saved."

NEW JERSEY ZINC CO.

UNITED STATES

Offices: 810 Broad St., Newark, N. J.; 55 Wall St., New York. **Officers:** Edgar Palmer, pres.; A. P. Cobb, v. p.; J. E. Hayes, v. p. and gen. mgr.; C. W. Sexton, sec.; H. S. Wardner, treas.; with E. Palmer, C. W. Cox, E. S. Marston, J. J. Riker, W. P. Hardenbergh, August Heckscher, T. D. Jones, E. M. Squier and S. P. Wetherill, directors; H. G. Clopper, gen. sales mgr.; E. V. Peters, asst. gen. sales mgr.; A. H. Peck, sales mgr.; H. Hardenbergh, gen. purch. agt.; W. J. Lee, Jr., purch. agt.

Inc. Oct. 30, 1880, in New Jersey as the New Jersey Zinc & Iron Co. Name changed 1897 to present title and capital increased from \$3,000,000 to \$10,000,000. Stock increased to \$35,000,000 by payment of stock dividend of 250% July 7, 1915. **Cap.**, 350,000 shares; \$100 par; all outstanding. Transfer office: 55 Wall St., New York.

Bonded debt: the unretired balance of bonds authorized Oct. 1, 1901, due Oct. 1, 1926, First Gold, 4%. Original authorized issue, \$10,000,000, of

which \$4,000,000 were issued, the balance to be issued only for the purchase of new property, stock of new corporations, the erection of new plants, etc. Of the \$6,000,000 of unissued bonds, \$2,800,000 had been retired up to Jan. 1, 1916, leaving a present authorized amount \$7,200,000. The mortgage provides for the cancellation of \$200,000 of unissued bonds yearly on Oct. 1, beginning 1902, the authorized amount of bonds to be reduced accordingly, and after all such unissued bonds have been canceled, the company is required to pay to the trustee, annually, on Oct. 1, \$200,000 as a sinking fund for the purchase or redemption of outstanding bonds at not exceeding par and interest.

Dividends: paid regularly at rate of 20% per annum, and in addition in recent years extra dividends have been paid as follows: Jan., 1907, 5%; Jan. 1, 1908, 1909, 1910 and 1911, 10% each; Jan., July and Dec., 1912, 10% each; Jan., July and Oct., 1913, 10% each; Jan. and July, 1914, 10% each; Oct. and Dec., 1914, 5% each; Jan., 1915, 10%; July 15, 1915, 30% and 250% stock. In the first six months of 1916 a total of \$13,300,000 was paid in six dividends (38%), partly earned in 1915.

Statement, first quarter, 1916:

Net profits	\$8,561,385
Deduct:	
Bond interest	\$40,000
Res. to retire bonds.....	75,000 115,000
Surplus for quarter.....	8,446,385
Dividends paid	6,650,000
Balance	1,796,385

Property: the famous zinc mines at Franklin Furnace, N. J. The different original holdings were consolidated as a result of litigation and to effect better mine operations. It was upon the economies due to a single control of the great orebody and to the discovery by J. P. Westmill of a process for treating the manganese-zinc ores that the fortunes of the company were built. For geology of mine see Lindgren's "Ore Deposits," p. 709; also U. S. G. S. Geologic Folio, No. 161.

Company owns a controlling interest in the New Jersey Zinc Co. of Pa., with operating plants at Palmerton and Freemansburgh, Pa.; also 8 operating mines near Benton, Wisc. (Mineral Point Zinc Co.); also many other producing properties and reduction works, including the Empire Zinc Co. of Mo., not operating any property at present, the Empire Zinc Co. of Colo.

The Franklin mine in New Jersey produces the high-grade ore from which the White Seal, Green Seal, Red Seal, and Horsehead brands of spelter are made. The reserves are unofficially reported to be in blocked-out ore, sufficient for a thirty-year supply at the present rate. Custom ores are also bought for treatment. The products include oxide of zinc, spelter, spiegeleisen, sulphuric acid and lithophone.

Production: no reports are published, but it is known that the company has a yearly smelting capacity of 160,000,000 to 170,000,000 lbs. of spelter, and the 1916 production is estimated at 250,000,000 lbs. of zinc, besides sulphuric acid, zinc oxide, lithophone, pig iron and ink.

NEW KEYSTONE COPPER CO.

Company dissolved and now being liquidated. Property sold in 1915 to the Inspiration Cons. Mining Co. on basis of 9 shares New Keystone for 1 share Inspiration. Fully described in Vol. XI, Copper Handbook.

NEW MARIAN CONSOLIDATED MINING CO.

COLORADO

Office; 1408 Lord's Court, New York. Controlled through ownership

of 82.8%, or 41,404 shares out of 50,000 issued shares by Iron Silver Mining Co.

Property: 3 patented claims, the Devlin, R. A. M. and Cyclops, about 23 acres, adjoining the Proserpine and Cumberland groups of the Iron Silver Co., on the E. and N. Reported to have been a considerable producer of silver-bearing iron and lead sulphide ores as far back as 1890. The ore-bearing formation occurs over 1,000' below the surface and contains considerable water. The Iron Silver Co. plans unwatering the old workings and systematic development of the ground in 1916.

NEW MESCAL MINING CO.

ARIZONA

Jerome, Ariz. Is a reorganization 1914 of the Mescal Mining Co. L. C. Cherry, pres., State Bank Bldg., Little Rock, Ark. Inc. 1914, in Ariz. Cap., \$1,500,000; shares \$1 par.

Property: Owen & Allison group, 3 patented claims, a mile south of Jerome in Verde district, showing fissure veins in slate and diorite, one 3' average width, traceable 1,600' and workings show 1-2% copper with trace of gold.

Development: 1,200' of workings, with 900' tunnel and a blind shaft from 700' tunnel level.

Equipment: electric with compressor, etc. Property idle for several years past but prospects are good for reopening property 1916.

NEW MONARCH MINING CO.

COLORADO

Office: c/o J. C. Kortz, pres. Cuyahoga Bldg., Cleveland, O. Mine office: Leadville, Lake Co., Colo. Frank Fuller, supt., at last accounts.

Property: the New Monarch and Cleveland mines, carrying lead and zinc sulphides. Developed by shafts and crosscuts. A crosscut to the N. E. is being driven in virgin ground at the bottom of the Monarch shaft. **Equipment:** includes a steam plant, compressor, etc. Operated by lessees since 1914 and producing about 800 tons of ore per month, averaging \$20 in gold, silver, lead and zinc.

NEW PLANET COPPER MINING CO.

ARIZONA

Office: 61 Broadway, New York. **Officers:** Alex. Rae, pres.; Geo. S. Barton, v. p.; Herman Cook, sec.-treas., with Julius H. Susmann, S. S. Rosenstamm, Geo. Crompton, Jas. H. Satterfield and T. M. Lloyd, directors. Inc. July 13, 1909, in Delaware. Cap., \$4,000,000; shares \$5 par; non-assessable; issued 342,905 shares. Is a reconstruction of the Planet Copper Mining Co., stock of which was retired by exchange for 240,000 shares of New Planet stock. Farmers Loan & Trust Co., New York, registrar. Annual meeting, third Wednesday in June.

Property: the Planet mine with 39 unpatented claims, 800 acres, in the Harcuvar district, on the southern bank of the Bill Williams Fork river, 21½ miles from Bouse on the Santa Fe cutoff and about 6 miles from Swansea. **Geology:** copper occurs mainly as oxidized ore, though nuclear particles of sulphides mixed with specular hematite are seen in the deeper workings. The orebodies are replacements in limestone, the ore bed developed at the Planet shaft lying on the contact between this rock and underlying gneiss. This deposit is 3 to 20' thick and dips 15° south. Much high-grade ore has been shipped from other parts of the property in past years; it was found as crusts, or shells, about impure hematite in limestone, especially near bodies of amphibolic rock now altered to black gneiss. A deep-seated mass of granite is the not improbable source of mineralization, although later igneous activity is shown in a volcanic plug not far distant and in the basalt flows which cover the surrounding country. The geology is very fully discussed in U. S. G. S. Bul. 451, p. 47, written by Howland Bancroft.

The ore deposits show a heavy iron gossan, mainly of hematite, apparently of workable grade, and it has been estimated that the property shows about 500,000 tons of 60% iron ore. The main orebody developed in the Planet shaft is about 300' in width, has a thickness of 4' 3" and an average copper content of 5.9%, according to a report by A. H. Kellar.

Development: aside from open cut and tunnels, is mainly at the Planet shaft, an incline sunk on the ore bed at an average angle of 15° to a depth of 733'. There are drifts, crosscuts, etc., amounting to 2,500'. A vertical 350' shaft connects with these workings and gives ventilation.

The old workings include 8 tunnels, longest 225' and 12 vertical pits and shafts, of 25 to 325' depth. About \$150,000 was expended under the management of the General Development Co. in sinking the vertical shaft and putting down a number of churn-drill holes, 3 holes showing low-grade sulphide ore below the old workings.

The Planet mine is probably the oldest copper mine in Arizona. It was opened in 1864, worked in a small way until 1874, and reopened in 1884 when a 36" circular blast furnace was erected. The property was taken over 1902, by the predecessor of the present company. The mine produced, 1864-74, upwards of \$500,000 worth of high-grade ore, ranging from 15 to 40% in copper, which was presumably shipped down the Colorado river to Guaymas, and thence to Swansea, for reduction.

Equipment: includes a 75-h. p. gasoline plant, with two hoists and a 5-drill air compressor. Buildings include a carpenter shop, smithy, 2 shaft houses and 3 dwellings.

Property considered as still unproven, churn drilling being too limited to determine existence, or nonexistence of large orebodies, and the greater part of the area is unexplored. Property reported under lease to Northwestern Leasing & Development Co. in 1916.

NEW PROVIDENCE GOLD MINING CO.

CALIFORNIA

Office: 2041 Emerson St., Berkeley, Calif. J. F. Chapman, supt. **Property:** 5 claims, 90 acres, including the Providence and New Providence, about 2½ miles S. E. of Tuolumne, Tuolumne Co., Calif., said to show 2 parallel veins, 5' wide, in black Calaveras slate, running N. 8° E., with dip 45° E. Ore is gold, with galena and 2% pyrite.

Development: by 1,300' shaft with levels every 100'. **Equipment:** includes 10-stamp mill. Product is a concentrate said to run better than \$90 per ton. About 12 men employed.

NEW PURITAN MINING CO.

SOUTH DAKOTA

Galena, S. D. **Officers:** Wm. J. McGoffin, pres.-mgr.; Dr. Fred M. Ganty, v. p.; Judge John R. Russell, sec.; Chas. J. Searle, treas., with J. R. Richardson, directors. **Inc.** 1915, as a reorganization of the Puritan Mining Co. **Cap.**, \$1,500,000; shares \$1 par; non-assessable; 200,000 shares issued. Annual meeting in June.

Property: 60 patented acres, in White Wood mining district, Lawrence Co., S. D., shows an orebody, 28' thick in quartzite with gold-silver-lead values, said to assay \$3.60 per ton.

Developed by several shafts to depth of 165'. **Equipment:** includes steam hoist, 6-drill compressor, No. 5 Cameron pump, and a 250-ton concentrating mill with cyanide unit. Property has been idle for 3 years owing to litigation but management plans resuming operations in 1916.

NEW QUINCY MINING CO.

UTAH

Office: 202 Atlas Blk., Salt Lake City. Mine office: Park City, Summit Co., Utah. **Officers:** W. Mont Ferry, pres.; W. R. Hutchinson, v. p.; A. L. Thomas, Jr., sec., with W. S. McCornick, F. J. Hagenbarth, Frank

Cook and Herman Bamberger, directors. F. Sommer Schmidt, con-
enr. Peter Harrington, supt.

Inc. June, 1915. Is a reorganization of the Thompson Quincy Mining
Co. Cap., \$125,000; shares 10 cts. par; assessable; with assessments not to
exceed 3 cts. during the first year. Exchange of stock made on a share-for-
share basis, calling for distribution of 1,045,035 shares. Stock is listed on
Salt Lake Exchange. The New Quincy Co. assumed the obligations of the
Thompson Quincy.

The annual report for 1915 shows: receipts from assessment No. 1,
\$10,509; miscellaneous sources, \$519. Disbursements, \$8,767; cash on hand
Jan. 1, 1916, \$2,260; indebtedness of company on Dec. 31, 1915, was \$44-
335; circulation of capital stock, issued to stockholders, \$1,041,174; treasury
stock, \$208,826; total, \$1,250,000.

Property: 140 patented acres in Park City district, with rights of way
and easements from the Daly West; Daly and Ontario companies. The
claims supposedly carry the extension of the Quincy orebody of the Daly
West mine. Developed by a 625' two-compartment vertical shaft, a cross-
cut tunnel through the Little Bell mine, cutting a contact vein, said to
carry ore assaying up to 20% lead, 160 oz. silver and \$2 gold per ton, and
through the Ontario drain tunnel No. 2, which was extended to the Quincy
mine by the Ontario company. Work in 1913 under the former manage-
ment was mainly from the 900' level of the Daly and Ontario companies
and a shaft raised from the 900' Daly West level to the contact was com-
pleted.

In 1915, a 293' crosscut was run N. 31° W. across the Plumed Knight
ground. This crosscut is 84' above the 900' level, Daly West, and starts
from the Talbot raise; a raise was also driven on fissure No. 4 on a 43°
incline a distance of 250', giving a vertical height of 160'. The crosscut
intersected 9 fissures, all of which showed some slight signs of mineraliza-
tion.

The company's engineer advises as necessary for the proving of the
property further drifting west on the so-called Thompson-Quincy work-
ings, crosscutting south from the Talbot fissure another 400' until the
Thompson-Quincy fissure is intersected at a point about 700' west of the
old workings, thus opening up new territory; also crosscutting south on the
intermediate level to intersect other fissures known to exist.

NEW RELIANCE GOLD MINING CO.

SOUTH DAKOTA

Office: 206 South 4th St., Minneapolis, Minn. **Mine office:** Trojan,
Lawrence Co., S. D. F. C. Bowman, gen. mgr.

Property: the Reliance mine, at Trojan, shows gold ore in quartzite
formation. Orebody said to have an average width of 8' over a distance
of 1,000' and to assay \$4 per ton. **Equipment:** includes a 30-stamp mill,
treating slime by the continuous decantation, countercurrent system, drills
and air compressor. During fiscal year ending April, 1915, mill treated
23,088 tons of ore, an average of 63.1 tons per day. Bullion recovery re-
ported as \$3.12 per ton, or 91.8%.

NEW STATE MINING & REDUCTION CO.

ARIZONA

Office: 316 New England Bldg., Topeka, Kan. **Property:** near Amado-
ville, Santa Cruz Co., Ariz., 26 claims, showing veins said to carry lead-
zinc-copper ores, with gold and silver values.

Development: by 150' shaft with 950' tunnel. **Equipment:** includes
gasoline hoist and Ingersoll compressor. Was planning to erect a 100-ton
dry concentrator to treat low-grade ores, at last accounts.

NEW STOCKTON MINING CO.

UTAH

Office: Mankato, S. D. **Mine at Stockton, Utah.** F. M. Currier, pres.;

R. A. Dunham, v. p.; W. Z. Harrison, sec.-treas., 1172 E. 7th St. S., Salt Lake City. W. A. Wilson, cons. engr., 406 Dooly Block, Salt Lake City; C. B. Kennedy, W. D. Kimball and M. M. Ferguson, directors. Inc. in South Dakota by A. J. Eagle to operate a lease and bond on the Ben Harrison mine and sold to Wm. Mills and R. A. Campbell; control passed July 22, 1916, to present management.

Property: the old Ben Harrison mine at Stockton showing a vein with one to two feet of ore, which averages 10% to 45% lead, 5 to 40 oz. silver and 60c to \$7 gold per ton.

Development: by shaft with main work on 200' and 500' levels.

Production: \$70,000 in 1913-1914. As shipped the ore has averaged \$12 to \$15 per ton with silver-gold-lead values.

NEW UTAH BINGHAM MINING CO.

UTAH

Office: Suite 816, 30 Broad St., New York. Mine office: Bingham Canyon, Utah. **Officers:** Dr. F. S. Mason, pres.; C. W. Caffrey, sec.; H. A. Bellows, treas.; preceding with D. T. Stuart, J. W. Macrae, F. Harold Brown and H. K. Bellows, directors; P. M. McCree, supt.

Inc. April, 1912, in Maine. **Cap.**, \$1,375,000; shares \$2.50 par; \$2.45 paid; 195,917 shares outstanding. **Bonds:** authorized, \$100,000, 5-year, 7%, issued Sept. 23, 1911, and payable Sept. 23, 1916; \$14,000 outstanding, \$23,000 cancelled. Security Transfer & Registrar Co., New York, transfer agent. Stock is listed on New York Curb and London Stock Exchange. Annual meeting 3rd Wednesday in June. Company acquired property and assets of the Utah Bingham Mining Co. for \$1,182,550, giving the shareholders one new share, \$2.15 paid, for each \$5 share held.

Property: 20 claims, 19 patented, 149 acres adjoining the Telegraph mine of the United States Mining Co., in Bingham Canyon, Utah. Claims cover about 3,000' along the footwall portion of the Jordan limestone ore-bearing zone of Bingham. The large orebodies of this district are found in fissures within the limestone, or along limestone contacts, and the Jordan belt is the most productive of the 3 belts known in the camp; 16 fissure veins have been opened. Before the company acquired the property a number of promising veins carrying ore in the porphyry, but too narrow to be valuable, had been exposed. These veins pass into the limestone and are expected to have large orebodies at the contact. Ore is mainly silver-lead.

Development: consists of about 15,000' of work, mainly by 3 tunnels. In the Turngren tunnel, over 1,300' long, 8 veins from 1 to 4' thick have been cut, 7 showing ore and 2 of them worked. These two veins run north, are parallel and contain high-grade ore in the Spanish mine and along the outcrop in the company's ground. The Harrison tunnel, 600' long, is in quartzite and will crosscut the Rough and Ready veins, which are opened by 3 other tunnels higher up the mountain, all showing ore. Work on these veins has been discontinued and all work concentrated on the Giant Chief.

The Giant Chief vein is a fault fissure, developed by a 200' shaft from which further exploration is being conducted on the 150' level; 600' of drifts and crosscuts driven in 1915 from this point have at 800' depth in the sulphide zone cut 7 fissures encountered in the higher workings. These veins carry oxidized mineral matter, surrounded by a soft lime, and show porphyry mineralized with iron pyrites. A small vein of carbonate ore, running nearly 50% lead, has been opened; the Bonanza tunnel is being driven 400' to cut this vein where it crosses the contact, 150' deeper. Total development work in 1915 was 2,618' and to April, 1916, about 150' more was done, mainly on the Giant Chief,

Equipment: includes compressor, 180-h. p. electric plant, taking current from the Utah Power & Light Co., hoist and all necessary buildings. **Production:** recent shipments said to have assayed 17.33 oz. silver, 1.49% copper, 23.5% lead, 22.8% iron, 10.7% silica. 73 tons of ore treated in 1915 returned \$1,600.

Property is well adapted for tunnel work, has large blocks of virgin ground and is considered promising. Company is an intermittent producer.
NEW YERINGTON COPPER CO. NEVADA

Office: 817 Newhouse Bldg., Salt Lake City, Utah. Mine address: Yerington, Lyon Co., Nev. **Officers:** Chas. N. Strevell, pres.; Joseph E. Caine, v. p.; W. B. Outcalt, sec.; J. H. Paterson, treas., with S. V. Derragh, H. P. Clark, H. C. Edwards and Duncan MacVichie, directors. V. A. Gilles, supt. Inc. Aug., 1911, in Utah. **Cap.**, \$1,000,000; shares \$1 par; assessable, at rate not to exceed 1 ct. for each 90 days. Listed on Salt Lake Stock Exchange. Is a reorganization of the Yerington Copper Co., whose stockholders received 1 share of new for 2 shares of old stock, leaving 570,000 shares in treasury.

Property: 12 claims, 4 miles due east of Yerington, shows porphyritic granite cut by diorite dikes. There are 3 distinct, nearly parallel veins, 50 to 300' apart, following the dike contacts. The oxidized ores extend downward about 100' and are underlaid by enriched glance changing in depth to shoots of chalcopyrite and pyrite.

Development: chiefly on the middle, or Yerington vein by a 450' incline shaft. The 250' level exposes an ore shoot 1 to 3' thick from which shipments have been made intermittently. The east drift shows a soft vein carrying a narrow shoot 3 to 5' thick of chalcopyrite ore in an altered gangue. The west drift shows another shoot of 8% ore. The Marsal 520' tunnel on the same vein encounters another ore shoot at 340', that is 1½ to 3' wide and has 3% ore extending to top of 90' raise. In 1914 company did about 1,350' of development work on the main tunnel and on the 100-300' levels. Shipments thus far have not quite covered expenses. Shipments in 1914 averaged from 9-13% copper.

Equipment: includes a 40-h. p. gasoline hoist, 320-cu. ft. compressor run by a 60-h. p. gasoline engine and a pumping plant jointly owned with the Blue Jay Co. C. B. Grose and associates of Yerington leased the property in 1915. Property regarded as promising.

NEW YORK-ARIZONA GOLD & COPPER CO. ARIZONA

Morenci, Graham Co., Ariz. **Officers:** A. L. York, pres.; J. F. Cleaveland, v. p.; C. E. Tyler, sec.-treas.; John C. Molder, gen. mgr.; J. R. Wester, supt., at last accounts. Inc. April 15, 1907, in Arizona. **Cap.**, \$900,000; shares \$1 par.

Property: 30 claims, unpatented, 600 acres, and a 150-acre mill site, 4 miles west of Morenci, in the Copper Mountain district. Includes the Buzzard Shadow and adjacent groups. Claims show quartzite, shale and limestone cut by porphyry, with contact deposits, having orebodies, more or less developed, said to range from 10" to 4' in width.

Development: by tunnels, 100', 450' and 600' long and the Lillian tunnel, 1,800', claimed to show a vein carrying several ore shoots. There are 5 shafts, including the 260' Argentine shaft, said to show copper sulphides; the 80' Louise shaft, reported to cut an 8" vein showing ore assaying up to 15% copper, 180 oz. silver and \$20 gold per ton, and the 72' Jensen shaft near the Louise. The Buzzard Shadow group, at the eastern end of the property, shows a 2 to 4' vein carrying auriferous and argentiferous copper ore.

Equipment: includes a 15-h. p. Fairbanks-Morse gasoline hoist, 4 Nissen stamps and a tube mill. Does not reply to letters; evidently pursuing a "watchful waiting" policy.

NEW YORK BONANZA MINING CO.

UTAH

Park City, Summit Co., Utah. Reported in Dec., 1915, that a new company had been formed to operate the claims. Old company described in Copper Handbook, Vol. XI.

NEW YORK CONSOLIDATED MINING CO.

MICHIGAN

Charter expired and corporate existence of company being wound up by F. W. Nichols, receiver, Houghton, Mich., in 1915.

NEW YORK & HONDURAS ROSARIO MINING CO.

HONDURAS, C. A.

Office: 17 Battery Place, New York. Mine office: San Juancito, Honduras, C. A. **Officers:** W. S. Valentine, pres.; Sidney Abenheim, v. p.; J. M. De Hart, 2nd v. p.; Ernest Schernikow, treas.; M. F. Soto, sec.; J. Perlman, asst. sec. **Directors:** Sidney Abenheim, H. H. Babcock, Lewis L. Clarke, I. Heidelsheimer, J. C. F. Jacoby, M. F. Soto, Ambrose G. Todd, W. S. Valentine. **Executive committee:** Lewis L. Clarke, chairman; Sidney Abenheim, H. H. Babcock, J. C. F. Jacoby, Ambrose G. Todd, F. H. Mimard, cons. engr.; V. F. Marsters, geol.; A. R. Gordon, mgr.; A. G. Greeley, gen. agent.

Inc. Nov., 1880, in New York. **Cap.**, \$2,000,000; shares \$10 par; all issued. Stock is listed on the New York Curb. **Dividends:** to Jan. 1, 1916, total \$3,790,000. Payments in 1915 amounted to 12% or \$240,000. American Exchange Nat'l Bank, New York, registrar. U. S. Mortgage & Trust Co., New York, transfer agents.

Income Account:

	Income	Expenses	Net Income	Reserve Fund	Net Surplus
1915	\$1,200,743	\$847,276	\$353,466	\$117,324	\$236,142

Balance sheet: Dec. 31, 1915, shows assets, \$3,174,704, which includes property and plant, \$2,343,707; bullion in transit, \$271,735; cash, \$108,572; supplies afloat, \$36,374; loan to Government of Honduras, \$38,309. **Liabilities:** include accounts payable, \$59,026; balance surplus, \$990,509.

Property: owns 25 sq. miles of mineral-bearing land, including the Rosario mine, at San Juancito, Honduras, C. A., and prospecting rights over 400 sq. miles of territory on Chile Mountain.

Development: at the Rosario mine in 1915 amounted to 13,000' as against 15,701' in 1914. This mine has about 20 mineral-bearing veins, which have been or are now being worked. The San Miguel was the main producer in 1915, the ore coming from above the upper 550' level. Work continues on the lower 100' level and on the upper 250 and 550' levels. The Concepcion vein is being developed through the 100' lower adit level, jointly with the San Miguel. On the San Joaquin vein, 2,997' of work was done in 1915, which proved the orebody to within 50' of the 650' lower level. Production amounted to 12,288 tons. The Candelaria vein ranks third in production with 2,185' of underground work. 10,652 tons, practically all from pillars of old workings were extracted from the Rosario vein, making this the fourth largest producer. Several other veins were small producers, while the Jucua and Southwest seem to have dwindled down and disappeared.

Two crosscuts are being driven—the Pena Blanca-Esperanza, beginning at the S. E. end of the Esperanza No. 3 and running in a S. W. direction to develop the southern territory, and the Pena Blanca Southwest crosscut, starting at the juncture of the Southwest and Jucua veins

in Block 84 and planned to reach Jucuara gulch. When this connection is made, additional water power and cheap timber will be obtainable from the western side of the mountain. This crosscut was 900' long Dec. 31, 1915, with 1,900' to go.

The company spent 32,594 pesos for prospecting and development on the Chile Mountain Concession without very promising results. Three gold-silver veins showing low-grade values are being thoroughly prospected.

Ore reserves: estimated by the management, Jan. 1, 1916, at 343,716 tons, valued at \$9.76 per ton, gross value of \$3,353,098 (U. S. currency), as compared with 418,978 tons at \$10.75, gross value, \$4,380,446 at end of 1914.

Equipment: includes electric compressor, air-drills, 350-ton stamp mill, cyanide plant, 1,200-h. p. hydro-electric plant and hoists. The company maintains a school and hospital.

A Ball mill and Dorr thickener tank, to be added in 1916, are expected to increase the milling capacity to about 400 tons. The mill treated 117,790 tons of ore in 1915, as compared with 109,170 tons in 1914, with a total recovery of 1,999,652 oz. silver and 16,475 oz. gold, a recovery of 87.45% silver and 92.32% gold.

Total bullion production from 1882-1915 was \$21,172,967 (U. S. currency).

Recent Production:

	Tons Ore	% Extr.	Silver Oz.	Gold Oz.	Value U. S. Cur.
	Crushed				
1915.....	117,790	88.66	1,748,803	15,210	\$1,178,614
1914.....	109,170	89.63	1,834,361	14,298	1,203,144

Operating Costs (pesos):

	Total Cost				Cost Per Ton			
	Mng.	Mlg.	Admin.	Total	Mng.	Mlg.	Admin.	Total
1915.....	1,055,637	659,533	273,862	1,989,032	8.962	5.559	2.235	16.886
1914.....	1,087,231	551,326	248,582	1,887,139	9.963	5.050	2.277	17.290

NEW YORK & MONTANA COPPER MINING CO. MONTANA

Address: c/o E. J. Mathews, 1007 Hoge Bldg., Seattle, Wash. Mine near Corbin, Jefferson Co., Mont. **Inc.** 1903, in Delaware. **Cap.**, \$1,000,000; shares \$1 par. **Lands:** about 250 acres, including the Erickson, Scioto and Copper Gulch groups, opened by 3 two-compartment shafts, said to make a good showing of medium-grade ore. Idle many years, but pays taxes.

NEW YORK-SEATTLE COPPER MINING CO. WASHINGTON

Probably dead. Mine near Index, Wash. Described in Copper Handbook, Vol. XI.

NEWBURY MINING CO. ARIZONA

Presumably idle. Reported in 1914 that control had been acquired by Makeever Bros., Journal Bldg., Boston, Mass. Described in Copper Handbook, Vol. XI.

NEWHOUSE TUNNEL CO. COLORADO

See Argo Mining and Tunnel Co.

NEWRAY MINES, LTD. ONTARIO

Office: 55 Yonge St., Toronto, Ont., Canada. **Inc.** in Ont. **Cap.**, \$1,000,000; shares \$1 par. Imperial Trust Co., Toronto, transfer agent. Is a reorganization of the Rea Consolidated Gold Mines, Ltd.; shares exchangeable at the rate of 1½ shares in the new company for every share of Rea Consolidated stock.

Property: North ½ of lots 6 and 7, Concession III, about 320 acres,

comprises the Rea mine, at Porcupine, Ont., $1\frac{1}{2}$ miles from Schumacher, the nearest railroad station. Mine was operated in 1914 under lease by the Porcupine-Aurum Mng. Co. The veins are well-defined quartz fissures, strike N. E. and dip N. W.; ore-shoots occur as lenses in and along shear zones.

Development: 2 compartment vertical shaft, sunk 420' on vein, with levels at 200, 300 and 400'. On the 200' level 390' of drifting was done. The oreshoot is cut and displaced by a fault at depth of 240'; below the fault the vein is not of the same character nor does it show ore. The orebody above the fault was stoped out for about 300' in length, $4\frac{1}{2}$ ' wide, and 200' in depth and is said to have produced 19,500 tons of ore averaging \$11 per ton.

Equipment: includes 10-stamp mill, Sullivan hoist, 6-drill compressor, pumps and boiler. **Production:** mill treated 11,607 tons of ore yielding \$125,000 in bullion in 1915. The new company is exploring the ground with diamond drills, but has so far failed to locate any new orebodies of commercial value. Property reported on by C. H. Poirier, June, 1916.

NIAGARA COPPER CO.

ARIZONA

Presumably dead, and mine, near Bagdad, Ariz., idle. See Copper Handbook, Vol. XI.

NIAGARA MINING CO.

UTAH

Is controlled by United States Smelting, Refining & Mining Co.

NIBLACK COPPER CO.

ALASKA

Niblack anchorage, Prince of Wales Island, Alaska. A. A. Wakefield, agent. Property formerly worked by the Niblack Copper Development Co., afterwards the Niblack Copper Co., is reported to have reverted to the Geo. M. Wakefield Mineral Land Co. Fully described Vol. VIII, Copper Handbook. No work done on the property since 1912 and 1913 save annual representation. Niblack Copper Co. is said to still have a corporate existence.

NICHOLS COPPER CO.

NEW YORK & QUEBEC

Office: 25 Broad St., New York. **Works office:** Laurel Hill, Queens Co., N. Y. Employs about 1,500 men. **Officers:** W. H. Nichols, pres.; J. B. F. Herreshoff, v. p.; C. W. Nichols, v. p.; W. C. Webster, sec. and gen. mgr.; Edw. R. Nichols, treas.; M. E. Harris, auditor. **Inc.** May, 1905, in New York. **Cap.**, \$10,000,000; reduced 1912 to \$7,000,000; \$1,000,000 preferred stock issued 1914; shares \$100 par; bonds \$3,000,000. Is the successor of Nichols Chemical Co.

The Laurel Hill Works include a smelter and electrolytic refinery, with steam and electric power.

The smelter has 20 reverberatory furnaces, taking 40 to 250-ton charges, each furnace heating a tubular boiler with waste gases. There is 1 Herreshoff water-jacket blast furnace of 600 tons rated daily capacity. Matte and slag flow, in an uninterrupted stream, to a large settler, whence slag skims into pots and matte is tapped into an iron bed. Waste gases pass into a 1,000' main flue, of iron and brick, leading to a 300' chimney.

The electrolytic plant is operated on the series system, and has 550 tanks. Anodes are cast. The final product is cast mainly into wire bars. This company enjoys a deservedly high reputation for the purity of its product and the efficiency of its metallurgical practice. Is the largest electrolytic refining plant in the world; capacity about 40,000,000 lbs. of copper per month.

The works do a very extensive custom refining business, treating mainly ores and matte from outside producers in the smelter, and western blister copper in the electrolytic plant. The works handle all the bessemer copper

from the Phelps-Dodge properties, and from the Old Dominion, Calumet & Arizona, East Butte, Granby and Ducktown companies, and others. The mining properties at Capelton, Quebec, are operated by the Albert Copper Co., a subsidiary of the Nichols Copper Co.

NINETY-NINE COPPER CO.

NEVADA

Mine near Goodsprings, Nev. Described in Copper Handbook, Vol. XI. Company presumably dead.

NIPISSING MINES CO.

ONTARIO

Office: 165 Broadway, New York. Mine office: Cobalt, Ont., Canada. Officers: E. P. Earle, pres.; Richard T. Greene, sec., with W. H. Brouse, David Fasken, John L. Feeny, August Heckscher, Denis Murphy, R. B. Watson, directors. P. C. Pfeiffer, treas.; R. B. Watson, gen. mgr.; H. Cark, supt.

Inc. April 6, 1906, in Maine. Cap., \$6,000,000; shares \$5 par; all issued. Transfer agents: Bankers Trust Co., New York, Old Colony Trust Co., Boston and Toronto Gen. Trust Corp., Toronto. Registrars: Liberty National Bank, New York, State Street Trust Co., Boston; Toronto Gen. Trust Corp., Toronto. Annual meeting, last Monday in April. The Nipissing Mines Co. is a holding company, owning the entire stock issue of the Nipissing Mining Co., Ltd., which see.

The annual report, dated Dec. 31, 1915, shows total receipts, \$1,249,059, including \$1,220,000 dividends on stock of Nipissing Mining Co., Ltd., and expenditures, \$1,241,163, including \$1,200,000 paid in 4 quarterly dividends (20%). Assets, Jan. 1, 1916, total \$6,307,895, including capital stock, Nipissing Mng. Co., Ltd., \$6,000,000; dividends receivable from Nipissing Mng. Co., Ltd., \$300,000; cash, \$7,896. Dividends paid quarterly at rate of 5%.

NIPISSING MINING CO., LTD.

ONTARIO

Office: 165 Broadway, New York and Cobalt, Ont., Canada. Is controlled through ownership of entire stock issue by the Nipissing Mines Co., which see. R. B. Watson, gen. mgr. Inc. 1904, in Ontario. Cap., \$250,000; shares \$100 par; all issued.

Comparative General Balance Sheet:

	Assets				Total
	Property & Equip.	Investm's	Ore and Bullion	Other Current	
1915.....	\$689,974	\$33,430	\$ 944,932	\$784,892 (a)	\$2,453,228
1914.....	746,887	69,520	1,129,539	416,350 (b)	2,362,296

(a) Includes cash, \$776,854. (b) Includes cash, \$391,292.

	Liabilities					Total
	Capital Stock	Acct's Pay.	Accr'd Exp's	Divid. Pay.	Surplus	
1915	\$250,000	\$103,909	\$13,058	\$300,000	\$1,786,261	\$2,453,228
1914	250,000	190,522	18,998	300,000	1,602,776	2,362,296

Comparative Income Account:

	Income		Cost Production	Profit Net	Divid's	Surplus
	From Ore	Total				
1915	\$2,222,256	\$2,256,432	\$815,005	\$1,441,427	\$1,220,000	\$183,485
1914	2,516,065	2,558,733	971,112	1,587,621	1,235,000	343,715

Dividends paid to Jan. 1, 1916, total \$14,153,297.

Property: 8 claims, 846 acres at Cobalt, Ontario, Canada, has over 100 fissure veins, from ½" to 12" in width, occurring in Huronian conglomerate or Keewatin formation. The ore is silver with cobalt and arsenic.

Development: total work in 1915 amounted to 10,496' as compared with 12,148' in 1914. There are 10 working shafts on the property. The lowest

or No. 64 shaft, 1,003', is the lowest point yet attained in the Cobalt district. Extensive development in 1914 on vein 64, the largest vein on the Nipissing property, failed to disclose pay ore at depth and no further work was done on this vein in 1915. However, a crosscut is being driven N. from the second level to explore the large section of conglomerate lying between vein 64 and Bucke Township.

Shaft 63 develops the Little Silver veins, that produced steadily throughout the year. The main vein system is developed by shaft 73 and continues to be the largest producer. Vein No. 98, developed on the fourth level is 575' long. The conglomerate was proved to a depth of 150' below the fourth level and further development on vein 490 according to the management gives promise of opening up pay ore in commercial quantities. Vein 96, S. of the Little Silver vein, is developed by tunnel and winze. Ore on the tunnel level averaged 4,000 oz. for 95' in length and 1.5' in width.

Nipissing lot 402, north of O'Brien and east of Chambers-Ferland, is being explored by the O'Brien shaft and 500' of E. and W. crosscuts. The work so far has failed to disclose any favorable results.

The Cobalt Lake fault is being developed by shaft 81, down 485', May, 1916. The fault was encountered at 270', but contained no values.

Ore reserves: Jan. 1, 1916, 182,748 tons, assaying 48.8 oz. silver per ton, or 8,921,718 oz. in all.

The hydraulic plant, in operation from April 23 to Nov. 23, washed 111 acres lying E. of Cart Lake and S. of Peterson Lake. Results were disappointing.

Equipment: includes a high-grade mill, a low-grade 40-stamp mill, cyanide plant, air compressors, power house, hoists, tramway, etc. An experimental 4-unit plant, using the oil flotation process, has been built to treat the tailings. The low-grade mill ran 80.45% of the time and treated 77,183 tons, making an average extraction of 87.52%. Total cost per ton was \$3.913, about 7 cts. less than in 1914.

Recent Shipments:

	Ore Tons	Gross Oz. Silver	Gross Val. Silver, Cobalt, Nickel & Arsenic Paid For	Net Value Received
1916.....	191.9	*3,000,000	*\$2,039,800	*\$1,265,500
1915.....	434.2	4,623,958	2,422,791	2,381,463
1914.....	1,328.6	3,999,862	2,226,430	2,207,428
1913.....		4,844,169	2,945,335	2,920,714

*Estimated first half.

Total shipments to Jan. 1, 1916, were 28,276 tons ore, containing 41,209,238 oz. silver. Net value received, \$22,158,065. Operating costs in 1915, based on 77,904 tons ore milled were \$10.462 per ton, or \$.199 per oz. silver, compared with \$12.13 and \$.207, respectively in 1914, based on 80,037 tons ore milled. Company is largest and has best holdings of any of the Cobalt companies, but despite its large acreage the company has seen its best days.

NIPSIC MINING CO., LTD.

IDAHO

Office: 403 Columbia Bldg., Spokane, Wash. Inc. Feb. 28, 1908, in Wash. Cap., \$1,500,000; shares \$1 par. Property sold to the Cons. Interstate-Callahan Mining Co., for \$111,200. Sale confirmed at a meeting of the shareholders of the Nipissic Mining Co., June 24, 1916. Management states net returns to stockholders will be 7 to 8 cts. per share. Company dissolved Aug. 25, 1916.

NISI PRIUS CONSOLIDATED MINING CO.

COLORADO

Controlled through stock ownership by Iron Silver Mining Co. Geo.

O. Argall, treas. Leadville, Lake Co., Colo. Property worked by two sets of lessees in 1915. **Development:** work amounted to 1,607' in 1915, and production was 107 tons of ore, netting the company \$84. Surplus Dec. 31, 1915, was \$608.

NIXON NEVADA MINING CO.**NEVADA**

Office: 50 Congress St., Boston, Mass. Mine office: Reno, Nev. **Officers:** Chas. F. Daniels, pres.; W. E. Brown, treas., with Jas. J. Coughlan, Geo. H. Allen, John F. McDonald, Joel Beau, T. F. Gagen and R. J. Jefferson, mine supt., directors.

Inc. 1915, in Maine. **Cap.**, \$750,000; shares \$1 par; fully paid and non-assessable; 670,985 shares issued. Stock is listed on Boston Curb.

Property: 635 acres in Hartlesville Township, known as the Granite Hill mine, 14 miles N. W. of Reno and 50 acres at Big Mouth Canyon, 50 miles N. E. of Reno, Washoe Co., Nev. The Granite Hill group of 4 claims is traversed by 4 parallel veins within a distance of 900'. **Development:** by shafts, crosscuts and drifts. A vertical shaft on vein No. 1, 100' deep, Jan., 1916, is being sunk to 300' level, with drifts on the 55' level for 100' and in excess of 100' on the 100' level. A double compartment shaft, 185' deep, Jan., 1916, is being sunk on the vein, at a higher point than the vertical shaft. A third shaft being sunk on No. 4 vein, was down 25', Jan., 1916.

Ore reserves: estimated by management as 72,000 tons, Jan. 1, 1916.

Equipment: at the Granite Hill includes engine, hoist, pump, office, dwellings and mine buildings. Carload shipments from development work averaged 19.47% copper and \$12.13 gold and silver per ton.

1916 shipments: 75 tons in June aggregating about \$7,500. First class ore about $\frac{1}{3}$ of the total, carried 40% copper, \$13.80 per ton gold and 26 oz. silver per ton. Second class ore carried 10% copper, \$8.80 per ton gold and 6.96 oz. silver per ton.

Developments at the Big Mouth Canyon property consist of numerous open cuts and several hundred feet of tunneling. No production to date, but showings of gold have been reported, and it was said January, 1916, that platinum had been discovered in doing assessment work. Mine is two miles from railroad. The veins are strong, of fair width, and carry shoots of exceptionally high-grade ore. Mr. Victor C. Alderson, E. M., has endorsed the property. It is thought that the property will make a good and profitable mine.

It was announced early in 1916 that the company had been financed for active development work through 1916 and 1917.

NOBE TUNGSTEN MINE**NEVADA**

Owned and operated by Atkins, Kroll & Co., San Francisco, Calif. Is a tungsten property, 11 miles from Sodaville, Mineral Co., Nev. The ore is reduced to a 50% product by wet concentration in the Del Monte mill, at Borns siding, 5 miles E. of Luning. The mill has Frue vanners and Deister slime tables. Production during first half of 1916 estimated at 50 tons of concentrates, valued at \$6,000 per ton.

NONPAREIL CONSOLIDATED COPPER CO.**WASHINGTON**

Mine near Index, Wash. Company presumably dead. Described in Copper Handbook, Vol. XI.

NONPAREIL COPPER MINING CO.**IDAHO**

Office: Wallace, Idaho. Mine near Mullan, Shoshone Co., Idaho. Amos M. Stroud, pres. and gen. mgr.; Jas. A. Wayne, sec. **Inc.** in Idaho. **Cap.**, \$1,500,000.

Property: 4 full and 3 fractional claims, on the west fork of Willow creek, across from the Carney mine, 3 miles S. E. of Mullan. **Development:**

by 4 tunnels. Surface ores have given assays up to 1.5% copper, and 8 to 19 oz. silver per ton. Has not replied to requests for information.

NOONDAY MINES CO.**BRITISH COLUMBIA**

Bruce White, mgr., Sandon. **Property:** the Noonday mine, near Sandon, B. C., is developed by several tunnels, said to have opened up an orebody 2-5' wide, averaging \$20 per ton in lead-silver. **Equipment:** includes compressor and 6 drills. Small shipments were maintained during 1915-16 from development work. A promising prospect.

NORFOLK SMELTER**VIRGINIA**

See Virginia Smelting Co., West Norfolk, Va.

NORFOLK SMELTING CO.**VIRGINIA**

A New York corporation; operates under lease on a royalty basis, the smelting department of Virginia Smelting Co.'s works, which see.

NORMAN MINES CO.**WASHINGTON**

Office: Columbia Bldg., Spokane, Wash. **Mine office:** Northport, Wash. **Officers:** J. A. Zeigler, pres.; Dr. W. B. Pickrell, v. p.; O. C. Moore, sec.; Sidney Norman, treas.-mgr., with C. D. Muxen, directors. Peter Porter, mgr.; C. C. Knutson, supt.; H. W. Newton, assayer.

Inc. 1914. Cap., \$100,000; shares 10 cts. par; assessable after treasury stock is sold; 450,000 shares issued. Company reported a cash surplus of \$6,000, May, 1916.

Property: 5 claims, about 100 acres, including the Great Western and Empire claims, patented, and Last Chance, unpatented, held under lease and bond, 7 miles S. E. of Northport, Stevens Co., Wash. Claims show a shear zone of lead-zinc carbonate ore in altered limestone, said to average 30% zinc, 13% lead, 4.6% lime, 1.1% sulphur, 5.5% iron, 2% insoluble.

Development: mainly on the Great Western orebody; with strike N. E. and dip 50° N. W., reported to measure 200'x150'x5' in width. The Empire vein, 25' at surface, has not yet been found in the lower workings. The old workings in the Last Chance group have been timbered and development work is being carried on, 1916. The Great Western group is developed by 325' tunnel and winze sunk to 200'. Management plans driving crosscuts and drifts on the 100' and 200' levels and adding a compressor plant.

Equipment: consists of a 2,000' aerial tramway at the Last Chance and a 600' surface railroad. Twenty men employed. Shipments of zinc carbonate ore made to Kulsa Spelter Co., Dewar, Okla., and lead-zinc ore sent to the Ozark Zinc Co., Coffeyville, Kansas.

NORSEMEN EXPLORATION CO.**BRITISH COLUMBIA**

Office: 424 Second Ave. So. Minneapolis, Minn. **Mine office:** Cap-sheaf, Vananda, Texada Island, B. C. **Officers:** E. E. Rorem, pres.; W. H. Curtis, v. p.; C. A. McKenzie, sec.; Allen T. Rorem, treas.; B. F. Laffin, A. E. Barker and Eden Schmidt, directors. Robt. Forbes, cons. engr.; Jas. Forbes, Sr., supt. **Inc. in Arizona. Cap., \$500,000;** shares \$1 par; issued, \$375,000.

Property: 23 claims, 1,200 acres, 730 patented, on Texada Island, B. C., is heavily timbered and shows contact deposits between limestone, granite and diorite. Copper occurs as chalcopyrite and bornite, with gold and silver values. The Cap-sheaf claim has an 80' vertical shaft, said to show 10' of ore, carrying 14% copper and \$11 in gold in samples reported as taken from surface down to 59'. Ore expected by manager to average 4% copper and \$6 gold and silver. The Cameron claim adjoining the Texada Iron mine has an iron capping of magnetite with irregular streaks and patches of chalcopyrite thought by management to average 4% copper. The Aladdin claim carries silver-lead ore. Has a 212' vertical shaft, with

175' of crosscutting. The Aladdin, De Ore and Blizzard claims are leased to the Minnesota & Texada Copperite Co., Ltd., of Minn., which is now doing development work.

Company's property is about 3 miles long, convenient to tide water and only 20 miles from a smelter. Property regarded as promising.

NORTON; A. O.

Office: 286 Congress St., Boston, Mass. **Mine office:** Suffield, Sherbrooke Co., Quebec. **A. O. Norton**, owner and mgr.; **W. Jenkin**, mine supt. **Property:** 600 acres, freehold, except 150 acres, title to which covers only mining rights, includes the Suffield, King, Silver Star and Marrington mines, in Ascot township, 7 miles from Sherbrooke, with railroads within 2 miles on either side.

The mines show 3 lenses, of 3 to 20' width, 1 proven to depth of 400', estimated by owner to average 4 to 5% copper, from a trace to 10% zinc, 5 to 25 oz. silver, and \$1.50 gold per ton. The King mine has a 165' incline shaft with about 500' of workings. The Suffield mine has a 245' shaft with about 1,200' of workings, showing ore with an average of about 4%, and combined gold and silver values of \$2 to \$12 per ton, with about 25% sulphur. The Marrington mine, 100 acres, 1½ miles from the Suffield, and about 1 mile from Capelton, is opened by a 260' shaft with about 400' of drifts, developing a lens about 75' wide at surface, said to carry at depth 5 to 7' of good ore. Little development work has been done since Aug., 1914, and no shipments have been made from the property.

Equipment: includes a steam plant, 100-h. p. boiler, a 50-h. p. double cylinder steam hoist and a straight-line air compressor. Property considered promising.

NORTH AMERICAN MINING CO., LTD.

Wallace, Idaho. Officers: John Presley, pres.-mgr.; L. B. Whitton, sec.-treas., with A. Schmit and B. Knutson, directors. **Cap.**, \$1,500,000; shares \$1 par.

Property: 880 acres, in Coeur d'Alene district, Shoshone Co., Idaho, adjoining the Bunker Hill & Sullivan, and believed to carry the continuation of the B. H. & S. main fissure. Developed by two tunnels and equipped with water power, compressor, drills, and surface buildings. Company is trying to raise necessary funds to continue the main tunnel another 1,200' by means of spectacular advertisements written by an "advertising agent."

NORTH AMERICAN ZINC CO.

Officers: Dr. J. W. Boyd, pres., Sarcoux, Mo.; Geo. Saunders, sec.-treas., with M. C. Goodwin, J. B. Gorman, directors. Operates a lease on 40 acres of mineral land at Wentworth, Newton Co., Mo., said to show a 30' deposit of zinc ore at 100'. Developed by 3 shafts to depth of 114'. **Equipment:** includes electric power, 250-ton mill, office and change room.

NORTH BINGHAM CONSOLIDATED MINING CO.

Office: Provo, Utah. **Mine near Bingham Canyon, Salt Lake Co., Utah.** Jesse Knight, pres.; Wm. W. Mathews, v. p.; W. Lester Mangum, sec.-treas., and J. Wm. Knight, directors. **Inc. June, 1907, in Utah. Cap.**, \$100,000; shares 10 cts. par; assessable; levied a one-half ct. assessment, 1910. Is controlled, through stock ownership, by the Knight Investment Co.

Property: 6 claims, in Barney Canyon, has a very wide ore zone, said to show leached ore carrying traces of copper and up to \$2.80 gold per ton. **Development:** includes a tunnel of about 1,000', and a 2-compartment shaft. Property is considered a good development proposition. Idle.

NORTH BUTTE EXTENSION DEVELOPMENT CO.

Office: 25 Broad St., New York. **Mine office:** O'Rourke Estate Bldg.

Butte, Mont. **Officers:** H. G. Bell, pres.; A. J. Ronaghan, sec., with I. A. Heilbronner, N. Bruce MacKelvie, Elbridge L. Adams, David Angus and C. W. Peters, directors. Inc. Oct. 10, 1908, in Maine. **Cap.**, \$1,500,000; shares \$1 par; issued, \$1,349,036. Is a reconstruction of the North Butte Extension Copper Mng. Co., which was a reorganization of the North Butte Extension Mng. Co. A controlling stock interest of \$800,000 was sold, March, 1910, to the Butte & Superior Mng. Co. Annual meeting in September.

Suit was instituted by the Butte & Superior interests against the promoters of the North Butte Extension Development Co. to recover shares of stock claimed to have been illegally issued and a proposal to return 50,000 shares was made and accepted by the company.

Apparently the company's only present property is the Overman claim, the Black Crow fractional claim of 2½ acres and the Clipper and Assay mill sites. **Development:** by a 700' shaft, planned to be deepened to 1,000'.

Most of the ground on which the various North Butte Extension companies were organized was held only under options which were forfeited. The Occidental claim was developed by a long crosscut from the Butte & Superior shaft, but nothing of importance was found and after payments of \$90,000 the claim was abandoned. Much of the original ground held by the company is now owned by the Rainbow Development and Butte & Superior companies.

According to the contract with the Butte & Superior, the latter company is driving a crosscut on the 1,200' level through the Four Johns claim and through the entire length of the Overman claim belonging to the North Butte Extension Co. The report issued by the company, March, 1916, stated that the development work being done by the Butte & Superior was expected to be finished during the first half of 1916. It has been reported that no ore of commercial value has as yet been encountered.

NORTH BUTTE MINING CO.

MONTANA

Office: 1400 Alworth Bldg., Duluth, Minn. **Mine office:** Norman Braley, gen. mgr., Butte, Mont. **Officers:** Thomas F. Cole, pres.; Charles A. Duncan, v. p.; Joseph B. Cotton, v. p. and gen. solicitor; preceding with W. J. Olcott, J. U. Sebenius, C. A. Congdon, G. A. Tomlinson, Chas. d'Autremont, Jr., John H. McLean, directors. Frederick R. Kennedy, sec.-treas.; Henry B. Paull, auditor. American Trust Co., Boston, Mass., transfer agent; Old Colony Trust Co., Boston, registrar. Stock listed on Boston Stock Exchange.

Inc. April 5, 1905, in Minnesota. **Cap.**, \$9,000,000; shares \$15 par; issued, \$6,450,000.

Comparative General Balance Sheet:

Assets	Property	Gr. Mt. Shaft	Invest.	Metal On Hand	Other Current	Total
1915.....	\$8,968,265	\$256,945	\$9,600	\$1,569,643	\$259,032	\$11,063,485
1914.....	8,921,783	228,239	9,600	1,074,819	88,357	10,322,798
Liabilities	Capital Stock	Current	Surplus Reserve	Total		
1915.....	\$6,450,000	\$731,067	\$3,882,418	\$11,063,485		
1914.....	6,450,000	731,027	3,141,771	10,322,798		

Comparative Income Account:

	Revenue	Operating Expenses	Net Income	Dividends	Surplus	Total Surplus
1915	\$4,155,522	\$3,027,875	\$1,127,646	\$387,000	\$740,646	\$3,882,417
1914	3,084,774	2,726,559	358,215	635,000 (D)	276,785	3,141,771
1913	5,182,674	3,744,897	1,437,777	820,000	617,777	3,418,556

(D) Deficit.

Dividends (paid quarterly): \$1.25 in 1905; \$7.25 in 1906; \$6 in 1907; \$3 in 1908; \$4 in 1909; \$1.10 in 1910; \$1.20 in 1911; \$1.70 in 1912; \$2 in 1913; \$1.50 in 1914; \$1.40 in 1915; \$1.75 to Aug. 1, 1916.

To give holdings more regular outline exchanges have been made between the North Butte and Anaconda companies, the Anaconda securing fractional interests in the Emily claim, adjoining the Berlin claim on the west, for cash, and concessions regarding the Edith May vein, preventing future controversy over the western extension of that vein. The North Butte secured a five-sixths interest in the Sioux Chief claim, giving up a small portion of the western end of the Gem and a part of the Adirondack claim.

Litigation with the Tuolumne Copper Mining Co. was settled Nov., 1910, the North Butte obtaining absolute ownership of the disputed part of the Jessie vein, and the Tuolumne obtaining absolute ownership of the ground formerly owned jointly on which the North Tuolumne vein apexed. The Tuolumne thus gained the eastern 412' of the Jessie vein, below the 400' level, while the North Butte secured title to the vein in the eastern 412' above the 400' level, as well as confirmation of its title to all of the Jessie vein lying west of the 412' tract, through the remainder of the Jessie claim, a distance of about 1,100'.

Property: on Butte Hill consists of the following claims—Edith May, Copper Dream, Miners Union, Jessie, Hancock, Ground Hog, Paul, Croesus, Snowball, Lynchburg, John Emmitt, Henry, Berlin, Leaf, Gustavus, Eva, Margaretha, Carlile, Jake, Midget, Protection, Kink Fraction, with fractional portions and undivided interests in the following claims: Speculator, Adirondack, Sioux Chief, East Gem, West Gem, Free Trade, Lone Star, Lillie May, Occidental, Granite Mountain, Sunset. The last named was acquired in 1912, during which year options and partial payments were made on a number of additional mining claims in the Butte district. A one-half interest in the Granite Mountain claim was acquired from the Lewisohns, the company to sink at its own cost the existing 500' shaft to a depth of 2,000' with connection on the 200' level. Title to the shaft remains with the North Butte.

East Side Holdings: in 1912-13 title was obtained to 50 lode claims, 525 acres, and fractional parts of 17 other claims, 214 acres, in the Butte East Side mineral area, 2 miles east of Anaconda Hill, between the bed of Silver Bow Creek and the Continental Divide, and adjacent to the A. C. M. Co.'s Tropic mine and the Pittsmtont mine of the East Butte C. M. Co. In 1914 this area was increased by the entire interests in 2 lode claims and fractional parts of 4 other claims. This large area in the East Side was obtained to provide for future mining operations of the company. In payment of land purchased in 1912-13 the company paid over \$850,000 cash and 20,000 shares of stock.

The Speculator group, or Butte Hill property is traversed by a number of fault veins, mostly belonging to the Blue vein series. These veins carry high-grade ores in shoots, which have thus far been remarkably persistent in depth. The ores carry much primary chalcocite, frequently massive, with considerable quantities of enargite and smaller proportions of other sulphides. All ores carry silver and lesser gold values. The veins are "heavy," requiring close attention and timbering with square sets, monthly timber used being about 1,000,000' board measure. No waste is hoisted, all being used for dry-filling. Waste is largely low-grade ore, a portion of which may be available for smelting at some future date and which can be extracted easily.

The exploration of the vein system has shown the necessity of thor-

ough drifting along the veins at considerable depth and development on the 2,200 to 3,000' levels has opened up profitable orebodies.

The principal ore supply comes from the following veins, named in their order of occurrence from the south boundary of the mine northward: Speculator, Edith May, Hancock, Jessie, Gem, South Croesus, North Croesus, Snowball, Berlin. Of these 9 veins, the Speculator, South Croesus and Snowball belong to the older vein system, the Hancock possibly so, and the others are well known members of the Blue vein, or Northwest fault vein series. The Edith May and the Jessie vein were the principal ore producers of the North Butte in the early operations of the company.

The Edith May is 18 to 42' in width above the 2,600' level, opened at 200' intervals from the 800' level downward. Below the 2,600' level the width of ore in the vein is 8 to 12. The vein was of little value until the 1,200' level was reached, after which there was a marked improvement, culminating in the 1,800' level, which developed a vein up to 42' wide, carrying a phenomenally high-grade ore, many of its stopes being practically all first-class ore for a distance of about 1,000' along the floor. The 2,000' level showed a slight decrease in average value, as well as in the length of the ore shoot, while on the 2,200' level the ore was of much lower grade and payable for only 300' in length as against a length of 1,000' on the 1,800' level.

Work on the 2,400' level has disclosed a 6' footwall band of 4.25% ore for 525'. Besides this the vein has a fine hanging-wall orebody which, on the 2,600' and 2,800' levels, shows 4½' of 4 to 4.5% ore for several hundred feet. On the 3,000' level the hanging-wall side of the vein is 2' to 2½' in width, containing 5 to 6% copper. The footwall side is about 3½' in width, assaying about 3.7% copper. The Edith May vein divides east of the shaft, showing no commercial ore in the south branch, but these branches unite some distance west of the shaft. On the 2,000' and 2,200' levels there are 2 fault planes, defining the limits of the better grade of ore, these faults diverging in their downward course.

The Jessie vein ranks next to the Edith May in production and promise. Where opened on the 700' level in the Gem crosscut, the Jessie showed a vein of about 10' width with bunches of 6% ore. The ore shoot found on the 1,200' and 2,200' level was high grade, 8' wide and nearly 1,000' long, changing in character below this depth and showing considerable sphalerite in the drifts to the west. On the 2,200' level, the vein is about 12' wide, showing some ore up to 5% in copper tenor, but averaging materially lower than the ore in the workings above. The west drift on the 2,000' level opened a 150' ore shoot, 6' wide, carrying 6% copper and 7.5 oz. silver. The 2,200' level shows low-grade ore only. The 2,600' drift west showed 4' of 3.5% ore displaced by a fault 15' from the crosscut and not yet recovered, while 300' of drifting east disclosed small bunches of high-grade ore. On the 2,800' level, vein where cut by a crosscut from the Granite Mt. shaft showed a total width of 6', with 3' high-grade ore assaying 11% copper and 10 oz. silver per ton.

The Croesus vein, called the North Croesus, is opened by drifts on the 1,800', 2,000', 2,200', 2,400' and 2,600' levels, developing a large and important orebody between the 1,600' and 2,000' levels. On the 1,800' level, the ore shoot is 8½' wide and averages 8 oz. silver per ton; on the 2,000' level the shoot is 300' long, averaging 10' thick of 3% copper and 6 oz. silver; the shoot is not yet cut on the 2,200' level, but on the 2,400' another ore shoot, 300' east of the one just noted, shows 2' of 3% ore with 7 oz. silver per ton; on the 2,600' level it has been opened by short drifts which show 3' of 4% copper ore.

The South Croesus vein has been mined from the 1,600' down to the 2,400' level, with the best showing on the 2,200' level. It has carried from 3 to 4' of ore in shoots, the longest being 270', averaging 5.5% copper and 5.5 oz. silver. On the 2,400' level east a 3' body of ore has been drifted on for 200', average grade 2.5%. On the 2,600' level west vein shows only low-grade pyrite.

The Gem vein showed no ore of commercial importance above the 1,600' level, and the 1,800' level had about 6' of 4.5% ore. It is developed to a small extent on the 18th, 20th, 26th and 28th levels, both value and width increasing with depth, the 2,800' level showing 12' of 5.3% ore carrying 2.2 oz. silver per ton. The vein is irregular in size and grade and where developed has been broken by cross faults.

The Adirondack vein, like the Gem, shows no commercial ore above the 1,600' level, but shows an ore shoot 60' long on the 1,800', 160' on the 2,200' and 300' long on the 2,400' level, widening proportionately. On the 2,400' level the orebody is 12' wide, 300' long and assays 5.25% copper and 3 oz. silver; on the 2,600' level the crosscut shows 7' of 3.5% ore and the drift shows 4' of 3% ore.

The Snowball vein has characteristically high silver values. It was first cut on the 18th level in 1910 and has been proven to carry several splendid orebodies by development work of recent years. On the 1,800' level it had 1¼' of 4% ore with 4 oz. silver for 100'; 2½' to 5' of 3% ore with 5½ oz. silver for 800' on the 2,000' level; 5' of 8% copper and 6 oz. silver ore for 740' on the 2,200' level, and 4½' of 5% copper and 7½ oz. silver ore for 750' on the 2,400' level east. Same shoot shows 175' of 3½% copper ore with width of 3' on 2,600' level. Reported in May, 1916, that a crosscut in new ground north of the Snowball vein, driven from the 22nd level of the Granite Mt. shaft, had cut 4½' of ore assaying 10% copper and 8 oz. silver per ton.

Development: is very extensive, aggregating many miles of workings. New development for 1915 amounted to 15,333' compared with 11,551' in 1914. The Granite shaft, since its completion to the 3,000' level, has been one of the 2 working shafts; sinking is to continue to the 3,600' level. A new electric hoist was put in operation May, 1915. It is the largest electrically-driven hoist in America, designed to handle 200 tons per hour from a 4,000' depth.

The Speculator, the other operating shaft, has been deepened to 2,800' with levels at 200' intervals, from and below the 1,400' point, developing all the veins worked in the mine. The Speculator shaft has a 128' steel head-gear standing on a 41x60' concrete foundation, equipped with self-dumping skips and pockets, with daily capacity of 1,500 tons of ore, no waste being hoisted, as it is used for underground filling.

The 500' Jessie, 700' Gem and 500' Adirondack shafts are idle and of no present value. The Granite Mountain shaft is connected with the main workings on practically all levels. Underground haulage is done with electric motors on the 1,800 to 2,800' levels.

Equipment: the main machinery plant and buildings are at the Speculator shaft. The engine house has a 20-ton traveling crane, and a 32x72" Nordberg Corliss duplex-cylinder hoist, operating 2 cages in counterbalance, with two 8-ton Kimberly skips swung under, and good for depth of 3,500'. An 18x36" duplex cylinder auxiliary hoist operates a double-deck cage, in a third compartment, for handling men, material and timber, and the shaft has a fourth compartment for ladders and pipes.

The compressor house has an air compressor with piston efficiency of 3,482' of free air per minute, reduced to a pressure of 70 lbs. per sq. inch,

capable of operating 40 to 50 rock drills; also a 4,000 cu. ft. compressor. The boiler house has two 500-h. p. and five 100-h. p. boilers. Miscellaneous buildings include a machine shop, smithy, carpenter shop, planing mill and a plate shop for repairing skips.

Employed an average of 720 men in 1915. The North Butte ore is smelted by the Washoe works of the Anaconda under a contract by which the company pays the smelter charges to the Anaconda Co. and the copper is turned over to the North Butte Co. and sold by its own agents, effecting a saving of \$150,000 or more a year.

Production:	Ore Tons	Copper Lbs.	Silver Oz.	Gold Oz.	Copper per Lb. Net Cost.	Sell. Pr.
1916 (a).....	255,040	11,814,193	*244,976	*365	.....	.....
1915.....	378,161	19,235,285	940,632	1,122	13.12c	16.70c
1914.....	337,372	18,421,761	1,092,300	1,107	11.50c	13.74c
1913.....	454,984	28,318,321	1,602,164	1,567	9.76c	15.08c
1912.....	425,248	26,480,123	1,377,468	1,367	9.65c	16.37c
1911.....	410,694	24,816,669	1,134,300	1,281	9.97c	12.56c
1910.....	408,528	25,267,092	988,190	1,196	10.36c	12.77c

(a) First half. * First quarter.

The North Butte had a spectacular rise as a heavy copper producer and a dividend paying mine of the first rank, and had an almost equally spectacular drop, due partially to the blighting effects of the 1907 panic, and also to the decrease in values in the Edith May vein, shortly after the panic.

Results in 1915 and early 1916 are disappointing. With copper averaging 3 cents higher in 1915 than in 1913, earnings were less in 1915, and production was much less. This was probably due to the grade of ore which has dropped from 61 lbs. copper per ton 5 years ago to 52 lbs., and to the net cost of production which has increased approximately 30% during the 5-year period.

Recovery for 1915 averaged 52 lbs. per ton, on an output of 495,275 tons, but for the first three months of 1916 was only 45 lbs. A report to the County Assessor for the year ending June 1, 1916, showed net profits of only \$1,229,339, or \$2.86 per share, and the cost per pound copper produced was about 13½c.

The company is mining much low-grade ore, which could not be profitably handled with lower copper prices, and it is evident that rigid economy would have to be exercised if the company had to operate with a 12c market.

Though it is currently reported about Butte that the present mines are near exhaustion, and the bonanza days are over, it is believed the mines can earn a profit for some years to come. The very moderate profits of 1916 should be conserved and used to develop and equip the East Side tract, which is expected to make a larger producer than the one now worked.

NORTH DOME MINING CO.

ONTARIO

Owned by Temiskaming Mining Co., Ltd., which see.

NORTH FORK MINING CO.

CALIFORNIA

Office: 405 Crocker Bldg., San Francisco, Calif. Mine office: Forest, Sierra Co., Calif. Geo. W. Stone, gen. mgr. Property: the North Fork mine, in Alleghany district, near Forest, shows a 2' quartz vein carrying arsenical sulphides and free gold. Developed by 1,000' crosscut in amphibolite, and a 200' incline shaft. Plan erecting 5-stamp mill and sinking shaft to 400' in 1916.

NORTH HOMESTAKE MINING CO.

SOUTH DAKOTA

Address: A. Maitland, Negaunee, Michigan, pres. and controlling owner; A. F. Maitland, v. p.; T. C. Jates, sec.; Jos. Fountain, supt. Inc.

in South Dakota. **Cap.**, \$6,000,000; shares \$5 par; 1,000,370 shares outstanding.

Property: 77 patented claims, 1,100 acres at Maitland, Lawrence Co., South Dakota, shows veins of quartz and sulphide ore, carrying gold and silver values. **Development:** by 750' vertical shaft and 600' drift on the 600' level with crosscuts E. and W. for 200' and 100', respectively.

Equipment: includes 125-ton cyanide mill, electric power, 4 electric pumps, 2 compressors and hoist. Mine is credited with a production of \$1,500,000 under former management. Development work carried on intermittently during past 5 years has so far failed to disclose new orebodies of commercial grade.

NORTH LAKE MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. **Operating office:** Sheldon Bldg., Houghton, Mich. **Officers:** R. M. Edwards, pres. and gen. mgr.; Arthur C. Paine, v. p.; Henry Tolman, treas.; A. L. Wyman, sec.; with H. D. Forbes, S. L. Powers, directors. **Inc.** Aug. 26, 1908, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; fully issued; \$9 paid in.

- Company paid \$144,000 for 360 acres of land, bought of St. Mary's Mineral Land Co., one-half in cash and one-half in 9,000 shares of stock at \$8, beginning business with \$300,000 cash in the treasury. The company suffered heavily by the failure of S. R. Dow & Co., Sept., 1912, losing \$160,188 in cash and interest unlawfully borrowed by its former president, S. R. Dow, and at the end of 1912 was \$19,000 in debt. This indebtedness was wiped out by an assessment of \$1 per share, levied April 18, 1913. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, third Thursday in April.

Annual report for 1915 shows total receipts of \$22,670 and expenses \$38,226, leaving a deficit \$15,556. Cash on hand, \$8,370; accounts payable, \$7,721. An assessment of \$1 per share, payable June 14, 1916, has been underwritten, thus making available \$100,000 for development work.

Property: 1,120 acres, in Secs. 28, 29, 32 and 33, T. 51 N., R. 37 W., lying immediately north and east of the Lake Copper Co. Property was supposed to carry about 7,000' of the strike of the Lake amygdaloidal bed, but apparently the Lake bed curves to the westward, rather than to the east. Property also carries the copper-bearing series of the Evergreen belt of amygdaloidal beds, and various other unidentified cupriferous strata. The company's lands are crossed by the Fire Steel river, and are traversed by both the Mineral Range and Copper Range railways.

Exploratory work has been planned thoroughly and systematically, the preliminary work consisting of diamond drilling to give 2 complete cross-sections, of about 8,500 and 9,500', respectively, to determine the strike and dip of all the strata on the property. These sections are about 1,000' apart, and the contact of the Keweenawan series with the eastern sandstone has been definitely located by drilling. Numerous drill holes have been bored, with depths ranging from 200' to more than 2,000'.

Diamond drilling was begun 1909, and ended 1911, with the No. 15 hole. Several cupriferous amygdaloidal beds were disclosed, and 2, underlying Nos. 6 and 8 conglomerates, have been correlated as extensions of Nos. 1 and 2 of the Adventure series of lodes. No. 1 bed, of about 33' width, showed 10' fairly charged with copper and No. 2 bed was lean. The formations above No. 8 conglomerate bed are practically unexplored, and excepting the work done in holes Nos. 3 and 7 remain entirely untouched. The results obtained from holes 3, 7 and 13, below this conglomerate bed, were very promising and a vertical shaft was therefore started July, 1913, in the

vicinity of No. 3. At a depth of 300' a crosscut to the N. W. was started. This cut through No. 8 conglomerate at 210' from the shaft. At 730' the crosscut broke through into overburden. A 200' winze, 30° incline, was sunk and 100' gained in depth. On the 400' level exploratory work for the lodes developed on South Lake property was continued, but with little success in finding commercial rock. At a distance of 1,050' N. W. of the shaft the crosscut broke through into the overburden. In the summer of 1915 shaft sinking was resumed, and by June, 1916, had been bottomed on the 800' level.

Equipment: includes a Nordberg hoist good for depth of 1,200', a small air compressor, boarding house and other necessary mine buildings.

The North Lake is an exploration company, but in view of the encouraging results secured by diamond-drill borings on this and adjoining properties, is considered promising and the present management is good.

NORTH LARAMIE PEAK COPPER MINING CO. WYOMING

Office: Esterbrook, Wyo. **Mine office:** Douglas, Converse Co., Wyo. H. C. Saul, pres.; L. V. Saul, sec.; W. A. Saul, treas. **Inc.** 1908 in Wyoming. **Cap.,** \$2,000,000; shares \$1 par; fully paid and nonassessable; 500,000 shares in treasury.

Property: 29 claims, 440 acres, patented, in the North Laramie Peak district. Claims show pre-Cambrian schists bordering granite contacts, on which 1,000' of diamond-drill work has proven existence of a flat body of disseminated chalcopryrite ore 40' wide. A shaft has been sunk 100' on a chimney of chalcopryrite ore said to assay 27% copper, 6 oz. silver and \$2 gold, for a total width of 5'. A second shaft, also in ore, will be deepened to 200'.

Equipment: includes 80-h. p. boiler with hoist, Cameron pump, steam power and a 3-drill compressor. Expects to start shipments in 1916. Is a close corporation, entirely owned and financed by Messrs. Saul.

NORTH MIDAS COPPER CO. ALASKA

Office: 50 Congress St., Boston, Mass. **Mine office:** Strelna, Alaska. **Officers:** Geo. Hale Brabrook, pres.; Allen T. Nye, Jr., v. p.; J. F. Crane, sec.-treas.; with A. W. Neal, Geo. M. Wheeler and O. J. Berg, directors. **Inc.** 1916 in Maine. **Cap.,** \$1,500,000; shares \$1 par. * Stock listed on Boston Curb. Old South Trust Co., Boston, registrar and transfer agents.

Property: in Kotsina-Chitina region, 15 miles from Strelna, on the Copper River and N. W. R. R., adjoins the holdings of the Alaska Cons. C. Co. Developed by 3 adits, totaling 1,600' in length, which have so far failed to disclose ore. A prospect.

NORTH MOUNTAIN MINING CO. NEVADA

Controlled by John Dern, Box 1,418, Salt Lake City, Utah. **Property:** 11 patented claims in Gold Canyon district, near Cherry Creek, White Pine Co., Nev. Idle many years.

NORTH PINAL MINING CO. ARIZONA

C. W. Cisncey, pres., 228 E. Jefferson St., Phoenix, Ariz. **Property:** formerly held by La Coronado Development Co., is in the Mineral Hill district, 10 miles from Price, Pinal Co., Ariz. **Development:** by a 300' shaft, shows a lens of copper ore at depth of 260' in the shaft, said to carry up to 70% copper. Ore is mainly bornite. **Equipment:** includes a 25-h. p. gasoline hoist and an air compressor.

NORTH STAR MINES CO. CALIFORNIA

Offices: 22 William St., New York; 15 Exchange Pl., Jersey City, N. J.; Grass Valley, Calif. **Officers:** Geo. B. Agnew, pres.; Sidney M. Colgate, v. p.; with Jas. Douglas, Wm. Hague and Wm. Church Osborn, directors; W. D. Pagan, sec.-treas.; A. B. Foote, gen. supt.

Inc. April 10, 1899, in New Jersey. Cap., \$5,000,000; shares \$10 par; \$2,500,000 outstanding. Stock is listed on Boston and San Francisco Exchanges. New York office and Old Colony Trust Co., Boston, transfer agents. Central Trust Co., New York, registrar. Annual meeting, second Wednesday in April.

Income Account for 1915:

Receipts:	Expenses:
Balance end of 1914.....\$1,019,083	Total operating expenses..\$ 525,948
Total production (N. Star) 1,089,751	Development expenses..... 103,895
Interest and dividends..... 40,086	Improvements 100,412
Production Champion Mines 205,333	Property purchases..... 81,524
	Champion Mines..... 350,005
	Dividends 250,000
	Balance Dec. 31, 1915..... 942,469
	<u>\$2,354,253</u>

Balance Sheet:		Plant	Champion		
Assets:	Property	Improv'm'ts	Mines	Current	Total
1915.....	\$1,489,512	\$222,070	\$854,757	\$942,469	\$3,508,808
Liabilities:		Capital Stock	Balance Dec. 31		Total
1915.....		\$2,500,000	\$1,008,808		\$3,508,808

Dividends: 2% in 1899; 5% in 1903; 6% in 1904; 8% in 1905; 10% in 1906 and 1907; 15% in 1908; 23% in 1909 and 1910; 17% in 1911; 12% in 1912 and 1913; 18% in 1914; 10% in 1915.

Property: the North Star mine, 1½ miles S. of Grass Valley, and the Champion mine, at Nevada City, Nevada Co., Calif.

The North Star, the main producer of the group, was discovered 1851 and operated continuously to date, with exception of 10 years, 1874-1884, first by the original locators and later by the North Star Quartz, the North Star Gold Mining Co., and the North Star Mining Co. The ore carries gold and silver in a quartz gangue, the precious metals occurring free or associated with pyrite, galena and sphalerite. The veins have a maximum width of 5', with ore shoots averaging 400 to 600' long and proven for 2,000' in depth.

Development: in 1915 amounted to 9,988', done on and above the 3,400' west level with favorable results. The extension of the east drifts on the 5,600' and 6,000' levels has thus far failed to locate the orebodies worked on the 5,000' and 5,300' level.

A promising new vein, intersected at 6,225', is under development at the 6,300' level in 1916. The discovery of this vein in 1915 led to an apex-suit brought by the Empire M. & Improvement Co., which claimed that the vein belonged to the Pennsylvania W. Y. O. D. vein system and asking for an injunction to restrain further alleged illegal extraction of ore. A counter-suit was brought by the North Star Co. asking \$15,000 damages for ore alleged to have been wrongfully mined by the Empire Co. The dispute was settled out of court in 1916 by an agreement giving each company practically an equal share of territory traversed by the vein in question.

The **Champion** mine, at Nevada City, is developed by the Providence shaft, 1,926' deep, with a total of 5,529' of underground work done in 1915. Nothing of importance was discovered and management plans development below the 2,400' in 1916. Operations at the Champion property resulted in a total operating deficit of \$143,384. **Equipment:** includes Laidlaw-Dun-Gordon air compressor, duplex hoist, electrically-driven tramway, 80 rock drills.

Milling Plants: company operates 3 mills, the North Star and Central

at Grass Valley and the Champion at Nevada City. The North Star and Central mills have 40-stamps of 1,050 lbs. each. The ore is hoisted from the Central shaft in automatic-dump skips to the bins and hauled in side-dump cars to the mill. It is dumped into 2 bins, each of 200 tons capacity, fitted with 1½" grizzlies, the oversize going to a 9" x 15" Blake crusher set with 1½". The crushers are run wet, discharging to the portion of the bin beneath the grizzly. The ore is fed to the crushers through a steel chute, fitted with vertical grizzly bars, which can be dropped to check the flow of ore, allowing the waste rock to be rejected, without going through the crushers.

The stamps are driven as 4 batteries by a 100-h. p. motor. From the batteries the pulp flows over eight 3'x20' amalgamation plates; the recovery by amalgamation is about 79%. The tailings from the plates go to 9 Dodd buddles, 8' in diam., making concentrates, middlings and tailings. The concentrates from the buddles go to a 2½" centrifugal pump, which elevates them to a 24" dewatering cone; the underflow of this cone goes to a 5'x10' tube mill driven by a 20-h. p. motor, is run over a 3'x6' amal. plate and thence to a 24" cone. The overflow goes to the cyanide plant, where it passes through 4 Merrill classifiers, Dorr thickeners, sand-vats (100-ton each), slime agitators, Oliver filters and Merrill presses. The average grade of ore milled is \$10 per ton, extraction is at the rate of \$10, and total operating costs are \$0.936.

Production: of the North Star mine in 1915 was 109,860 tons of ore, mainly from stopes above the 3,400, 4,000 and 4,400' levels, yielding \$9.92 per ton crushed, at a total cost of \$5.74 per ton. Of the total production about 80.37% was obtained in the mills by amalgamation and 19.63% by cyanidation. Management estimates that 97.4% of the total gold and silver values was recovered. Four hundred men employed.

NORTH THOMPSON (ASSOCIATED) GOLD MINES, LTD.

ONTARIO

Is a subsidiary of Associated Gold Mines of Western Australia. **Offices:** 20 Copthall Ave., London, E. C., England, and 310 Dominion Express Bldg., Montreal. Capt. H. B. Hooper, chairman; Dr. J. M. Bell, managing director; with Ed. Hooper, E. F. McCarthy, Herman Landau, F. H. Hamilton, A. H. Collier, B. Brookman, directors; R. Davidson, London, sec.

Inc. Nov. 26, 1914. Registered in London, Feb., 1915. **Cap.** £200,000; shares £1 par; 101,750 shares outstanding.

Property: the North Thompson mine, 40 acres, between the Vipond and Porcupine Crown mines, on the S. W. ¼ of S. ½ of lot 10, in Tisdale Twp., Cobalt, Ont. Mine has several lenticular veins of quartz, schist and iron pyrite, said to be 2½' wide and to show good gold values.

Development: by 300' 3-compartment shaft with about 400' of cross-cutting and drifting. The ground is also being prospected by diamond drilling. **Equipment:** includes air compressor, hoist, one 60-h. p. and one 40-h. p. boiler, power house, blacksmith shop and office buildings. Employs about 25 men.

NORTHERN CUSTOMS CONCENTRATOR, LTD.

ONTARIO

Office: Traders Bank Bldg., Toronto, Ont. A. J. Young, pres.; M. F. Fairlie, supt.; F. J. Bourne, cons. engr. Operates a 200-ton, 80-stamp concentrating mill north of the La Rose mine, at Cobalt, Ont.

NORTHERN LIGHT COPPER CO.

NEVADA

Yerington, Lyon Co., Nev. **Property:** 6 claims, 20 miles east of Yerington, said to have produced some 16.4% copper ore. No recent returns secured.

NORTHERN LIGHT DEVELOPMENT MINING CO. ALASKA

Latouche, Latouche Island, Alaska. Inc. about 1909 in Washington. Cap., \$1,000,000; shares \$1 par. Lands: 6 claims, on an island in Prince William Sound, opposite Latouche island, slightly developed by tunnels and by a blind shaft, sunk from a crosscut, showing 6' of auriferous and argenterous chalcopyrite. A 250' tunnel driven in 1914 said to show a 2' vein. No returns secured.

NORTHERN LIGHT MINING & MILLING CO. IDAHO

Office: Wallace, Idaho. Mine office: Kellogg, Shoshone Co., Idaho. Officers: John H. Nordquist pres.; Rush J. White, v. p.; Leroy Hooper, sec.-treas.; Benj. G. Harmon, gen. mgr.; with B. N. Barnett, directors. Sidney E. Harmon, supt.

Inc. Jan., 1915, in Idaho. Cap., 1,500,000 shares; 5 cts. par; assessable; first assessment of 4 mills levied Aug. 25, 1915; 576,000 shares outstanding. Annual meeting, May 10, at Wallace. Management reports \$8,000 expended on development work since June 1, 1915, and \$8,000 cash on hand, Dec., 1915.

Property: 5 claims, surveyed for patent, 50 acres, on Pine Creek, Coeur d'Alene district, about 5 miles W. of Kellogg. Mine has ore shoots 100' x 200' x 6' in width, in quartzite, running N. 70° W., with dip 65° S. Ore is sulphide, said to average 7% lead, 2.5 oz. silver, with some zinc.

Development: by 500' tunnel and 200' vertical shaft being sunk to 400' level. Equipment: includes air hoist, Ingersoll-Rand compressor, electric power, Gould triplex and Cameron pumps.

Management estimated reserves of 12,000 tons, Jan. 1, 1916. Systematic development work planned for 1916.

NORTHERN ORE CO. NEW YORK

Edwards, St. Lawrence Co., N. Y. Officers: T. I. Crane, pres.; W. S. Pilling, treas.; Justice Grugan, mgr. Inc. in New York and operated as a close corporation.

Property: 650 acres, extending over 12 miles in a N. E. direction from Fowler to Edwards, lies within a talc-zinc belt, showing highly metamorphosed pre-Cambrian crystalline rocks. Mine has limestone and serpentine formation with veins, 6" to 14' wide, of sphalerite and pyrite, striking N. E. and dipping 40-50° N. W.

Development: to depth of 500' by 2 vertical shafts and diamond drill holes. Equipment: includes steam and electric power, machine shop, power house and office building. The 150-ton concentrating mill started operations 1915. Ore is delivered from the mine over a trestle to the ore bins, where it is fed automatically to the rock crusher below. From the crusher the ore passes to rolls and jigs, and finally to James concentrating tables. Wet magnetic separators effect the separation of the zinc and iron sulphides.

Production: mill treated 12,000 tons of ore during 1915. Present shipments of pyrite concentrate are at the rate of 45 tons daily.

NORTHERN PYRITES CO. ONTARIO

Office: 25 Broad St., New York. Robt. K. Painter, gen. mgr.; H. V. Smythe, supt. Is a subsidiary of the General Chemical Co.

Property: the Northern Pyrites mine on Vermillion Lake at North Pines, Ont., Canada, shows veins averaging 45' in width for 1,000' in length, with strike N. E. and dip 55° N. W. Mine said to have the largest pyrite deposit under development in Canada.

Equipment: includes 2-mile Leschen aerial tramway, Lambert hoist, compressor and concentrating mill. Shipments to the United States are made via Graham on the Grand Trunk Pacific R. R. and the Great Lakes. Employs 130 men. Company does not publish financial or statistical reports. Property reported on by Walter Harvey Weed.

NORTHERN SIERRA MADRE MINING CO.**MEXICO**

Address: D. E. Alexander, Humboldt Savings Bank Bldg., San Francisco, Cal. Mine near Soyopa, Sonora, Mex. **Officers:** Chas. K. Blender, pres.; Carlo Giovannetti, v. p.; John O'Donnell, sec.; Fred Townsend, treas.; preceding, with D. E. Alexander, Fred Trevarrow and E. C. Curtis, directors; F. R. Luckhardt, gen. mgr. Inc. Aug. 2, 1901, in California. **Cap.**, \$300,000; shares \$1 par.

Property: 167 acres, including La Reina de Cobre and Providencia copper mines and El Colosus silver-lead mine, 25 miles west of Suaqui de Batuc. La Reina shows diabase, shale and limestone, carrying orebodies of oxidized and sulphide ores, with quartz gangue, estimated to average 15.5% copper, 20% lead, a trace of zinc, 73 oz. silver and \$8 gold per ton.

Development: by 633' of workings. Management estimates 4,854 tons of ore in sight, with 3,214 tons blocked out for stoping. Closed down owing to Mexican revolution.

NORTHERN VALLEY MINING CO.**MONTANA**

Officers: S. F. Mallette, pres.; Godfrey, Ill.; Walter K. Mallette, v. p.. Anaconda, Mont.; H. W. Wilson, sec.-treas., Twin Falls, Idaho. Inc. 1912 in Arizona. **Cap.**, \$1,000,000; shares \$1 par; 600,000 shares issued. Controlled by the American Metal Mining Ass'n of Arizona.

Property: consists of the holdings of the defunct Amazon-Montana Development Co. in Amazon district, Jefferson Co., Mont. Idle and no work contemplated in near future.

NORTHLAND COPPER-GOLD GROUP.**ALASKA**

Office: Ernst & Buddenborg, 518 Hinckley Bldg., Seattle, Wash. **Property:** 8 claims, in Ketchikan district, west coast of Prince of Wales island, S. E. Alaska, said to show a 600 to 800' mineral zone containing numerous veins, traceable for 3 miles. Claims show limestone and greenstone porphyry intrusions, with flat dipping veins alongside, that run N. E. and S. W. The veins are from 1 to 8' thick and contain lenses of ore with chalcopyrite mixed with pyrite, lying beneath the green stone hanging wall.

Development: by 70' crosscut tunnel and a 50' shaft, showing 3' of ore. A 112' tunnel taps this shaft and shows 18" solid 20% ore, according to owners. Shipments of 153 tons are said to have returned 10.05% copper, 26.3% iron, 14.2% silica, \$1.38 in silver and gold, or a total value of \$19.84 per ton. Smelting rate to Tacoma is \$1.50 per ton for this ore. No recent returns secured.

NORTHPORT SMELTING & REFINING CO.**WASHINGTON**

Northport, Stevens Co., Washington. **Officers:** J. L. Day, pres.; E. R. Day, sec.; with Edw. Boyce, E. R. Knight and F. M. Rothrock, directors; Sam. James, mgr.

Inc. Sept. 25, 1915, in Idaho, as a reorganization of the Northport S. & R. Co., Ltd. **Cap.**, \$1,000,000; shares \$1 par. Company owns the Northport smelter, built on the site of the old Le Roi Mining Co.'s plant. The new \$500,000 plant was blown in March 7, 1916. **Equipment:** 2 lead furnaces, 42" wide and 16' long, of 300 tons daily capacity, are now in operation and a third furnace is being added. Employs 150 men. Company is treating ores from the Hercules and Tamarack & Custer, but plans to do a general custom business.

NORTHWEST MINES DEVELOPMENT CO.**WASHINGTON**

Office: 204 Paulsen Bldg., Spokane, Wash. Mine office: Keller, Wash. **Officers:** Wm. E. Johnson, pres.-supt.; H. J. Lefevre, v. p.; Harry J. Neely, sec.-treas.; Wm. E. Malm, Keller, mgr.; preceding, with Henry Osterman, H. J. Earnest, directors.

Inc. Dec. 15, 1915, in Wash. **Cap.**, \$200,000; shares \$100 par; 500 out-

standing. Authorized bond issue, \$300,000; none issued. Annual meeting, 2nd Monday in January.

Property: 17 claims, 330 acres, surveyed for patent, 12 claims in Okanogan county and 5 in Ferry county, said to show zinc, gold, silver and lead ore in fissure veins and disseminations in granite. **Development:** by 2,000' of tunnels and diamond drilling, 140' vertical shaft with 480' of underground workings, of which 435' are claimed to be in ore averaging 1.83% copper, and 32' in copper-zinc ore, assaying 14% zinc for 10'.

Equipment: includes electric power and 150-ton smelter at Keller. Machinery to be installed in 1916. Only meagre development done to date. Secretary reports, June 13, 1916: "Ore reserves unknown, but immense."

NORTHWESTERN LEASING & DEVELOPMENT CO. ARIZONA

Reported operating property of the New Planet Copper Mining Co. under lease in 1916. See New Planet.

NORTHWESTERN METALS CO. MONTANA

Shared the fate of all Marcus L. Hewitt promotions. Bankrupt. Entire property reported sold by court for \$22,000, July, 1916. Fully described Vol. XI, Copper Handbook.

NORTHWESTERN MINING CO. IDAHO

Idle. Prof. W. B. Clark, Johns Hopkins University, Baltimore, Md., pres. Owns a copper mine near Lucile, Idaho Co., Idaho. Described in Copper Handbook, Vol. XI.

NORWEGIAN CONSOLIDATED MINING CO. CALIFORNIA

Office: Pacific Bldg., San Francisco, Calif. **Property:** the Norwegian mine, ½ mile S. E. of Melones, Tuolumne Co., Calif., has a 4" vein of quartz with rich tellurides in amphibolite schist. Vein strikes N. 12° W., with dip 54° E. Developed by 550' incline shaft.

NOVEMBER MINING CO. NEW MEXICO

W. H. Kinnon, mgr., Steins Pass, N. Mex. Inc. 1913, in New Mexico, to take over a group of claims, including the World's Fair and Louise, at Granite Gap, 12 miles S. of Steins Pass. Mine shows silver-lead-copper-zinc ore in veins in a contact between limestone and granite.

Development: by shafts, tunnels and diamond drilling. **Equipment:** includes compressor and tramway. Has been an intermittent shipper for several years.

NYMAN CONSOLIDATED MINES CO. CALIFORNIA

Office: 502 Humboldt Bank Bldg., San Francisco, Calif. Mine office: Jamestown, Tuolumne Co., Calif. **Officers:** A. L. Trowbridge, pres.; R. W. Barrett, v. p.; F. G. Mudgett, sec.-treas.; with O. H. Duncanson, directors; C. E. Shafer, supt.

Inc. March 19, 1915, in Calif. **Cap.**, \$200,000; shares \$1 par; assessable; 119,785 shares issued. Gross earnings in 1915 were \$22,117, and operating expenses \$20,994. Cash in banks, \$19,146 on March 31, 1916.

Property: 5 patented claims, 240 acres, on the Mother Lode, between Quartz and Stent, 2 miles S. of Jamestown, shows a contact fissure in amphibolite schist and greenstone formation. Main orebody from 10-25' wide has strike N. 35° W., with dip 58° E. Ore averaging \$10 per ton occurs in shoots and streaks, cutting Calaveras slates.

Development: by 12,500' of underground workings, consisting of 600' tunnel, 615' vertical shaft and 850' incline shaft, with levels at 400', 600' and 800', crosscut 200' E. on the 400' level with 500' S. drift and 400 crosscut W. on the 600' level. The mine was closed down in 1907, without ore reserves. In Jan., 1916, management estimated 150,000 tons above the 600' level and 25,000 tons blocked out.

Equipment: includes 2,000' double-drum hoist, 750 cu. ft. air com-

pressor, pumps, electric power and 200-ton 40-stamp mill, with Frue vanners for 20 stamps. Average grade of ore treated in 1915 was \$60.50 per ton, the mill making an extraction of 85%. Total cost was \$2.50 per ton.

Production: for 9 months ending May 1, 1916, was 5,525 tons, yielding \$31,092. Output to date about \$2,000,000. Management plans adding tube mills in 1916 and operating mill to capacity.

NYMO ZINC & LEAD CO., INC.

MISSOURI

Office: 34 Wall St., New York. **Officers:** Benj. L. Love, pres.; John L. Morrison, principal owner, v. p. and sec., Germantown, Phil., Pa.; above, with W. H. Johnson, Douglas Fenwick and Hugh T. Halbert, directors; E. R. Cowan, treas.

Inc. Feb. 25, 1916, in New York. **Cap.**, \$100,000; shares \$5 par; outstanding, \$50,000. Douglas Fenwick & Co., 34 Wall St., New York, transfer agent. Franklin Trust Co., New York, registrar. Listed on New York Curb. Dividends: 1%, paid April, 1916.

Financial statement of April 21, 1916, shows cash, \$1,865. Gross receipts from ore sales, \$7,004; cost of production, \$3,523.

Property: formerly known as the Brattleboro mining lease, 6 acres, in East Joplin mining district, has lead-zinc ore occurring at 65'-86' in depth, said to be proven by 6 drill holes. **Development:** a shaft with drifts east and west for only 30'. **Equipment:** includes hoist and 2 boilers.

OAKLAND COPPER BELL MINE.

NEVADA

Owens group of claims in the Pumpkin Hollow section of Yerington district, Lyon Co., Nev., developed by a 40' shaft showing 3' of ore, said to carry 7% copper with 5 oz. silver and \$2 gold. Made small shipments in summer of 1913. Presumably idle.

OAKS CO.

NEW MEXICO

Alma, Socorro Co., N. Mex. W. J. Weatherby, pres.; H. A. Hoover, sec. **Property:** the Pacific, Hub and a portion of the Johnson groups, 500 acres, in the Cooney, or Mogollon district, about 80 miles by daily stage from Silver City, the nearest railway point. Also has a bond on 200 acres additional, including the Eberle and McKinley groups. The company is developing its mines and shipping ore, also driving the Oaks tunnel, which will start at Mineral creek and crosscut the Gray Hawk, Socorro, Pacific and other veins in its 9,800' length. It will be used as a main drainage and haulage tunnel for the district. The Eberle, McKinley, Dewey and Johnson No. 7 mines are developing and ore is shipped intermittently to the Crown mills.

OATMAN CRESCENT MINING CO.

ARIZONA

Office: 25 Broad St., New York. Mine office: Oatman, Ariz. **Officers:** Geo. W. Peirce, pres.-gen. mgr.; W. T. Esser, v. p.; Gowan Peirce, sec.-treas.; with A. G. Reynolds, directors.

Inc. 1915. **Cap.**, 1,000,000 shares; 400,000 issued. Security Transfer & Registrar Co., New York, registrar and transfer agents.

Property: 9 claims, 170 acres, 4 miles S. E. of Oatman, said to show 3 strong veins outcropping at surface for 3,000' in length and giving average assays of \$6.13 per ton in gold. The veins strike N. W. and dip steeply S. The Highland Chief vein from 10-40' wide, consists of altered and brecciated wall rock, with quartz and calcite, associated with black oxide of manganese.

Development: by 112' crosscut tunnel, several shallow pits and openings. **Equipment:** includes 50-h. p. engine, compressor, jackhammers, etc. Management plans driving the tunnel to 500'. Is regarded as a promising prospect.

OATMAN GOLD MINING & MILLING CO. ARIZONA

Kingman, Ariz. Eli Hilty, pres.-mgr.; S. W. Klass, sec. Inc. 1915 in Arizona. Cap., \$1,000,000; shares \$1 par.

Property: 10 claims, about 160 acres, in the Tom Reed Gold Road mining district, shows several well defined veins with stringers of quartz and calcite carrying free gold.

The Kokomo vein is a fault fissure, 40' wide at surface, and said to show for 4,500' on company's ground, with strike N. 62° W. and dip 80° N. E., cutting the andesite, or occurring in a contact between rhyolite and andesite.

Development: a 500' shaft was sunk on the Kokomo vein in 1915 and crosscuts are being run N. and S. **Equipment:** includes compressor and 25-h. p. hoist. Management hopes to cut the main orebody within 90' of the shaft on the 500' level. A prospect. Reported on by E. W. Brooks.

OATMAN NORTH STAR MINES CO. ARIZONA

Oatman, Ariz. A. O. Parsons, pres., with C. E. Gilman, R. R. Moore and Lloyd Tevis, directors. Inc. 1915 in Ariz. Cap., \$150,000; shares 10 cts. par. Stock is listed on San Francisco and Los Angeles Exchanges.

Property: 17 claims, 250 acres, at Oatman, claimed to carry extension of Tom Reed vein system. Sinking a 400' shaft in 1916.

OATMAN PIONEER MINES, INC. ARIZONA

Oatman, Ariz. E. H. Dawson, mgr. Inc. in 1915. **Property:** a group of patented claims, including the Pioneer, formerly owned by the Pioneer Cons. Mines Co., 2 miles from Oatman, said to carry a vein, outcropping at surface from 10'-50' wide and proven to depth of 200'.

Development: by 400' main Pioneer shaft and several hundred feet of drifts. **Equipment:** includes 10-stamp mill, cyanide plant, 80-h. p. engine, compressor and 2 hoists. Messrs. Keith & Keith, of Boston, have taken a working option on the mine and are developing same, June, 1916, with view to purchase.

OATMAN SOUTHERN MINING & MILLING CO. ARIZONA

Oatman, Ariz. **Officers:** S. R. Porter, pres. and treas.; B. W. McCloskey, v. p.; with R. C. Curry, directors; Mrs. J. C. Garinger, sec.

Inc. Oct. 9, 1915, in Ariz. Cap., \$100,000; shares 10 cts. par; outstanding, 520,000. Security Transfer & Registrar Co., New York, transfer agt. and registrar. Listed on New York Curb as a prospect.

Property: 11 claims, 220 acres, in S. W. end of the Oatman camp, on the Black Range vein system. **Development:** 2 inclined shafts, 64' and 108' deep, on the veins, said to show bodies of low-grade quartz ore. Shafts are 280' apart, but said to be unfavorably located for development purposes, so a new shaft was started. In April, 1916, about 500' of development work had been done.

OATMAN SYNDICATE MINING CO. ARIZONA

Oatman, Ariz. **Officers:** J. L. McIver, pres.-mgr.; Geo. W. Long, v. p.; C. W. Herndon, sec.-treas. Inc. Oct. 29, 1915, in Ariz. Cap., \$100,000; shares 10 cts.; 500,000 shares issued. Valley Bank, Phoenix, Ariz., transfer agent. Operating expenses to March, 1916, were \$30,000.

Property: the Putney group, 11 claims, 4 patented, about 200 acres, 6 miles S. of Oatman, embraces about 3,500' on the main Black Range-Nellie Iode system. Mine shows a quartz contact deposit surrounded by andesite, rhyolite and granite, with N. W. strike and dip of 45°.

Development: by 400' vertical shaft. Drifts are being run both ways on the vein from the 400' level. **Equipment:** includes 40-h. p. hoist, 5-drill compressor and gasoline power.

OATMAN UNITED MINES CO. ARIZONA

Oatman, Ariz. **Officers:** Chas. S. Sprague, pres.; C. C. Spicer, v. p.;

C. P. Campbell, sec.-treas.; J. K. Turner, cons. engr. Inc. 1915 in Ariz. Cap., \$2,000,000; shares \$1 par; 750,000 shares in treasury.

Property: 150 acres, surveyed for patent, 1½ miles N. E. of Oatman, adjoining the Big Jim on the S. and the Tom Reed on the S. W., shows 3 well defined, gold-bearing fissure veins in andesite and along andesite-rhyolite contact. The ore is oxidized and occurs irregularly.

Equipment: includes 5-drill Ingersoll-Rand compressor, 40-h. p. hoist and 50-h. p. engine. Management plans sinking a 500' two-compartment shaft between the North and South veins. A prospect.

O'BRIEN MINING CO.

ONTARIO

M. J. O'Brien, Cobalt, Ont., owner. R. H. James, mgr.

Property: the O'Brien mine, a promising silver producer at Cobalt. **Development:** by 6 shafts to depth of 200', with considerable crosscutting, raising, drifting and stoping.

The mill treated 51,892 tons of ore in 1914. **Shipments:** 1,237,345 oz. silver. Royalty paid to government was \$5,898 in 1914, with total payments to date of \$700,966. Company reported to have acquired new holdings in the district in 1916 and is planning extensive exploratory work with diamond drills.

OCEANIC QUICKSILVER MINE.

CALIFORNIA

Murray Innes, owner and mgr., Cambria, San Luis Obispo Co., Calif. Thos. Knowles, supt. Gross earnings in 1915 were \$110,000 and operating expenses \$75,000.

Property: 3 patented claims, 500 acres, about 5 miles E. of Cambria, shows a contact deposit 800'x650'x20' in width running N. W., with nearly vertical dip, in serpentine and sandstone formation. The ore contains cinnabar and iron sulphide, assaying 0.4% quicksilver.

Development: to depth of 650' by 300' vertical winze and 1,500' tunnel. Underground workings total 5,000'. **Ore reserves:** estimated by owner at 300,000 tons with 150,000 tons blocked out, March 1, 1916. **Equipment:** includes 25-h. p. hoist, compressor, pump, ½-mile wire tramway and 20-ton concentrating mill.

Recent production: 1,125 flasks in 1913; 1,256 flasks in 1914; 1,213 flasks in 1915. Concentrates average 5% quicksilver. Average price received during 1915 was \$91 per flask.

OCTAVE MINES CO.

ARIZONA

H. C. Gibbs, pres., 60 State St., Boston, Mass. **Property:** the Octave gold mine, an old mine with a record of \$2,000,000 produced. Shows same geologic features as the Congress mine, 10 miles to east. The rocks are granitic, intruded by acidic and basic dikes, including some of post mineral age.

Development: to depth of 2,000' and for 1,400' along the vein; 500' of new work done in 1914-15, mainly E. of a fault that cut off the ore on the 8th level, has shown an orebody 270' long, 2.2' thick, averaging \$10 per ton, separated by 25' of lean vein from 90' of \$13.44 ore that is 4' wide. Property examined by J. Nelson Nevius, 1916.

OCTO MINING CO.

NEW MEXICO

Office: 112 East State St., Redlands, Calif. Mine at Lordsburg, Grant Co., N. M. **Officers:** N. W. Halt, pres.; G. S. Turrill, v. p. and sec.; C. S. McWhorter, treas.; A. G. Hubbard, F. L. Winsor and C. C. Reasoner, directors; E. K. Davis, gen. mgr.; Chas. Pickenbeck, mine supt. Inc. Nov. 15, 1912, in California. Cap., \$500,000; shares \$1 par; issued, 300,000. Annual meeting, third Thursday in December.

Property: shows a deposit of ore said to average 15% copper. A 2-compartment shaft is being sunk 500' in 1916. **Equipment:** includes 2 small hoists, air compressor and 50-h. p. boilers. Digitized by Google

O. F. & L. MINING CO.**MISSOURI**

Duenweg, Jasper Co., Mo. Inc. in Missouri. **Cap.**, \$30,000. Operates a sub-lease on 20 lots in Sec. 3, T. 27, R. 32, Duenweg, owned by the Boston Duenweg Mining Co. and held under lease by the Wilson Mines Co.

Development: by 185' shaft, 2 shallow shafts and drill holes, exposing 14% zinc blende. **Equipment:** includes 250-ton concentrating plant, boiler, pump, steam power, Freman crusher. Fifteen men employed. Is a steady producer.

OHIO & COLORADO SMELTING & REFINING CO. COLORADO

Office: 822 A. C. Foster Bldg., Denver, Colo., and 52 Broadway, New York. **Works:** Salida, Chaffee Co., Colo. **Officers:** J. C. Kortz, pres.; B. Hochschild, v. p.; Max Schott, sec. and gen. mgr.; C. M. Loeb, treas.; E. H. Laws, supt.

Cap., \$3,000,000. Is controlled, through stock ownership, by American Metal Co., Ltd. Company owns no mines, but owns and operates the Salida smelter of 1,000 tons rated daily capacity, doing a general custom business. The plant has a 300-ton sintering plant, a sampling mill, 6 lead blast-furnaces, 48x180", of 250-ton daily capacity, and handles mainly silver-lead ores. The only copper treated is that bought with lead ores, which is concentrated to about 40% tenor.

OHIO COPPER CO.**UTAH**

Liquidated and properties and assets transferred to the Ohio Copper Mining Co., which see. Old company fully described in former volumes.

OHIO COPPER MINING CO.**UTAH**

Office: 61 Broadway, New York. **Operating office:** Salt Lake City, Utah. **Mine and works office:** Lark, Salt Lake Co., Utah. **Officers:** W. O. Allison, pres.; M. Levy, treas.; R. Victor, D. G. Bogert and H. H. Boyesen, directors; Chas. W. Saacke, sec.

Inc. July 8, 1912, in Maine. **Cap.**, \$8,000,000; shares \$5 par, \$3 paid; issued, 1,300,000. Funded debt \$2,000,000, first mortgage convertible 6% bonds; \$1,246,000 outstanding, due Sept. 1, 1917, interest payable March and Sept. 1, with proviso for \$120,000 sinking fund each year, met July, 1913, by the novel, questionable, but apparently only available method, of cancellation of that amount of treasury bonds. J. L. Williams, 74 Broadway, New York, and David Fullam, Boston, transfer agents; Empire Trust Co., New York, and International Trust, Boston, registrars. Annual meeting, first Wednesday in June at Portland, Me.

Company went into receivers' hands Sept. 16, 1914. In August, 1915, the Empire Trust Co. filed suit to foreclose a mortgage given to secure \$2,000,000 worth of bonds. The company is now in charge of a trustees' committee, headed by H. T. Catrow and Chas. T. Lark, both large stock and bondholders.

The mine and mill were leased to the General Exploration Co., which company operated the mine, treating 2,000 tons of ore per day. The lease on the property ran to May 20, 1916, and called for a minimum royalty of \$6,250 a month, this amount covering the interest on outstanding bonds and current expenses.

Foreclosure of the mortgage took place Aug. 22, 1916, and the reorganization planned provides for consolidation of the Bingham Central Railway (owning Mascotte tunnel) in a new corporation with cap. of \$2,750,000 and \$2,250,000 6% cumulative repayment convertible bonds. Stockholders of Ohio company can subscribe for new bonds at par and bonds will be used on basis of \$75 new bonds for each \$100 old. If 75% of the B. C. Railway & Tunnel Co. bonds enter reorganization, the new company

will receive the railway free of debt for \$453,375 stock and an equal amount of bonds.

New stock will be pooled for 5 years.

Property: 14 claims, patented, 120 acres, bounded on the N. and W. by holdings of the Utah Copper Co., on the E. by the Fortuna Mining & Milling Co., on the S. by United States Mining Co., and on the S. W. by the Boston Consolidated. The Mascotte tunnel, controlled by the Heinze Estate, through the Bingham Central railway, exacts a toll of 15 cts. per ton on all ore extracted through that avenue, yielding a very considerable revenue to the owners. The mineral property was bought by the old company from the Columbia Copper Mining Co., for \$245,000.

Geology: property carries some ore in veins along a mineralized zone with E.-W. strike and dip of 45° N., consisting of a belt of quartzite of 500' width carrying 2 parallel veins, known as the What Cheer and All's Well. These veins are more than 500' apart, and separated by mineralized quartzite which constitutes the main orebody of the property, the ore averaging 1.015% copper. The quartzite, which adjoins the laccolithic mass of monzonite-porphry of the neighboring Utah Copper and Boston Consolidated properties, is much shattered and broken, with ore disseminations and impregnations along shatter and cleavage planes, in the brecciated material, ore being chiefly chalcocite and chalcopyrite, associated with pyrite, readily amenable to concentration, and lying above the level of the Mascotte tunnel.

Estimates of ore developed vary greatly, the former management claiming that ore had been developed under about 5 acres, the porphyritic orebody being estimated as 400' wide, 1,000' long and 600' deep. One estimate gave 3,746,165 tons of ore developed with 9,738,690 tons of probable ore and the average tenor probably about that of the ore milled, or 1.01% copper.

The 14,000' double track Mascotte tunnel, connecting with the shaft at depth of 1,100', cares for the large volume of water coming from the workings. Ore is blocked out in 100' squares, with extensive development on the 3rd, 5th and 7th levels, and the caving system is used in extraction. Ore is sent from the upper workings, through chutes, to a 4,000-ton ore-bin, 20' wide and 200' long, extending over both tracks, loaded in about 4 minutes from the bins into trains of 18 to 20 five-ton double-bottom steel cars, and hauled by electric locomotives, to the concentrator at Lark.

The mill, at Lark, 3,200' from the mouth of the Mascotte tunnel, is 317' long and 391' deep, in 4 units, built in 6 terraces. Three of the 4 units are in commission handling 2,000 tons, daily. The unusual feature of this mill is the absence of water classification, the only hydraulic classification being by the jigs, and concentration is entirely by jigs and tables, with a few buddles that treat the very finest feed, there being no vanners. Equipment includes 2 coarse and 4 fine Blake crushers, elevators, trommels, conveyors, 4 roughing and 8 finishing rolls, of Allis-Chalmers make, 16 Monadnock Chilean mills, 144 jigs, 288 Wilfley and James tables, and Callow classifying tanks. The installation includes 51 motors, ranging from 15 to 150-h. p.

Three systems of milling have been tried since the mill went into operation. Originally the ore, coarsely broken by Blake crushers, was ground in Chilean mills. The Wall rolls were tried in 1912, only to be removed in order to obtain better results.

Property is so low-grade, it can only be worked at a reasonable profit when copper prices are high. If the company did not have to pay royalty on the Mascotte tunnel, it could operate profitably.

OHIO KEATING GOLD MINING CO.

MONTANA

Address: care Symons Dry Goods Co., Butte, Montana. Mine at Radersburg, Broadwater Co., Mont. Officers: Jos. Oppenheimer, pres.;

Jack Cohen, v. p.; C. H. Smith, sec.-treas., with B. Calkins and W. M. Tuohy, directors.

Cap., \$800,000, increased Dec., 1910, from \$500,000. Company had \$113,924 debts, July, 1914, and property closed down, pending decision of stockholders to change the stock from non-assessable to assessable and payment of an initial assessment of 15 cts. per share. Controlled through stock ownership by Radersburg Consolidated Mining Co.

Property: a promising, though small gold mine, producing some copper from pyrite ores found as shoots in strong fissure veins in igneous rocks. **Development:** to 1,000' level, with about 3,800' of drifts and crosscuts. **Equipment:** includes electric and steam pumps, electric hoist, mining cars and tools.

Fred T. Green examined the property in 1914 and estimated probable ore in mine at \$486,151, about \$116,914 worth of ore blocked out (6,680 tons) and \$90,000 worth of \$4 ore on the dump.

OHIO LEAD MINING & SMELTING CO.

NEVADA

Idle. Mine near Wells, Elko Co., Nev. Described in Copper Handbook, Vol. XI.

OHIO MINES CO.

ARIZONA

Office: 314 Outlook Bldg., Columbus, Ohio. H. W. Whitaker, pres.; T. D. Brown, v. p.; J. F. Rogers, sec.-treas.; preceding officers, R. S. Barbee, J. M. Rittenour, Jacob Sebastian, Thos. M. Murphy, W. G. Brossman, and J. S. Jones, directors. Inc. Jan., 1909, in Arizona. **Cap.**, \$2,500,000; shares \$1 par; in \$200,000 preferred and \$2,300,000 common stock; issued 1,482,908 shares; \$40,760 first 7% mortgage notes, \$38,160 issued. Annual meeting, third Monday in January.

Property: 14 claims, partly patented, 400 acres, with a 5-acre mill site, and water-rights on the Agua Fria river, 6 miles from the mine, in the Big Bug district. Property was bought of the Jessie Mines Co., whose promoters managed to escape jail.

Development: by 3 shafts, 659', 206' and 200' deep, with 7,000' of workings, and the mine is said to have produced upwards of \$750,000 in gold, under an ownership previous to that of the Jessie Mines Co. Property under lease, 1915, to Chaparral Mining Co., which is doing some development work.

OJIBWAY MINING CO.

MICHIGAN

Office: 1400 Alworth Bldg., Duluth, Minn. Mine office: Ojibway, Keweenaw Co., Mich. **Officers:** Dr. Lucius L. Hubbard, pres.; Chas. A. Duncan, v. p.; preceding with Thos. F. Cole, Chester A. Congdon, Chas. d'Autremont, Jr., Oscar J. Larson, Capt. Jas. Hoatson, Capt. Thos. Hoatson and John D. Ryan, directors; Frederic R. Kennedy, sec.-treas.. Henry B. Paull, auditor.

Inc. June 8, 1907, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; assessable; issued, \$2,100,000, \$15 paid. Levied a \$2 assessment Jan., 1910, payable \$1 March and \$1 Oct., 1910, and a \$1 assessment Dec. 10, 1912. Company began business with \$500,000 cash, and, on Dec. 31, 1912, last yearly report issued, had cash and accounts receivable of \$115,709, with \$9,808 accounts payable. Property was bought for \$459,919.29. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, first Tuesday in June.

Property: 1,560 acres, bounded on the north by the Cliff and on the south by the Seneca, includes the old Manhattan tract, Bacon & Jacob lands, bought of the Union Copper Land & Mining Co.

The Kearsarge bed was located, 1904, on the Miskwabik tract, about 4

miles N. E. of Mohawk No. 1 shaft, and was proven by 5 bore holes drilled across the formation at intervals of 1,200'. Four of these holes gave good cores, being especially rich well toward the northern limits of the tract. The drill holes showed the Kearsarge amygdaloidal bed to be divided into 7 alternations of amygdaloid and trap, immediately above the geological horizon of the Wolverine sandstone, the different cores each showing copper from either one or more of four horizons. Drilling indicates that copper values alternate from bed to bed, or layer to layer, if the cupriferous zone of the Ojibway be considered a single strata, only two of the amygdaloidal layers being well mineralized in a given cross-section, as a rule.

Development: by two 3-compartment shafts. No. 1, or north shaft, 1,500' from the northern boundary of the property, is 2,051' deep, disclosing copper from grass roots. Developments in this shaft show that the Kearsarge stratum is split in two, having distinct beds of 20' and 13' respectively, separated by 13 to 15' of trap. The 1,600' and 1,700' levels show good ore.

No. 2 shaft, 1,116' S. W. of No. 1, is sunk about 90' in the footwall, and is 1,954' deep, disclosing very little copper ground above 800', though a material betterment is noted below that depth, and a very marked improvement is noted below 1,500' depth. This shaft is sunk in unusually firm ground, requiring very little timbering. Work was suspended June 30, 1913, for lack of working capital, and generally discouraging results shown in development.

The mine is equipped for development to a depth of 2,000'. Development has been systematic, but the management planned making a mine upon 5-drill cores, which, as development has proven, gave rather too favorable an indication of the richness of the lode.

O. K. EXTENSION MINING & REDUCTION CO. UTAH

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. **Mine office:** Milford, Beaver Co., Utah. **Officers:** A. J. McMullen, pres. and gen. mgr.; T. M. Farrell, v. p.; Chas. A. Weaver, sec.-treas.; preceding with R. H. Greenhalgh, directors.

Inc. Nov., 1899, in Utah. Cap., 300,000 shares, 3 cts. par, assessable; issued, 125,000; total assessments to date, \$15,363. Annual meeting, second Tuesday in October.

Lands: 6 claims, 3 patented, 120 acres, near the Majestic mine, in the Beaver Lake district, show monzonite and quartz-porphry, carrying 2 fissure veins, of 5 to 24' estimated average width, traceable 150'. Opened by 7 pits and shafts of 15 to 510' depth, and a 150' tunnel, with 1,045' of workings, showing chalcopryrite estimated to average 2% copper. Inactive except for annual assessment work.

O. K. SILVER M. & M. CO. UTAH

David Keith, gen. mgr., Kearns Bldg., Salt Lake City, Utah. Thos. Kearns, pres.; W. G. Lamb, sec.-treas. **Inc. 1909, in Utah. Cap., \$100,000; shares 10cts. par, assessable. Property:** 33 claims in Erickson mining district, Indian Springs, Tooele Co., Utah. **Development:** by a 135' incline shaft, reported all in ore running better than 488 oz. silver and \$4.70 gold per ton. Developing and producing in 1916.

OKLAHOMA COPPER CO. ARIZONA

Mine near Florence, Pinal Co., Ariz. Company apparently out of business. Described in Copper Handbook, Vols. X and XI.

OLALLA COPPER MINING & SMELTING CO. BRITISH COLUMBIA

Office: Second National Bank Bldg., Paterson, N. J. **Mine office:** Olalla, Yale district, B. C. **Officers:** Robt. Gaede, pres.; Jos. Bamford, Jr., v. p.; John E. Tylee, sec.-treas.; preceding with Frank A. Blauvelt, Warren

N. Conant, Robt. Swinley, H. Chas. Royce and Frank E. Morrison, directors. Inc. Oct. 19, 1901, in Maine. **Cap.**, \$8,000,000; shares \$25 par. Annual meeting, first Monday in August.

Property: 32 claims, crown-granted, 1,183 acres, and a 92-acre mill, smelter and the Olalla town site, in the lower Similkameen and Keremeos camps, Osoyoos division, Yale district, 4 miles from a railway. Lands said to show contact deposits between diorite and felsite, with orebodies in both, but mainly in the felsite. Twelve claims adjoin the town site of Olalla, and the Dividend group, of 7 claims, is 17 miles distant. Vein under development is claimed by management, to carry bunchy replacement deposits of chalcopryrite, with garnetite and magnetite gangue, in limestone, near intrusive contacts, assaying 1.5 to 5% copper, a little silver and \$1 to \$7 gold per ton. **Development:** by a 70' shaft, and tunnels of 642', 600', 150' and 112', with 1,504' of workings. There is no power equipment. Property now idle, is leased, for 25 years, to the Yale Development & Construction Co., organized among the stockholders of this company.

OLD COLONY COPPER CO.

MICHIGAN

Office: 70 State St., Boston, Mass. Mine office: Houghton, Mich. **Officers:** H. F. Fay, pres.; C. J. Morrissey, sec.-treas.; preceding with W. F. Fitzgerald, W. A. Mosman, Rogers L. Barstow, F. L. Maguire, and John G. Stone, directors; Geo. S. Goodale, supt.; A. L. Dickerman, cons. engr.

Inc., 1898, in Michigan. **Cap.**, \$2,500,000; shares \$25 par, all issued; \$13 paid in. American Trust Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Stock listed on Boston Stock Exchange. Annual meeting, second Wednesday in December.

Receipts and Expenditures: (year ended Sept. 30, 1915) balance Oct. 1, 1914, 59,306; accounts receivable, \$154; less accounts payable, \$2,488; total, \$56,972. Receipts (rent, \$704; interest, \$2,163; assessment acct., \$15,982), \$18,849; total receipts, \$75,821. Payments: for diamond drilling, including superintendence, labor and supplies, \$27,657; taxes, \$4,408; general expense, including salaries, insurance, rent, etc., \$8,089; total, \$40,154. Balance Oct. 1, 1915: cash, \$36,939; accounts receivable, \$95; total, \$37,033; less accounts payable, \$1,367; net balance, \$35,666.

General Balance Sheet: (Sept. 30, 1915) assets: real estate, \$709,790; machinery and equipment, \$6,325; cash and debts receivable, \$37,034; profit and loss (general expense acct.) \$542,305; total, \$1,295,454. Liabilities: capital stock, \$1,294,087; accounts payable, \$1,367; total, \$1,295,454.

Property: about 1,200 acres on the Mineral Range, Houghton Co., Mich., in Sec. 17-18, T. 56, N., R. 32 W., east of the Calumet & Hecla, and south of the Mayflower mines. **Development:** a cross-section was secured, 1899-1901, by a tunnel driven about 3,000' and by diamond drill borings eastward to the western end of the tunnel; this cross-section showed upwards of 75 amygdaloidal and conglomerate beds, a number of which carried a little copper in the drill cores and where cut in the tunnel. There are 5 shafts, aggregating about 2,200' in depth, and over 6,000' of drifts and crosscuts, all of which have shown indifferent results. Work was discontinued in 1909, and resumed again in 1911 by diamond drilling. In April, 1912, the drills were moved to the north, and hole No. 14 was located between 400' and 500' S. E. of Mayflower hole No. 16, which has been called the "discovery" hole, and in which the so-called Mayflower lode was first cut on that property, disclosing a lode of unusual width and a high degree of mineralization. Two drills have been employed continuously in this work which has progressed in a general S. W. direction along the strike of the strata.

To date 25 holes have been drilled in 23 of which the lode has been located within an area of 3,000' N. and S. by 2,000' E. and W. and the general average of all the values shows it to have an unusual degree of mineralization. Hole No. 38 which encountered the lode in April, 1916, and which produced one of the richest cores, secured in these investigations, is located 3,000' S. of the boundary line between this property and that of the Mayflower.

This diamond drilling campaign has been entirely original exploration of an unprospected territory, and has met many puzzling geological problems but the work has been thoroughly and scientifically performed and is now practically finished. The company should soon be in a position to start a shaft to develop the mineral deposit which has been so persistent throughout the area covered by drilling.

OLD DOMINION CO.

ARIZONA

Office: 50 Congress St., Boston, Mass. **Officers:** Jas. Douglas, pres.; Chas. Sumner Smith, v. p.; Wm. M. Bradley, clerk; Chas. H. Altmiller, asst. clerk and treas.; preceding (excepting Wm. M. Bradley) with Cleveland H. Dodge, Jas. McLean, Arthur C. James, Chas. S. Smith and J. Waldo Smith, directors.

Inc., Jan. 15, 1904, in Maine. **Cap.,** \$8,750,000; shares \$25 par; \$7,333,825 issued and fully paid. Annual meeting, last Wednesday in January. Stock listed on Boston and New York Stock Exchange.

Dividends: 50c in 1905 and 1906; \$1 in 1907; 50c in 1908; \$1.50 in 1909, 1910 and 1911; \$4 in 1912; \$5 in 1913; \$4 in 1914; \$5 in 1915; a total of \$7,320,478.

The company is a securities-holding corporation only, organized to promote the operation of the Old Dominion Copper Mining & Smelting Co. and United Globe Mines properties. These two companies are operated individually, but with a free exchange, upon an equitable basis, of ores for smelting and fluxing. On Jan. 1, 1916, the Old Dominion Co. owned 155,353 shares or \$3,883,825 out of \$5,000,000 stock issued by the Old Dominion Copper M. & S. Co. and the entire stock, \$2,300,000, of the United Globe Mines. Income account for 1915 shows net income of \$1,389,396, and a surplus of \$355,696, as compared with \$832,434 and \$433,064 in 1914. Dividends paid in 1915 amounted to \$1,466,765, compared with \$1,173,412 in 1914.

The stock represents ownership in subsidiaries producing over 30,000,000 lbs. of copper annually, at a cost of about 8½ cts. a pound, equivalent to earnings for Old Dominion of \$7.75 per share on 15c copper and \$13.70 per share on 20c copper.

Old Dominion Copper Mining & Smelting Co.

(Controlled by stock ownership.) **Office:** 50 Congress St., Boston, Mass. Mine and works office: Globe, Gila Co., Ariz. **Officers:** Sumner Smith, pres.; Chas. G. Lund, v. p.; Chas. H. Altmiller, sec.-treas.; preceding with J. T. Herrick, E. P. Ricker, J. Waldo Smith and F. T. Bulmer, directors; P. G. Beckett, gen. mgr.; I. H. Barkdall, mine supt.; L. O. Howard, smelter supt.

Inc. July, 1895, in New Jersey. **Cap.,** \$5,000,000; shares \$25 par; issued, \$4,050,000. Stock listed on New York Exchange. Annual meeting, 1st Wednesday in April. Is controlled through ownership of 155,353 shares of the 162,000 shares of issued stock, by the Old Dominion Co.

Dividends: resumed July, 1907, after an intermission of 12 years, have been \$1.25 per share in 1907, \$1 in 1908, \$3 in 1909, \$3 in 1910, \$3 in 1911, \$4.50 in 1912, \$5 in 1913, \$2.75 regular and a special dividend of \$10 per

share in 1914; \$5 and a special dividend of \$1.50 in 1915; total to Dec. 31, 1915 (29 dividends), \$6,480,000. In 1916 has paid \$5.50 per share to July 1. Gross earnings for 1915 were \$2,854,846; net earnings \$1,337,086. Surplus Dec. 31, 1915, was \$726,852. Balance sheet of Dec. 31, 1915:

Assets		Liabilities	
Mines	\$3,421,806	Capital stock	\$4,050,000
Plant	3,406,529	Debts	463,874
Floating assets	1,687,206		
	<hr/>		
Total	\$8,515,543	Total debt liability.....	\$4,513,874

The surplus account consists of: reserve against "special" fund voted for dividend, \$128,144; reserve for plant renewals (neither asset nor liability) \$1,902,446; mine renewals, \$1,244,225; profit and loss, \$726,852; total surplus, \$4,001,668.

The company was engaged for years in litigation with A. S. Bigelow and the estate of Leonard Lewisohn, suing for recovery of secret promotion profits. This has been settled for \$900,000 by the Leonard Lewisohn estate and by a judgment for \$2,223,722 against A. S. Bigelow rendered by the Supreme Court. The securities turned over by Bigelow have yielded 2 "special dividends," the first for \$10, the second for \$2. There will be another and final one of not more than \$1.

Property: 38 mining claims and fractions, 5 mill site claims and 4 placer mining claims, all patented; included in these is the Old Dominion mine at Globe; the Old Dominion and Keystone claims, 3½ miles north of Globe and the Continental mine at the head of Webster gulch, about 18 miles west of Globe; also the Chicago & New York group of 60 acres and the Geneva mine.

Geology: at the Old Dominion mine, the principal ore zone occurs along a big fault vein having a N.-E. strike with sharp easterly dip. The hanging wall is limestone and quartzite, with footwall of diabase of more recent age, faulting evidently occurring both before and after the intrusion of the diabase. The ore favors the hanging wall, but also occurs in lenses along the bedding planes of the limestone and in shattered quartzite, the largest lens yet developed being 60x100x200' in size. The oxidized ores are mainly cuprite, associated with a little malachite and chrysocolla, in a gangue of iron oxides and quartz.

Sulphide ores first appear at a depth of about 350', as chalcocite, with gangue of pyrite and quartz, the lower workings also showing chalcopyrite. All ores are more or less argentiferous, and, as a rule, are highly silicious, requiring heavy lime and iron fluxes in smelting. The mine shows large sulphide ore shoots on the 14th level and below, and has improved wonderfully in the deeper workings opened up in the past few years.

The orebody under Pinal creek shows oxidized ores up to 20% in copper tenor, on the 8th, 9th and 10th levels, with chalcocite of even better tenor on the 11th level.

Development: principal mining developments of the past few years have been at the western end of the mine, which furnishes ¾ of the smelting ore mined. On the 15th and 16th levels the vein is broken and bunched. On the 17th and 18th it is 35' to 40' wide, but of concentrating tenor.

The east side workings on the 14th, 15th and 16th levels develop the Gladiator orebody, and production, nil in 1913, was 16,000 tons in 1915. Development, 1915; totaled 14,341' as compared with 15,665' in 1914 and 17,783' in 1913. Development in 1916 will be on the 17th and 18th levels,

Mine is now developed down to the 1,800' level, where the workings show a wider orebody both east and west than was found on the 1,400', with no sign of diminishing values or size below the bottom workings of the mine.

No important changes have been made in mining methods and the heavy wet ground on the west side is still worked by square sets and filling, while the more solid ground on the east side of the mine is stoped by cut and fill without timber.

The "A" shaft, or main working shaft, on the eastern side of Pinal creek, in the west section of the mine, is connected with the principal workings by underground trolley lines, including a line to handle the ore of the Gladiator mine, which has yielded a notable quantity of smelting ore, and large quantities of concentrating ore. Ore extraction on the east side is mainly from the 1,200', 1,400' and 1,600' levels, and on the west side from the 1,200', 1,300', 1,400', 1,500' and 1,600' levels. Large ore pockets have been cut in preparation for the new concentrator. "A" shaft has 5 compartments, 2 equipped for skip hoisting, 2 with cages for lowering men and supplies, and 1 for air and steamlines, water columns and electric cables. Ore and waste, hoisted to surface, is handled in skips.

Equipment at "A" shaft includes a steel engine house, built 1910, having a 17"x31"x48" Nordberg compound hoist, good for 2,000' depth.

"B" shaft, on the eastern side of Pinal creek, bottomed on the 14th level, has 4 compartments. "C" shaft has a 100,000 cu. ft. fan for ventilation, and is bottomed on the 14th level. "D" shaft, 300' deep, is located on the western side of Pinal creek, about 2,000' west of the most westerly previous workings. The "K" shaft, 1,400' deep, also has a ventilating fan. The Transit shaft is about $\frac{1}{8}$ mile east of "A". The Kingdon (1,200') and Grey shafts, main working shafts of the United Globe Company, are connected with the 1,200' level of the O. D. mine. The Grey shaft has a 75-h. p. Wellman-Seaver-Morgan electric hoist. Property has a number of smaller shafts and several tunnels, not in present use.

Pumping: the mine is very wet, the daily average amount of water pumped being between five and six million gallons. During March, 1915, as high as 14,000,000 gallons were pumped in 24 hours. Unprecedented heavy rains were the cause of the increase. The company sells part of the water pumped to the Miami C. Co., but receipts from this source reimburse it only to a slight extent for the pumping expense.

During 1915, 1,989.16 million gals. water was discharged through the drainage adit and 779.54 million gals. was pumped to surface, total 2,769.4 million gals. compared with 1,349.21 million gals. in 1914. The Miami Copper Co. bought 730 million gals. for use in its concentrator.

The mine is equipped with pumps of about 10,000,000 gals. capacity daily, these including a 1,500-gal. Prescott pump on the 10th level, having a 12" water column, discharging 30' above the collar of the shaft, into a launder on a trestle leading to a storage tank, whence water is drawn for use of the mill and smelter. There are 4 Nordberg steam pumps on the 12th level, having a rated capacity of 8,000,000 gals. per day, with 4 Gould electric pumps, 2 on the 10th and 2 on the 14th levels. On the 18th level two 1,200 gals per minute quintuplex Aldrich electric pumps have been added.

Mill and Smelter: the mine, mill and smelter are connected by a private railway, equipped with a Porter locomotive, and 50-ton ore cars.

A new crusher plant and sampling mill were erected in 1913. Capacity 150 tons per hour. In 1914, a 600-ton concentrator, using a 300-ton flotation

plant to extract copper from the slime, was completed. The old 300-ton concentration mill, erected 1909, will be maintained as a reserve for test purposes.

The smelter does custom work, and was formerly an extensive purchaser of sulphide ores for fluxing the oxidized ores of the Old Dominion and United Globe mines, but these mines have developed such quantities of sulphides. in the lower workings, that the amount of custom ore handled has been materially reduced and no sulphide ore is purchased at the present time.

The smelter has 8 double storage bins, holding 1,000 tons of coke, limestone and ore. Mixing, weighing and charging are done automatically, requiring a force of only 4 men. There are 5 blast furnaces, 3 being 44"x 198" at the tuyeres, and the other 2 being 44"x231", set tandem, with settlers between, charged automatically from side-dumping cars. The furnaces have a nominal capacity of about 2,400 tons daily, but one furnace is held in reserve.* Fuel is New Mexican coke, from the Dawson Coke Co. The smelter is served by an electric locomotive and three 3,000-lb. tilting cars for charging, with a steam locomotive and dump-cars for slags.

In the converter department acid converting was abandoned in Jan., 1913, and one stand of the basic converter type has handled all of the production since that time. The basic converter has been particularly successful at the Old Dominion plant. A shell recently removed from the stand had been there for 30 months without patching and had during that time produced over 70,000 lbs. of copper. Shells are handled by a 40-ton electric traveling crane. The converters take 50% matte, and turn out blister copper of 99.5% copper with small silver values.

The power plant at the smelter includes a 2,300-k. w. generator and two 750-k. w. generators, direct-connected to General Electric horizontal low-pressure steam turbines, utilizing exhaust steam. All machinery, except hoists and compressors, is actuated electrically. There is a 30-drill Nordberg compound air compressor, with intercooler and water-jacketed air cylinders, and a complete electric light plant. Within the last three years a 5,000-cu. ft. air compressor has been installed. Furnace blast is supplied by Connersville blowers of 45,000 cu. ft. per minute aggregate capacity, and an 18,000 cu. ft. Nordberg air compressor furnishes converter blast. Fuel oil is used for the boilers.

Production: smelter production is larger than mine production because the smelter treats ores of the United Globe and a considerable amount of custom ore.

	Tons		%		Tons		Costs per Ton			Cost Rec'd	
	Extr.	Cu.	Conc.	Cu.	Charge Smelt.	Mng.	Conc.	Sm.	Cu. Prod.	p.Lb. Cts.	p.Lb. Cts.
1916									*19,759,000		
1915	115,459	6.56	173,046	4.34	206,549	\$5.51	\$1.21	\$2.75	27,736,158	8.90	18.61
1914	129,813	7.44	151,893	4.67	207,595	5.20	0.93	2.67	30,210,361	8.22	13.71
1913	169,961	5.88	150,203	3.70	300,926	4.78	0.88	2.63	30,572,863	9.70	15.21
1912	201,181	4.67	166,870	3.77	306,086	4.55	0.75	2.30	27,353,243	10.34	16.42
1911	174,246	5.84	140,230	3.99	231,603	4.18	1.01	2.57	26,482,019	9.15	12.39

*First half of year.

Production in 1915, included 2,937 oz. gold and 150,621 oz. silver compared with 3,308 oz. gold and 148,459 oz. silver in 1914. Increased milling costs in 1915 were due to heavy repair expenses and flotation work. Cost of converting per ton of fine copper produced in bullion, 1915, was \$5.36 compared with \$5.65 in 1914.

Monthly production compares as follows (in lbs.):

	1916	1915	1914	1913
Jan.	3,121,000	1,745,000	2,797,000	2,727,000
Feb.	2,823,000	2,074,000	3,066,000	2,381,000
March	3,277,000	603,000	2,997,000	2,953,000
April	3,290,000	1,338,000	2,779,000	3,040,000
May	3,405,000	2,868,000	3,303,000	2,749,000
June	3,843,000	2,744,000	2,937,000	2,511,000
July		3,199,000	2,962,000	2,526,000
Aug.		2,843,000	2,236,000	2,524,000
Sept.		2,538,000	2,121,000	2,679,000
Oct.		2,970,000	1,616,000	2,037,000
Nov.		2,443,000	1,924,000	2,170,000
Dec.		2,495,000	1,700,000	2,613,000

Ore reserves in the Old Dominion property are sufficient for at least 2 years production at the normal rate. It is not advisable to have reserves for a longer period than this as it is too expensive to keep the ground open. Ore has been found continuously and consecutively on all levels down to the 18th, 1,400' level, and company has found no difficulty in opening ore as required. Indications are that production will increase in the future rather than decrease. Management is exceptionally capable and efficient.

OLD EMMA MINES CO.

UTAH

Idle. Jesse Knight, pres., Provo, Utah. Fully described in Vol. X, Copper Handbook. **Property:** 5 claims, comprises the Emma, a famous old mine, whose orebodies were worked out after producing over \$6,000,000. In 1871 owned by Emma Silver Mining Co., Ltd., an English concern, succeeded by America Emma Mng. Co., later by present corporation.

Property reported leased for 14 months from July, 1916, to Old Emma Leasing Co. (George Graham Rice promotion), with 2,000,000, shares, 10c par; half of stock in treasury, 250,000 shares offered at 10c.

Being drilled in conjunction with the Emma Copper Mining Co., 1916, and stock active as result of market campaign on Emma Copper, its neighbor.

OLD EVERGREEN M. & T. CO.

UTAH

H. G. McMillan, gen. mgr., 649 E. South Temple St., Salt Lake City, Utah. **Cap.**, \$300,000; shares \$1 par; all outstanding.

Property: 12 patented claims, 3 miles N. E. of Alta, in the Big Cottonwood district, Salt Lake Co., was an old-time producer of gold-copper ore. Developed by 2,700' drainage and transportation tunnel. Idle. Reported in 1915 that operations would be resumed.

OLD GLORY GOLD MINING CO.

OREGON

C. L. Magnum, pres.-gen. mgr., Box 365, Grants Pass, Ore. **Property:** The Old Glory mine on Silver creek in western Josephine county, 4 lode and 2 placer claims, said to show a large lode of low-grade copper ore carrying gold and silver values. Management states property will be equipped with machinery in 1916, and development pushed.

OLD HUNDRED MINING CO.

COLORADO

Office: Room 706, Electric Bldg., Cleveland, Ohio. Mine near Silverton, San Juan Co., Colo. **Officers:** Howell Hinds, pres.; W. S. Briggs, sec.-treas.; preceding with H. H. Burgess, E. P. Price and Frank S. Whitcomb, directors; J. M. Elmer, supt. Inc. June, 1906, in Maine. **Cap.**, \$5,000,000; shares \$5 par.

The company has authorized \$400,000 of series "A" first mortgage 6% bonds, none issued. The mine was floated by Thos. Nevins & Sons, of

New York, who advanced the money for its equipment and development.

Property: 26 claims, patented, 500 acres, in Cunningham gulch, on Galena mountain, San Juan district, 5 miles north of Silverton. The Silverton & Northern railway runs to the mine. Claims show a quartz vein said to be 5 to 12' wide, carrying values in gold, silver, lead and copper, with increasing copper at depth, ore being claimed to carry average values of \$8 to \$12 per ton. **Development:** mainly by tunnel. Mine is claimed to have upwards of 4 miles of workings.

Equipment: includes steam and electric power, numerous buildings, including a store, and the mine has a tramline. The 200-ton mill has 40 stamps, crushers, rolls, jigs, Frue vanners, concentrating and slime tables.

The property was promoted in New York upon representation by engineers that the mine contained bodies of low-grade ore which could be profitably mined if a larger output and lower milling cost could be secured. Despite the new machinery furnished and development done, the mine failed to redeem the promises made and is still awaiting some one who can make it pay by right management and proper ore treatment. Stock regarded as of little value, but property likely to be reopened.

OLD IMPERIAL MINING & MILLING CO. NEVADA

Cherry Creek, White Pine Co., Nev. Advertised sold for \$125 delinquent tax, Jan., 1916.

OLD PUEBLO MINING & MILLING CO. ARIZONA

See Tucson Consolidated Copper Co.

OLD SUSAN MINING CO. UTAH

Office: 411 Felt Bldg., Salt Lake City, Utah. **Officers:** W. H. Simons, pres.; P. F. Thompson, v. p.; E. D. R. Thompson, sec.-treas.-mgr., with F. A. Druehl, directors. **Inc.** 1899, in Utah. **Cap.**, 400,000 shares; 10 cts. par; 257,572 shares outstanding. Annual meeting first Monday in January.

Property: 3 patented claims, 25 acres in Tintic mining district, Juab Co., Utah, shows gold-silver-lead ore in fissure veins in porphyry and monzonite. Developed to depth of 300' by 1,500' tunnel. The mine is now worked by lessees on a royalty basis.

OLD TOWN M., M. & TRANSPORTATION CO. COLORADO

Idaho Springs, Colo. **Officers:** Wm. L. Bush, pres.; Geo. K. Kimball, sec., treas. and mgr., with R. J. Davies, J. Ramsey Speer, and J. B. Phillips, directors.

Inc. 1910, in Colo. **Cap.**, \$1,000,000; shares \$1 par; 738,302 shares outstanding. Gross earnings in 1915 were \$58,628. Annual meeting, 1st Monday in February. Company succeeded the Old Town Consolidated Mining Co., which itself was the successor of the Old Town Mining & Milling Co., both defunct. Property had not been profitable and was sold for a debt of \$60,000 at sheriff's sale, June 15, 1910.

Property: 22 claims, patented, 39,877 acres, in Russell mining district, Gilpin Co., Colo., has the Wautauga vein, carrying a paystreak of 4' average width, with gold and silver-bearing copper ore. **Development:** 2,205' incline shaft with 4,326' of workings and tunnels. Operations in 1915 consisted of 600' of drifting. Management estimates 150,000 tons of \$6 ore blocked out. **Equipment:** includes hoist, pump, steam and electric power and Leyner air compressor.

Production: about 6,760 tons of ore, averaging \$8.40 per ton were treated in 1915, yielding 3,298.11 oz. gold, 5,684.61 oz. silver and 9,992 lbs. copper. Total production to 1916 under present management, \$218,467. Production was mostly from the 1,200 and 1,300' levels. Property worked by lessees.

OLD VESUVIUS MINE**ARIZONA**

Address: C. H. McMahan and brothers, owners, Kirkland, Yavapai Co., Arizona. **Property:** the City Group, known as the Old Vesuvius mine, 6 claims, unpatented, 9 miles S. E. of Kirkland. Shows 4 veins in schist, said to carry 1.2 to 2 oz. gold, 1 oz. silver and 0.8% copper. Developed by several shallow incline shafts. Small shipments made in 1914-19. Planning to retimber and sink one of the shafts.

OLD VETERAN MINING CO.**IDAHO**

Office: Barnard Blk., Wallace, Idaho. **Officers:** M. J. Farrell, pres. gen. mgr.; Allan G. Kennedy, v. p.; L. L. Brainard, sec.-treas.; with F. H. Harper and B. J. Farrell, directors.

Inc. March, 1915. Cap., \$150,000; shares 10 cts. par; assessable; 750,000 shares of stock were sold at 2 cts. per share, upon which assessments of 2 ct. are to be levied every two months.

Property: 7 claims, 2 miles above Burke, Shoshone county, shows several fault fissures. Developed by 1,500' of tunnels. No. 3 tunnel was being driven 300' at last accounts.

OLD YUMA MINE**ARIZONA**

Col. Epes Randolph, owner, Tucson, Ariz. Mine closed, Aug., 1916. **Property:** 40 unpatented claims, about 14 miles W. of Tucson, Pima Co., Ariz., shows a fissure vein, 40' wide in andesite, carrying gold, molybdenite and specularite. Ore occurs in 4 shoots, each about 300' long, and is said to average \$3 gold and 1¼% molybdenum. Developed by vertical shaft to depth of 320'.

Equipment: includes 15-h. p. hoist, pump, 400' tramway and 400-ton concentrating mill. Concentrates said to average 21% MoO₃. Promises to become an important producer of molybdenum ore.

OLIVIA GROUP**IDAHO**

Owned and operated by Hazlitt & Trader, Dixie, Idaho Co., Idaho. **Property:** 11 unpatented claims, 210 acres in Dixie mining district, shows gold-silver-copper ore in quartz fissure veins, 8"-40" wide, running N. W. with dip 60° N. E. The country rock is granite and gneiss.

Development: by 100' tunnel, 100' vertical shaft and drifts, totaling 1,000' of underground workings. **Equipment:** includes a new 10-ton Huntington mill, which ran only a short time in 1915. Plan driving tunnel on Ironsides claim to depth of 250' in 1916.

ONECO COPPER MINING CO.**MICHIGAN**

Office: 78 Devonshire St., Boston, Mass. Mine office: Hancock, Mich. **Officers:** John D. Cuddihy, pres.; John Brooks, sec.-treas.; preceding with F. L. Maguire, J. E. Fitz Gerald, Jr., directors; John L. Harris, gen. mgr.

Inc. Dec., 1898, in Michigan. Cap., \$2,500,000; shares \$25 par, \$5.50 paid in; issued, \$1,750,000 June 9, 1913. Levied a 50-ct. assessment Jan. 15, 1906, a \$1 assessment Feb. 21, 1910, and a \$1 assessment Oct. 10, 1912. Annual meeting, third Thursday in March. Stock traded on Boston curb. Company its own transfer agent; Federal Trust Co., Boston, registrar.

Property: 800 acres in Houghton county, all on the Keweenaw copper formation, in Secs. 2, 10 and 11, T. 56 N., R. 33 W., forming a main tract of 640 acres, and a smaller tract of 160 acres, adjoining diagonally on the N. E. corner. The property lies east of the Franklin Junior and Rhode Island mines, but is separated therefrom by a quarter mile of intervening lands.

Development: the mine was opened 1862, and exploring was done 1890 and 1898. Work was begun by the company June 26, 1899, on a 2-compartment shaft that was sunk 500'. Drifting on the upper levels showed a bed of fair width, carrying a little copper, and the shaft cut a narrow

fissure, rich in copper, this being of interest because it is one of the few productive crossveins found in the Portage Lake district. The bed on which the shaft was sunk has been variously identified as the Isle Royale, Grand Portage and Kearsarge amygdaloids, but is now termed the Oneco amygdaloid.

Work was suspended 1900 until Aug., 1909, when diamond drilling was begun, 10 drill holes being bored, cutting the Oneco bed on which the shaft is sunk, and an unidentified amygdaloidal bed, called the Torch Lake or Tomahawk lode, about 1,200' west of the Oneco, cores from both beds showing more or less copper. Drill holes were bored to depth of 1,000 to 1,700', locating the eastern sandstone and giving 2 complete cross-sections, 2,700' apart.

The mine was reopened Nov., 1910, and drifting resumed on the 4th level. The shaft has been sunk to a depth of 1,250' and extensive drifting on the 9th, 10th, 11th and 12th levels, both north and south, has shown the vein to be 10 to 20' wide and well mineralized. Mine has been idle since 1913, due to lack of funds.

ONEIDA-STAGG MINING & MILLING CO.

COLORADO

H. T. Rogers, mgr., Idaho Springs, Colo. Inc. 1914, as a consolidation of the Oneida and Stagg Mining companies. Mine at Freeland, 5 miles from Idaho Springs.

Development: by 1,000' tunnel and a 150' raise from the tunnel level, which cut a 5' vein of gray copper ore, said to assay as high as 4% copper, 10 oz. silver and .52 oz. gold. A 50-ton cyanide mill was erected in 1914 to treat the ore by the continuous decantation system, but was remodeled in 1915 to use the oil flotation process. Milling costs are placed at 85 cts. per ton of ore treated. Production from development work pays all operating expenses.

ONONDAGA COPPER CO.

MICHIGAN

Houghton, Mich. **Officers:** Reginald C. Pryor, pres., treas. and gen. mgr.; C. H. Lang, v. p.; Wm. Duffney, sec., with Ward B. Smith and D. L. Robinson, directors.

Inc. April 22, 1912, in Michigan. **Cap.**, \$3,750,000; shares \$25 par; \$4 paid; issued, 99,955. Stock listed on the Boston Exchange. Paul Revere Trust Co., Boston, transfer agent; State Street Trust Co., registrar. Balance sheet Feb. 1, 1916, shows \$46,585 on hand, as against \$74,675 on Jan. 31, 1914.

Property: 10,230 acres in Ontonagon county, Mich., near the White Pine mine of the Calumet & Hecla Co. The formation, a fine-grained sandstone, has been exposed by surface trenching at several points and found to carry flake copper in considerable quantity. The values appear to be patchy, but as the ore frequently averages 10% where cross-faults occur, a commercial average may reasonably be expected.

Development: is confined to diamond drill work. The first hole completed in Jan., 1913, has a depth of 1,912' and is apparently in the horizon of the Isle Royale-Arcadian lode. Hole No. 2 is 1,500' deep. Hole No. 5 driven in 1913 to 2,000' depth, failed to reach the contact. In 1914 holes Nos. 6, 7, 8 and 9 were drilled, making a complete cross-section from the S. E. corner of Sec. 14 to the N. W. corner of Sec. 4. None of the lodes cut in the holes gave cores showing copper in commercial quantities. Owing to unsettled conditions work was discontinued Sept. 21, 1914. Drilling near the northern boundary was started July, 1915, each hole exploring the territory farther south. In the extreme S. E. corner the lode was located at 1,100' depth, but revealed no copper values. Drilling is being continued in 1916.

ONONDAGA MINES CO.**COLORADO**

Office: 717 Onondaga Bank Bldg., Syracuse, N. Y. Mine office: Georgetown, Clear Creek Co., Colo. Arthur H. Osbor, mgr.; T. Kyner, supt.

Property: the Onondaga and Colorado Central-Aliunde group on Leavenworth Mountain, Georgetown. In the Onondaga, the Ruler vein, 18" wide, showing gold-silver-lead ore, is under development through the Capital tunnel. Drifts are being run eastward on the vein at 3 different points. The Aliunde group has about 30 miles of underground workings, including the Hall and Doric tunnels; the latter will be advanced to intersect the Ruler vein of the Onondaga. The Aliunde is reported to have produced milling ore which yielded 275 oz. silver per ton in former years.

Equipment: includes compressor, hoist and power plant. **Production:** from development work amounts to about 20 tons daily of \$9 ore, mainly from the 180' and 100' levels. Employs 30 men. Surface equipment was to be added in 1916.

ONTARIO MINING CO.**IDAHO**

Officers: M. A. Folson, pres.; Stanley A. Easton, treas. and gen. mgr. An apex suit brought by the Stewart Mining Co. was decided in favor of the Ontario Mining Co., giving the latter company a verdict for \$48,245.

Property: on Ontario Creek, adjoining the Stewart in the Kellogg-Wardner district, Shoshone county, shows quartz fissure veins carrying pyrite, sphalerite and galena ore, and proved to be the southern extension of the main Stewart orebody. The vein system is faulted, as in the Stewart, and the ore crushed, making mine operations troublesome.

Development: by 800' crosscut tunnel from which a shaft was sunk to 320' depth. **Equipment:** includes a 200-ton mill.

Profits in 1914 were \$239,175. **Production:** in 1915:

Tons Mined	Gross Value	Cost Extrn.	Cost Trans. & Red.	Net Profits
81,208	\$689,392	\$265,728	\$223,724	\$223,724

ONTARIO SILVER MINING CO.**UTAH**

Offices: 163 So. Main St., Salt Lake City, and Room 1208, 32 Broadway, New York. Mine office: Park City, Utah. **Officers:** J. E. Bamberger, pres.; Ernest Bamberger, v. p.-treas.-gen. mgr., with D. M. Hyman, John S. Critchlow, Wm. C. Osborne, H. G. McMillan and Walter Linforth, directors. Herbert Cohen, sec.; J. L. Tilton, New York, asst. sec. Newton A. Dunyon, supt.

Inc. 1887, in Calif. **Cap.**, \$15,000,000; shares \$100 par; all issued. Stock is listed on New York Exchange. Union Trust Co., New York, registrar. Annual meeting, third Monday in January. Was at one time the largest silver producer in Utah with a total production of about \$35,000,000 gross and a dividend record of \$14,932,500.

The annual report, Dec. 31, 1915, showed receipts from ore sales and royalties, \$72,682; disbursements, \$60,586; cash and bullion on hand, bonds and other liquid assets, \$312,574.

Property: the Ontario mine, 800 acres, patented, across the divide from the Emma Copper Co., at the head of Little Cottonwood canyon; also owns the Weber Coal Co., 811 acres coal land and the New Quincy and Naildriver Mining companies.

The Ontario is an old and very famous silver-lead mine in which the ore occurs in a great pipe and chamber deposit in limestone. Ore shows an increase in zinc content at depth. In December, 1915, the manager decided to reopen the Ontario mine below the 1,500', or Drain tunnel No. 2 level. The old workings were unwatered to the 1,700' level and work

is progressing on the 500, 1,000 and 1,500' levels in 1916, on company account.

Development: about 60 miles of old workings, includes two tunnels and a shaft 2,000' deep. From the 900' level to surface, mine is worked by lessees employing 70 men and reported shipping at the rate of 250 tons per month, 1916.

Equipment: includes 3½ miles power line, 2 electric pumps, hoist, compressor and 100-ton mill.

Stock believed to have a speculative value in addition to its liquidating value of about \$8 per share. Although the high-grade ore is mined out there is much low-grade ore left in the property which will yield a fair profit with silver at 64c or better.

ONWATTA MINE

ARKANSAS

W. C. Settles, supt. Mine in Dodd City district, Marion Co., Arkansas, shows lead ore with calamine, smithsonite and cadmium ore, occurring in fissures or fault breccias, the zinc ore averaging better than 60% metallic content. The formation is limestone. An intermittent producer.

OOM PAUL CONSOLIDATED MINING CO.

IDAHO

Office: Wallace, Idaho. **Mine office:** Burke, Idaho. **Officers:** Jas. F. McCarthy, pres.-mgr.-treas.; F. H. Richardson, v. p.-supt.; L. E. Hanley, sec., with E. H. Moffitt, J. B. Sloan and Walter Mackay, directors.

Inc. April, 1907, in Idaho **Cap.**, \$1,600,000; shares \$1 par; assessable; 1,397,598 shares issued. Stock listed on Butte and Spokane Exchanges.

Property: 10 patented claims, 200 acres in Coeur d'Alene district, near Burke, shows silver-lead ore in fissure veins traversing a quartzite formation. Driving a 3,000' crosscut tunnel, in 1,200', Jan. 1, 1916.

Equipment: consists of an Ingersoll-Rand compressor. A prospect. Company will eventually acquire control of the Central Mining Co., which is to be developed through the Oom Paul tunnel.

OPEX CONSOLIDATED MINES CO.

UTAH

Address: care Knight Investment Co., Provo, Utah. Mine near Robinson, Juab Co., Utah, leased to Emerald Mining Co. See Vol. X, Copper Handbook.

OPHIR GOLD MINES, MILLING & POWER CO.

COLORADO

Succeeded Oct., 1915, by Ophir Range Gold Mining Co., which see.

OPHIR HILL CONSOLIDATED MINING CO.

UTAH

Office: Miner Bldg., Butte, Mont. **Mine office:** Ophir, Tooele Co., Utah. **Officers:** Wm. A. Clarke, pres.; W. C. Siderfin, sec.; E. W. Clark, treas. and gen. mgr.; preceded with Chas. W. Clark, directors. A. G. Swanson, mine supt.; R. H. Dunstan, mill supt.; E. Bowman, engr. Company is managed as a close corporation.

Property: one-half mile north of Ophir, carries the 5' Top-vein, the 20' Big vein, the Middle vein 10', the Copper vein 8', and the Blue vein 6' thick, and from 10'-100' wide. **Ore:** contains argentiferous galena, with pyrite, averaging 8% lead and 10 oz. silver per ton; also some copper and zinc ores. Ores occur as replacements in argillaceous limestone and shale, in 3 clearly-defined shoots, known as the Wild Delirium, Miner's Delight and Western Stope. **Development:** an 1,800' incline shaft, with the usual levels and stopes, also a transportation tunnel nearly 1 mile long, through which all ore is taken. This tunnel intersected the vein on the 1,300' level; it also drains the mine at depth. **Equipment:** includes a steam plant, not operating, and a hoist; there is a gravity tramway from the mine to the 200-ton mill.

Production: averages about 100 tons daily of lead-silver ore, with a little gold and 2½% copper. Concentrates run about 10-12 oz. silver and

10-12% lead per ton. The property is an excellent one. A branch line of the S. P., L. A. & S. L. R. R. was built to the property in 1912.

OPHIR KING GOLD MINING CO.

UTAH

Mine near Ophir, Tooele Co., Utah. Inc. Nov., 1907, in Utah. **Cap.**, \$10,000; shares 2 cts. par, assessable. **Lands:** 30 acres, patented, 9 miles from railroad, adjoining the Ophir Hill and Cliff Mining Co.'s properties and carry auriferous and argentiferous copper and lead ores. Mine has 400' tunnel, with some crosscutting, and several shallow shafts. Property worked under lease in 1913. Property and equipment were sold at sheriff's sale in Nov., 1914, to John B. Holmes, for \$1,750, to satisfy a judgment obtained by Holmes.

OPHIR QUEEN MINING CO.

UTAH

S. Crawford, Cedar River, Mich., controls property.

OPHIR RANGE GOLD MINING CO.

COLORADO

Ophir, San Miguel Co., Colo. Company acquired the holdings of the Ophir Gold Mines, Milling and Power Co., Oct., 1915. W. P. Day, pres.; Peoria, Ill.; A. W. Wilson, sec.; W. H. Staver, mgr. Inc. July, 1915, in Colorado.

Operates a lease on the Suffolk mine, 300 claims, partly patented, at Ophir. **Ore:** gold-silver, in fissure veins, traversing andesite and noted for its pockets of free gold ore. **Development:** by several tunnels from 500' to 2,000' long, with a total of 20,000' of underground workings. **Equipment:** includes 300 cu. ft. air compressor, 5,270' tramway and 100-ton concentrating mill with 2 Wilfley tables.

Production: in 1915 amounted to 2,000 tons of ore. Concentrates averaged \$15 per ton in gold and silver.

OPHIR SILVER MINING CO.

NEVADA

Offices: 265 Russ Bldg., San Francisco and Virginia City, Nev. **Officers:** H. L. Slosson, Jr., pres.; Chas. D. Olney, sec. Inc. April 30, 1860, in Cal. **Cap.**, 201,600 shares; \$1 par; all outstanding. Listed on New York Curb and on San Francisco Exchange. Last dividend paid May 21, 1908.

Property: the Ophir claim, 675' along the Comstock Lode, includes the Ophir mine, at Virginia City, being operated in conjunction with the Mexican Gold and Silver Mining Co., which see.

Production: to 1908, said to be \$15,514,000.

OPHIR-UTAH MINING CO.

UTAH

Idle. Office: Salt Lake City, Utah. Mine near Ophir, Tooele Co., Utah. G. G. Schliep, pres.; C. L. Olson, sec.-treas. Inc. Feb. 13, 1909, in Utah. **Cap.**, \$250,000; shares 25 cts. par; nonassessable. **Lands:** 7 claims, 9 miles from railroad, show copper and lead ores. Has several buildings and a hoist.

OPOHONGO MINING CO.

UTAH

Office: Provo, Utah. Mine address: Samuel Cox, supt., Eureka, Juab Co., Utah. **Officers:** Wm. Hatfield, pres. and mgr.; J. H. Hatfield, v. p.; J. W. Hatfield, sec.-treas. Inc. 1908, in Utah. **Cap.**, \$250,000; shares 25 cts. par; assessable. Shares are listed on the Salt Lake Stock Exchange. **Dividends:** three 1-ct. and two 2-ct. declarations in 1911-12 and one of 2 cts. on Jan. 30, 1913, a total of \$80,907 to 1916. Stock is listed on the Salt Lake Exchange.

Lands: 3 claims, patented, in the vicinity of the Black Jack and Ajax mines. **Development:** by shafts and tunnels, with about 2,000' of workings, to depth of 1,000', with principal workings on the 500' and 700' levels. The mine is operated jointly with the Gold Chain, with which it is connected on the 300' level, and hoisting is through the Black Jack shaft. The 450' level shows an 18' orebody, said to give assays up to 10% copper and

\$60 gold per ton. The 700' level shows this same ore shoot. Present development is mainly in the main tunnel of Gold Chain mine, now being driven to cut the main vein. The 1,000' level shows the fissure in the east drift, but no ore, as the ore shoot has not been reached. Lessees are at work in the upper levels and are getting 7% copper ore on the 300-750' levels. The ore contains 7-10 oz. silver and \$1-\$2 gold per ton.

Machinery equipment, owned jointly with the Gold Chain, includes an air compressor. Production has been intermittent since it began in 1909.

OPPORTUNITY CONS. GOLD MINING CO. COLORADO

Office: 318 Century Bldg., Denver, Colo. Arthur Park, Jas. R. Hayes, L. W. Partridge, Francis B. Choate and D. L. Cubberly, directors. **Inc.** 1915. **Cap.**, \$500,000; shares \$1 par.

Has a 3-year lease and bond on the London Mine, comprising 12 claims, in Pine or Wisconsin district, Gilpin Co., Colo., said to show well defined veins of gold-silver ore. Developed by 204' shaft with 3 cross-cuts, 140', 250' and 132' in length.

Equipment: includes a 10-stamp, 50-ton amalgamating and concentration mill and boarding house. Plan adding electric power.

OPTIMO MINING CO.

WISCONSIN

Property at Linden, Iowa Co., Wisc., is the main producer of lead-zinc concentrates in the Linden district. Operates a 100-ton mill and produces concentrates averaging from 50-59% zinc. **Equipment:** includes electric power, drills and pump.

ORANGE COUNTY COPPER MINE

VERMONT

Strafford, Orange Co., Vt. J. B. Reynolds, mgr. and principal owner, 54 No. Main St., Rutland, Vt. Lovat Fraser, engr.

Lands: 900 acres, held under deed of mining rights, are near the Elizabeth mine, 13 miles from the Boston & Maine railway. Property carries a lenticular orebody, conforming to dip of the country rocks, which include gneiss, under garnetiferous mica-schist and above hornblende-schist, with strike of west of north, and average dip of about 45°. The lens, of 40' extreme width, but not mineralized for the full width, is traceable 4,000' on the property. Ore carries chalcopryrite, disseminated in massive pyrrhotite, averaging 2% copper.

Development: by 110' incline shaft, with about 70' of laterals on the 100' level. **Equipment:** includes steam boilers, a 3-drill air compressor and several mine buildings. Geology is described, Bull. 455, U. S. Geol. Survey. Owner writes Jan., 1916, that "mine is in transition state—new development anticipated."

ORE CHIMNEY MINING CO., LTD.

ONTARIO

Office: 100 Clyde Block, Hamilton, Ont. Mine office: Northbrook, Frontenac Co., Ont. **Officers:** A. E. Fletcher, pres.; J. D. Misener, v. p.; Chas. Narraway, sec.-treas.; preceded with Richard Haggerty, Chas. Zinn, S. A. Edick, J. M. Slater and John M. Fletcher, directors. W. G. Anderson, gen. mgr.

Inc. Oct. 11, 1909, in Ontario. **Cap.**, \$600,000; shares 40 cts. par; non-assessable. Annual meeting, last Tuesday in October. The property was bought of the president for 850,000 shares of stock.

Property: 6 claims, 300 acres, in the Eastern mining district, 50 miles from Kingston and about 11 miles from Kaladar, the nearest C. P. R. R. station. Claims show limestone, conglomerate and schist, and are reported by the management to have a vertical 20' quartz vein traceable 4,000' and carrying galena and chalcopryrite, the ore averaging 1.5% copper, 17% lead, 2% zinc, 68 oz. silver and \$6.60 gold. Development is by 260' shaft.

Equipment: includes two 100-h. p. tubular boilers, 6-drill compressor, hoist good for 500' depth. A 20-stamp mill, purchased in Nova Scotia, is to be erected on the property. Company's prospectus has been subjected to criticism on account of its inaccuracy and misstatements, but company is developing property and apparently successfully so.

ORE EXTENSION MINING CO., LTD.

ONTARIO

Vineland, Ont., Canada. **Officers:** David Fretz, pres.-mgr.; S. Spiece, v. p.; Geo. Laws, sec.-treas., with J. O. Moore and S. R. Lupton, directors. **Inc.** Nov. 1, 1913, in Ont. **Cap.**, \$1,500,000; shares 50 cts. par. **Transfer office:** 354 Hudson St., Buffalo, N. Y. Annual meeting, 2nd Thursday in January.

Property: 167 acres at Northbrook, Lennox and Addington counties, Ontario, said to show gold-silver-lead-zinc-copper ore, in six veins, from a few feet to 40' wide, in diorite and schist. Developed by a 2-compartment shaft 53' deep. Work retarded owing to lack of working funds. A prospect.

OREGON-ARIZONA COPPER CO.

ARIZONA

Mine near Superior, Pinal Co., Ariz. Has steam power. At last accounts was under bond and lease, and said to be controlled by Jack Newman, of Santa Monica, Calif., and associates.

OREGON & BRITISH COLUMBIA MINING & DEV. CO., LTD. B. C.

Office: 826 Northwestern Bk. Bldg., Portland, Ore. Mine at Copper Mountain, near Princeton, B. C. **Officers:** at last accounts, W. J. Peddicord, pres.; Walter T. Woodew, v. p.; G. Evert Baker, sec.-treas.-gen. mgr., with John Mock, directors. **Inc.** Jan. 6, 1906, in Oregon. **Cap.**, \$150,000; shares 10 cts. par; non-assessable; issued, 1,455,000 shares.

Property: 8 claims, crown-granted, 379 acres, well timbered, in the Yale district, B. C. Claims show diorite cut by diabase carrying patches, stringers and disseminations of chalcopryite, bornite and magnetite, without quartz. The ore carries from 1½ to 3½% copper and is said to show as high as \$4.50 gold per ton. **Development:** a 176' tunnel, reported to show 40' of mineralized ground, carrying chalcopryite and bornite, the last 8' of the tunnel said to show an 8' vein of solid ore, with 18" to 2' of talc gangue. Claims adjoin the Sunset mine and other properties of the British Columbia Copper Co. Management expects to resume development work.

OREGON-IDAHO INVESTMENT CO.

OREGON

Baker City, Baker Co., Ore. **Officers:** Jas. A. Howard, pres.; John Arthur, v. p.; Fred R. Mellis, sec.-treas. **Cap.**, \$50,000. Is a small, close corporation organized as a developing and holding company, but whose chief business since 1909 has been the operation of the Baker City, Ore., ore-sampling plant, burned April, 1911, but rebuilt later in the year.

Property: includes the Humboldt mine and Poorman group, 8 claims, 160 acres, surveyed for patent, on Balm creek, 25 miles N. E. of Baker. The group shows a copper-bearing vein for 2,000' that has a gossan cap 200' wide in places.

Development: by an 800' tunnel with several short crosscuts at depth of 100', showing 2.5 to 3.5% copper, present as chalcopryite. The Humboldt mine is being developed by shaft and crosscuts, said to be in good grade milling ore.

O'REILLY GOLD MINING CO.

COLORADO

Reported in 1915 that company was to be reorganized as the Marie Mining Co., and development continued. Owns the Bay State mine, near Breckenridge, Summit Co., Colo. Developed by a 300' tunnel, showing auriferous and argentiferous copper ore.

ORFORD NICKEL-COPPER REFINERY **NEW JERSEY**

Property of International Nickel Co., 43 Exchange Place, New York. Plant at Bayonne, N. J., treats nickel-copper matte from Sudbury smelter. Robt. C. Stanley, supt. of plant; A. J. Wadham, asst. supt.

ORGAN MOUNTAIN MINING CO. **NEW MEXICO**

Office: 204 Mills Bldg., El Paso, Tex. **Mine office:** Organ, N. M. **Officers:** J. I. McCullough, pres.; J. H. May., v. p.; F. W. Campbell, sec.-treas.; with J. C. White, O. J. Jolliffe and T. S. Semple, directors. Inc. 1913, in New Mexico. **Cap.,** \$2,000,000; shares \$1 par; fully paid and non-assessable; issued, about 1,225,000.

Property: 17 claims, 2 patented, 340 acres, 12 miles N. E. of Las Cruces and the A. T. & S. F. R. R. was formerly owned by the Bennett-Stephenson M. & M. Co. It includes the Stephenson, Henderson, Page and Bennett mines, showing 6 veins in carboniferous limestone, lying near or in contact with porphyry dikes. Veins are said to be from 5'-30' wide, with ore-shoots opened up from 50'-600' in length. Ores are mainly lead, silver, copper and wulfenite.

Development: consists of a 3-compartment shaft, 400' deep, 2,000' drainage tunnel and several thousand feet of drifting. Mine was discovered 1849, and closed 1911; is credited with a production to 1915 of about \$1,000,000.

Equipment: includes 200-h. p. plant at mine and 250-h. p. plant at mill; together with 3 hoists, pumps and 2 air compressors of 9-drill capacity combined. Mill includes 2 Joplin jigs, 3 Wilfley tables, 1 vanner and 2 slimers.

The American S. & R. Co. has taken a 10-year bond and lease (March 15, 1915) on the property. The option calls for a loan to the Organ M. M. Co. of \$20 000 for 3 years, 50% of net smelter proceeds and the expenditure of \$125,000 on development work. The purchase price is \$500,000, and royalties will be applied on the purchase price if completed within 4 years.

ORIENT GOLD MINES, LTD. **WASHINGTON**

Office: 511 Hyde Block, Spokane, Wash. **Mine at Orient, Ferry Co., Wash.** Frank Ansley, pres. and mgr.; E. E. Doan, v. p.; Thos. R. L. Harris, sec.-treas.; L. F. Hachess and Geo. Burness, directors; R. Strawhun, supt. **Cap.,** \$1,500,000.

Property: the White Elephant mine with 6 claims, located 3 miles south of the Canadian border, and an equal distance from Rock Cut. The mine is a gold producer, but contains gray copper ore. The mineral zone, 75' wide, lies between diorite and andesite.

Development: by a 225' incline shaft sunk on the vein with a dip of 70° E. Workings on the 100' level show disseminated pyrite ore carrying from \$3 to \$6 per ton, with occasional shoots of copper ore. **Equipment:** includes steam plant, compressor, sawmill, etc.

Property reported taken over by a Spokane syndicate, March, 1916, and cyanide plant to be erected.

ORIENTAL CONSOLIDATED MINING CO. **KOREA, ASIA**

Office: 15 Broad St., New York. **Mines and works:** Unsan district, Korea, Asia. **Officers:** H. C. Perkins, pres.; Leigh Hunt, v. p.; Frederic Bull, 2nd v. p.-treas., 34 Pine St., New York; with L. T. Haggin, Ogden Mills, J. S. Fassett, Wm. P. Palmer and H. F. Meserve, directors; George Kennaby, sec. **Officers in Korea:** Alf. Welhaven, gen. mgr.; Thos. W. Van Ess, asst. gen. mgr.; C. A. Crispin, auditor; E. S. Barstow, supt. of transportation; J. B. Lower, supt.; J. A. Vernon, asst. supt., of Tabowie, Taracol, Candlestick, Chintui & Prospects; F. W. Deal, supt. of Maibong & Kuk San Dong; W. H. Aldridge, mech. engr.; J. N. Fletcher, supt. of Fuel & C

Timber Ry.; A. B. Palmer, cashier; E. L. Power, M. D., physician; W. D. Townsend, agent, Chemulpoo.

Inc. Sept. 29, 1897, in W. Va., to operate mining concessions in Korea. Cap., \$5,000,000; outstanding \$4,293,900, and the balance is owned by the company; shares \$10 par. No bonded debt. Stock transferred and dividends paid at 15 Broad St., New York. Listed on London Stock Exchange.

Comparative General Balance Sheet: (June 30)

Assets—	Mines & Prop.	Cash	Supplies	Misc.	Total
1915.....	\$4,043,900	\$463,410	\$266,688	\$19,109	\$4,793,107
1914.....	4,043,900	512,781	356,085	69,301	4,982,067
Liabilities—	Capital Stock		Creditors	Surplus Profit on Hand	Total
1915.....	\$4,293,900		\$52,189	\$447,018	\$4,793,107
1914.....	4,293,900		42,465	645,702	4,982,067

Comparative Income Account: June 30)

	Total Income	—Costs—		Conc't Exp's	Other Exp's	Total Exp's	Divid's	Surplus
1915..	\$1,672,487	\$569,872	\$148,603	\$ 82,474	\$286,442	\$1,012,891	\$858,780	\$198,684 (d)
1914..	1,731,473	596,189	187,219	96,845	248,439	1,108,692	644,085	21,304 (d)
1913..	1,661,476	610,212	168,657	107,892	208,831	1,090,091	429,890	141,994
1912..	1,562,110	520,136	161,825	66,500	162,122	909,588	429,380	223,137

(d) Deficit.

Dividends: in recent years, 1903, \$1.25; 1904, 1905 and 1906, \$1 each; 1907, 60c; 1908, \$1.50; 1909, \$1.15; 1910, \$1; 1911, \$1.50; 1912, \$1; 1913 and 1914, \$1.50; 1915, \$2. Total dividends to June, 1915, \$6,435,775, equal to 150%, or \$15 per share.

Property: a number of gold mines in the Unsan district, in the northern part of Korea, ore occurring in veins. **Development:** by tunnels and shafts, deepest workings about 2,000'. New workings for year ending June 30, 1915, totaled 37,214', compared with 32,379' the previous year. **Ore reserves:** estimated July 1, 1915, 844,000 tons, containing \$4,841,085, compared with 822,500 tons having a value of \$4,760,750 the year previous.

Ores are treated in the company's four stamp mills, 210 stamps in all, and cyanide plants. Power is mainly electrical, with some steam.

Production: (year ending June 30)

Year—	Tons		—Per Ton—		Year—	Tons		—Per Ton—	
	Crushed	Yield	Costs			Crushed	Yield	Costs	
1909.....	296,417	\$4.80	\$2.72		1913.....	313,701	\$5.19	\$3.25	
1910.....	320,707	4.40	2.43		1914.....	301,162	5.60	3.68	
1911.....	344,097	4.37	2.45		1915.....	297,889	5.45	3.40	
1912.....	323,703	4.76	2.68						

ORIENTAL GOLD MINING CO.

CALIFORNIA

A subsidiary of Croesus Gold M. & M. Co., 734 Fifth Ave., N. Y. City. Mine office: Alleghany, Sierra Co., Calif. W. S. Pearson, mgr. **Property:** the Oriental mine, on Kanaka creek, about 1½ miles W. of Alleghany, has 2 quartz veins in granite and schist, with strike N. 70° W., and dip 35° N. The ore contains pyrite, arsenopyrite and gold.

Development: by tunnel 4,150' long and several crosscuts. **Equipment:** includes 10-stamp mill with two 6' Frue vanners. Property was idle for several years, but control was acquired by the Croesus Gold M. & M. Co., and development work is now under way.

ORIGINAL AMADOR CONSOLIDATED MINES CO. CALIFORNIA

Office: 1225 Broadway, Oakland, Calif. T. S. O'Brien, supt., Amador City, Amador Co., Calif.

Property: 6 claims, covering 4,400' on the lode at Amador City, is said to carry a system of parallel quartz veins, from 12'-50' wide, with diabase hanging and Mariposa slate footwall. **Development:** by incline shaft to depth of 780'. The ore is mined by the shrinkage stope method.

Equipment: includes Ingersoll-Rand compressor driven by 100-h. p. motor, double-drum hoist, drills and 20-stamp mill for amalgamation and concentration of the ore, making an extraction of 90%.

The concentrates average \$80 per ton. The mill was remodeled in 1915 and is equipped with 4 trommels, 2 Dorr classifiers, two 8x3' Hardinge conical mills, 2 hydraulic classifiers with 3 spigots each, Deister double-decked sand and slime tables and a cyanide plant. Capacity has been increased from 90 tons daily in 1914 to about 300 tons in 1916. Operating costs reported at \$2.56 per ton. Employs 32 men.

ORIGINAL BANNACK MINING CO. MONTANA

Office: 302 D. F. Walker Bldg., Salt Lake City. **Officers:** Lorenzo Price, Jr., pres.; A. J. Bruneau, v. p.; E. F. Mobley, sec.-treas.; with W. L. Smith and Ambrose Nord, directors.

Inc. in Utah. Cap., \$1,000,000; shares \$1 par; assessable; 600,000 shares outstanding. Listed in Salt Lake City.

Property: 9 patented claims in the Bannack mining district, Bannack, Mont., adjoining the Bannack Gold Mining Co., and said to have the extension of the latter's ore zone. Credited with a production of \$350,000. Management claims there is an ore-shoot 1,800' long and from 50 to 125' in width, containing "hundreds of thousands of tons of ore, that will average \$11 per ton," values mainly in the gold content, with some copper, a statement that is a gross exaggeration.

Reported in June, 1916, that property had been equipped with new machinery, including a 325 cu. ft. compressor and a 25-h. p. gasoline hoist, and would be systematically developed to the 300' level.

ORIGINAL MINING & MILLING CO. CALIFORNIA

Merced, Mariposa Co., Calif. **Property:** the Original Quartz mine, 4 unpatented claims, at Merced, in Sec. 21, T. 3 S., R. 19 E., said to carry a 2' vein, with slate hanging and footwall.

Development: by 640' shaft and several thousand feet of workings. **Equipment:** includes compressor, electric hoist, machine drills, 10-stamp mill and several buildings. Employs 40 men.

ORION MINING & MILLING CO. ARIZONA

Office: 733 Central Bldg., Los Angeles, Calif. Mine office: Oatman, Mohave Co., Ariz. **Officers:** J. L. Humble, pres.; C. J. Rhodes, v. p.-gen. mgr.; Wm. H. Wise, sec.-treas.; F. F. Brush, mgr., Oatman.

Inc. 1915 in Ariz. Cap., \$1,250,000; increased March, 1916, to \$1,500,000; shares \$1 par.

Property: 170 acres, 70 patented, at Oatman, includes the Gold Dust group, one of the oldest gold producers in the district. **Development:** by several shafts from 100' to 550' deep, a 100' tunnel, crosscuts and drifts.

Equipment: includes 360 cu. ft. compressor, 75-h. p. electric hoist, 20-stamp mill and cyanide plant, mine buildings and dwellings. Developing in 1915.

ORIZABA MINING & DEVELOPING CO. NEVADA

Offices: Goldfield and Orizaba, Nevada. Company is controlled by the Diamondfield Black Butte Reorganized Mng. Co. **Officers:** L. K. Koontz, pres.; L. L. Patrick, v. p.; Harry B. Ruhl, sec.-treas.; with P. V. Rovnianek and A. V. Rovnianek, directors.

Inc. 1915. Cap., \$1,000,000; shares \$1 par; 700,000 issued.

Property: 6 claims, in process of patent, 120 acres, at Orizaba, Nye county, shows gold-silver-copper-lead ore in veins 2-7' wide, occurring on a contact between limestone and granite. The main vein strikes S. 20° E., with dip 70° S. W.

C. D. Wilkinson reported on the property in Oct., 1915, and estimated

1,500 tons of \$20 ore exposed in the mine and 1,200 tons of \$12 ore on the dumps. Developed by 95' shaft with 140' east drift on that level. A prospect.

ORO AMIGO PLATINO MINING CO.

NEVADA

Goodsprings, Nev. **Officers:** S. E. Yount, pres.; Geo. A. Fayle, v. p.; H. K. Riddell, sec.-treas.-mgr.; with N. B. Hunter and Fred A. Hale, Jr., directors.

Inc. Nov., 1914, in Nevada. **Cap.**, \$1,000,000; shares \$1 par; 465,450 shares issued. Annual meeting, Jan. 15th. Operating expenses for 1915 were \$8,500.

Property: 3 unpatented claims, 60 acres, in Yellow Pine mining district, Clark Co., Nevada, about 2 miles N. E. of the Boss mine. **Ore:** quartz and plumbogjarosite in fissure veins in limestone. Values are copper, gold, platinum and palladium, occurring in shoots 6'-4' wide. **Development:** by 2 tunnels, 70' and 150' long, with 500' total underground workings. Not yet producing.

ORO BELLE DEVELOPMENT CO.

ARIZONA

Address: Crown King, Yavapai Co., Ariz. Inc. in 1915 by C. C. Cowan to operate the Oro Belle and Gray Eagle gold mines, formerly owned by Tiger Gold Mining Co., now held under lease from Mrs. Hattie Barnes, care Theron Davis, 170 Broadway, New York.

Property: 10 patented claims, 172 acres, 5 miles S. E. of Crown King, Arizona, shows pyrite and chalcopyrite in fissure veins, 2'-15' wide. Veins strike N., dip 60° W. Ore is said to assay \$20 gold, 2 oz. silver and 1% copper per ton.

Development: by 8 tunnels, longest 1,000', and a 600' shaft. **Ore reserves:** estimated April, 1916, at 5,000 tons of \$20 ore. **Equipment:** includes a 50-h. p. steam hoist, compressor and 20-stamp, 60-ton mill.

Production: 19,010 lbs. fine copper, 9,937 oz. silver and 4,313 oz. gold in 1907; 3,639 oz. silver and 1,823 oz. gold in 1908; 4,802 lbs. fine copper, 2,725 oz. silver and 1,226 oz. gold in 1909. Property was idle until Oct., 1915, when company started operations. Mine credited with total production to date of \$700,000. Employs 20 men.

ORO BELLE MINES CO.

CALIFORNIA

W. B. Andrews, Duluth, Minn., pres.; H. W. Fesing, Houghton, Mich., sec.-treas.

Property: the Oro Belle Mine and millsite, in Hart Mining district, San Bernardino Co., Calif., about 14 miles W. of Searchlight, Nev. **Ore:** mainly gold, occurs in two veins. On the 700' level the vein is said to be 6' wide and to carry 4' of ore averaging \$8 per ton. The Woodward lode was cut on the 100' level, showing a width of 125' and giving assays of from \$5 to \$20.

Development: by 814' vertical main working shaft with levels at every 100', a total of 2,700' of lateral work.

On Feb. 10, 1915, the Oro Belle entered into an agreement with the Tonopah Belmont Development Co. whereby the latter should undertake the development and equipment of the Oro Belle mine under a 1-year lease and bond, and eventually pay the debts of the Oro Belle Mines Co. (not to exceed \$27,000), in consideration of which the Tonopah Belmont should receive 500,000 shares of stock in a new company to be organized to take over the mine, with an option on further 100,000 shares of treasury stock at par, \$1. The option was relinquished within the year and the Oro Belle is presumably idle.

ORO COBRA MINING CO.

ARIZONA

Address: Thos. Wilkinson, pres. and gen. mgr., 715 High St., Burling-

ton, Iowa. Operating office: Prescott, Ariz. Mine near Wenden, Yuma Co., Ariz. At last accounts, Judge John J. Hawkins, v. p.; S. M. Wilkinson, sec.-treas.; R. R. MacDonald, supt. Inc. Oct., 1901, in Arizona. Cap., \$1,500,000; shares \$1 par; nonassessable; fully issued. Annual meeting, second Tuesday in February.

Property: 14 claims, 280 acres, in the Tank Pass section of the Harcuvar mountains, Ellsworth district, 12 miles west of Wenden. The claims show diorite, schist, granite and porphyry, with several fissure veins, from a few inches to 20' in estimated average width, carrying oxidized ores near surface, said to assay 12 to 15% copper, and \$1.50 to \$80 per ton in combined silver and gold values, with chalcopyrite, at shallow depth. Mine is opened by shafts of 250', 150' and 40', and a tunnel of 110' with 700' of workings. Only assessment work done in 1915.

ORO FINO MINING CO.

CALIFORNIA

East Auburn, Calif. **Officers:** Geo. H. Hyde, pres.; J. B. Landis, v. p.; Haines Gridley, sec.-treas.-mgr. Inc. Aug. 29, 1913, in Calif. Cap., \$200,000; shares \$1 par; 189,865 outstanding. Annual meeting, 1st Monday in August.

Property: the Bellevue & Bullion mines, 7 claims, 4 patented, 80 acres, in Ophir Mining district, Ophir, Placer county. Shows a fissure vein, 1'-4' wide, running E.-W., with dip of 75°, between schist hanging-wall and grano-diorite footwall. Ore is quartz with some sulphides, assaying from \$7-\$10 per ton in gold and silver.

Development: by 340' vertical shaft, with a total of 2,000' underground workings. Management estimated 12,000 tons of ore blocked out, Dec., 1915.

Equipment: includes 50-h. p. electric hoist, Leyner compressor, electric pump, and 10-stamp, 35-ton mill. Mill started operating in Oct., 1915.

ORO GRANDE MINES CO.

ARIZONA

Office: Clinton, Ia. Mine near Wickenburg, Maricopa Co., Ariz. **Officers:** at last accounts, G. E. Lamb, pres. and treas.; Geo. B. Upton, v. p. and gen. mgr.; F. W. Ellis, sec.; and T. G. Norris, directors. Inc. 1901 in Arizona. Cap., \$3,000,000; shares \$10 par; nonassessable; issued, \$2,500,000. Is a close corporation, controlled by 6 shareholders. Annual meeting, second Tuesday in January.

Property: 9 claims, patented, 161 acres, in the Black Rock district of Yavapai county, shows contact deposits, between diorite and hornblende-schist. The one under development, with strike of N. 27° E. and vertical dip, is estimated by management as 170' wide, traceable 4,400', carries oxidized ores, bornite and chalcocite, with gold values estimated to average \$5.40 per ton. **Development:** by shafts of 320', 100' and 100', with about 8,000' of workings, and is reported to have blocked out 980,000 tons of ore.

Equipment: includes a 55-h. p. gasoline plant at the mine, with a 15-h. p. hoist and 5-drill Sullivan air compressor.

The 50-ton mill has ten 1,050-lb. stamps with a 40-h. p. gasoline engine; water is pumped, for milling, from Box canyon on the Hassayampa river.

The manager reports a saving by straight amalgamation of 99% of assay values and having made 60-day mill-runs with a total cost of \$1.87 per ton, for mining, milling, pumping and all expenses, which is interesting, if true. Idle since 1914.

ORO OLD GLORY MINE.

ARIZONA

G B. Williams, owner, 316 Meigg St., Rochester, N. Y. A. J. Fraser, supt. **Property:** the Old Glory, or Oro mine, 10 claims, unpatented, in the Oro Blanco district, 30 miles west of Nogales, Santa Cruz Co., Ariz. Mine shows a 16' fissure vein with a 5' paystreak of silicious sulphide ore carrying copper and lead with gold.

Development: carried on since 1911 consists of a 350' shaft with 2 levels

and ground opened for stoping. In 1915 \$1,000 was spent on the property. **Equipment:** includes pumps, tramway and mill. Mine has produced about \$50,000 worth of ore to 1916. Plan sinking winze and continuing drift on vein at 350' level.

ORO-PLATA MINE.**ARIZONA**

Address: O. B. Stanton, supt., Kingman, Mohave Co., Ariz., and 101 Wall St., N. Y. Property is a gold mine, producing lead-zinc ore, with gold and silver values. **Development:** by 280' shaft; equipped with gasoline hoist. Mine has mill with 2 Nissen stamps. Credited with production of \$500,000 in gold and silver.

ORONOGO MUTUAL MINING CO.**MISSOURI**

Guy H. Waring, Oronogo, Jasper Co., Mo., mgr. **Property:** 40 acres of zinc bearing land, includes the Old Judge mine on the Elliott land, the Hockaday tract, purchased from the American Z. L. & Sm. Co. and mining rights of city lots at Oronogo.

The Old Judge is developed by 2 shafts, 165' and 170' deep. **Equipment:** includes 16 air drills, 2 electric hoists, 2 compressors, Carterville crusher and a new 500-ton electrically driven concentrating plant with 2 sets of jigs, slime tanks and 11 tables.

Production of zinc concentrates was begun the latter part of 1914. About 85 men employed.

ORPHAN BOY MINING CO.**UTAH**

Idle. Milford, Utah. At last accounts, James R. Craig, pres.; W. D. Williams, v. p. and mgr.; Chas. A. Doe, sec.-treas.; foregoing, with M. R. Williams and Geo. H. Williams, directors.

Property: in Star district, 20 miles S. W. of Milford, Beaver Co., Utah, shows limestone, cut by quartz monzonite, with ore in veins and replacements. There are 11 claims, adjoining the Red Warrior and Mowitza mines, developed by 500' shaft with 1,200' of tunnels and workings from which considerable high-grade ore has been shipped. Vein, though narrow, has bodies of lead-carbonate ore carrying a little copper. Presumably doing annual assessment work.

ORPHAN COPPER CO.**ARIZONA**

Property sold under judgment in 1913 and since idle. Fully described Vol. XI, Copper Handbook.

OSBORN CONSOLIDATED MINING & MILLING CO.**UTAH**

American Fork, Utah. **Officers:** at last accounts, S. Osborn, pres. and gen. mgr.; W. D. Loveless, v. p.; Alfred J. Osborn, sec.-treas. Inc. July 17, 1907, in Utah. **Cap.**, \$125,000; shares 25 cts. par.

Property: 9 claims, in American Fork canyon, about 4 miles from Park City, shows veins of 5 to 8' width, carrying lead values near surface, developed by a number of shallow shafts and shaft tunnels. The 200' main shaft is sunk at an incline of 42°. Copper ores occur in depth in many of the adjacent mines and are expected here. Development meagre. Presumably idle.

OSCEOLA CONSOLIDATED MINING CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. Mine office: Osceola, Houghton Co., Mich. **Officers:** E. V. R. Thayer, pres.; Jas. MacNaughton, gen. mgr.; Wm. H. Dwelly, Jr., E. V. R. Thayer, J. M. Longyear, Wm. D. Calverly, D. S. Dean, Benj. Joy and Guy W. Currier, directors; C. H. Bissell, sec.-treas.; G. L. Osgood, asst. sec.-treas.; Frank H. Haller, supt.; A. Lincoln Burgan, mill supt.; Chas. D. Hohl, chief engr.; Jas. Rowe, mng. capt. Osceola branch: Jos. Discombe, mng. capt. North Kearsarge branch: Frank Lands, mng. capt. South Kearsarge branch: John T. Reeder, purch. agt.; Wm. Veale, chief clerk.

Inc., 1873, in Michigan, and reincorporated 1903 for a term of 30 years. Cap., \$2,500,000; shares \$25 par; issued, \$2,403,750. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, second Thursday in March. Company is controlled by the Calumet & Hecla Mining Co., through ownership of 32,750 shares. Balance sheet of Dec. 31, 1915, shows net earnings of \$1,610,860, and a surplus of \$2,166,646.

Dividends: company has paid 82 dividends, beginning 1878, to March, 1916, aggregating \$13,627,925. Recently dividends have been \$2 in 1904; \$4 in 1905; \$16 in 1906; \$7 in 1907; \$2 in 1908; \$14 in 1909; \$8 in 1910; \$7 in 1911; \$12 in 1912; \$7.50 in 1913; \$3 in 1914; \$8 in 1915; \$3 in Jan. and \$4 in March and June, 1916.

Net earnings were \$677,105 in 1908; \$1,070,645 in 1909; \$758,586 in 1910; \$664,628 in 1911; \$1,163,288 in 1912, equivalent to \$12.09 per share; \$381,967 in 1913; \$353,677 in 1914; \$1,610,860 in 1915.

Property: 2,120 acres, in 4 separate tracts, also an extensive mill site, in Houghton county, and miscellaneous lands in Houghton and Keweenaw counties, Michigan. Company's property includes the Osceola, North Kearsarge, South Kearsarge and Tamarack Junior mines.

The Osceola mine proper, 720 acres, lying next south of the Calumet & Hecla, was opened, 1873, on the Calumet conglomerate; this bed proving unremunerative, work was begun on the Osceola amygdaloidal bed, parallel and 730' east of the Calumet conglomerate. The Osceola amygdaloid has a strike of approximately N. 39° E., and is opened by six shafts numbered from north to south. Crosscuts have been sent from the Osceola workings to the Calumet conglomerate, at various depths, without encouragement, and diamond drilling was done, 1904, to locate and test the Kearsarge amygdaloid on the old Osceola tract, but the results were not encouraging. It is said that the company ceded the right to mine the Kearsarge bed on its property to the Laurium Mining Co., in exchange for certain surface rights.

The 4 northernmost shafts of the Osceola mine proper are abandoned. No. 5 Osceola shaft, 700' S. E. of No. 3, is 4,667' deep. No. 6 Osceola shaft, formerly known as the Opechee, 1,300' S. W. of No. 5, is 4,734' deep. This shaft shows some good stopes, especially on the lower levels in the southern drifts, toward the Tecumseh mine.

The compressor house is equipped with a 50-drill Nordberg 2-stage cross-compound air compressor.

Water is secured from Lake Superior through a 1½-mile line of 6" pipe, connecting with a stand pipe at the Tamarack mine, leading to a 130,000-gal. concrete reservoir between Osceola shafts Nos. 5 and 6.

The Kearsarge or North Kearsarge mine, 1,120 acres, lies north of the Wolverine, with which it has underground connections. Extensive diamond drilling, 1905-07, showed considerable good stamp rock in the foot and hanging walls, at points where the main bed was impoverished. Diamond-drill boring costs were \$2 to \$3 per foot, as against \$6 to \$8 per foot for drifting. The Kearsarge amygdaloidal bed ranges 16 to 20' in width, in this mine, and has proven very bunched, though with very good average values. The southern workings, approaching the Wolverine, have shown improvement, but the mine is richest near the Ahmeek, to the north. About 60 power drills are used in this branch.

No. 1 North Kearsarge shaft is 3,873' deep and has a Nordberg hoist good for 6,500' depth, operating two 6-ton skips in balance. No. 2 North Kearsarge shaft was abandoned at depth of 2,400', some years ago.

No. 3 North Kearsarge shaft, 1,825' N. E. of No. 1, is 3,403' deep and

develops a large area of good ground, especially in the northern drifts. No. 4 North Kearsarge shaft, begun 1907, sunk 75' in the footwall, is 1,622' deep. The shaft is lined with concrete for 185' from surface, and has large loading bins just below the 10th and 13th levels, to which rock is milled through chutes, from the levels above. Equipment of the rock house includes two 40-ton crushers, driven by a special Nordberg engine.

The steel frame boiler house at No. 4 has three 84" Pratt boilers, with room for 2 additional.

The North Kearsarge surface plant includes a stone compressor house and a 30-drill compressor at No. 1 shaft, where are located also the combination machine and carpenter shops, warehouse and office, all of wood.

The **South Kearsarge** mine, 160 acres, lying south of the Wolverine and east of the Centennial, was known formerly as the Iroquois. Development was begun Sept., 1899, and the best stopes are toward the Centennial line, the Kearsarge bed averaging about the same width as in the North Kearsarge and Wolverine mines, and being remarkably uniform in copper values. This mine is completely developed, both shafts and all but a few of the drifts having reached the boundaries of the property, and the mine is officially stated to have a life of but 2 years, at the present rate of extraction, without taking into account about 700,000 tons in the pillars and arches; the mining of these will be a slow operation and costs higher than at present.

No. 1 South Kearsarge shaft, the northernmost, is 2,820' deep, and practically at the boundary. The shaft rock house cares also for rock from No. 2 shaft, with which it is connected by an 1,100' trestle. Two skips are operated in balance. No. 2 South Kearsarge shaft is 1,992' deep.

The **Tamarack Junior** mine, 120 acres, lying between the Centennial and Calumet & Hecla, has 2 vertical shafts, on the Calumet conglomerate, No. 2 being 3,360' deep, with 12 levels opened. The Tamarack Junior has been idle since 1903, and apparently is dead, so far as the conglomerate is concerned, with indifferent prospects of finding other workable cupriferous beds on the tract.

Rock is transported from the various mines to the mills by the Hancock & Calumet railway, a branch of the Duluth, South Shore & Atlantic system.

Mill: is built in 2 sections, the main section being 176x213', of steel frame, with 4 Nordberg steeple-compound stamps. These stamps, which are now in very general use in the Lake Superior district, were invented by Mr. Nordberg as the result of some years of experimentation. The stamps have circular mortars, with $\frac{5}{8}$ " screens, and hydraulic separators, about 20% of the copper secured in milling coming from the mortar discharges and separators. The older section has 3 stamps with circular screens having $\frac{3}{8}$ " openings, and is otherwise a duplicate of No. 2 mill.

The wash department of the 2 mills are equipped with Woodbury classifiers and jigs with 6 round tables and 1 Wilfley table for each stamp. The Wilfleys taking headings from the round tables. An Allis-Chalmers Chilean mill reduces over-size material from the stamp mortars and there are crushing rolls and Hardinge mills. Stamping costs were 16.95 cts. per short ton in 1905, and only 11.71 cts. in 1907, the latter figure being the lowest ever reported by any mill for this work, and milling costs were 13.36 cts. per ton in 1908. No figures of stamping costs have been made public since the change in management.

The steel boiler house, adjoining the mills and furnishing power for both, has three 250-h. p. 72" boilers, delivering steam at 150-lbs. pressure,

and nine 250-h. p. 84" boilers operated under 105-lbs. pressure, all of the locomotive-firebox type.

The power plant has an Allis-Chalmers Corliss engine, operating a 100-k. w. Morgan-Gardner d. c. generator, furnishing current for 220-volt incandescent enclosed arc lamps.

The joint pump house of the Osceola and Tamarack mines has two 40,000,000-gal. triple-expansion Nordberg pumps having 22", 40" and 60" cylinders, with three 30" horizontal plungers of 52" stroke and 42" discharge. Water is taken through an 8' tunnel, running 1,275' under Torch lake, with 3" intake holes, guarding against clogging by ice.

Production:

	Tons R'k Treated	Lbs. Min. Prod.	Lbs. Cu. Cost		Lbs. Cu. Prod.	Total Cost per Lb.	Rec'd per Lb. Cts.
			per Ton R'k Stpd.	per T. (a)			
1916 (½ yr.)	.....	.....	.....	.....	9,791,439	.....	.....
1915	1,361,089	26,777,790	14.5	\$1.18	19,731,472	10.03	18.19
1914	1,108,447	20,997,900	13.5	1.29	14,970,737	10.79	13.14
1913	735,044	14,945,645	15.4	1.60 (d)	11,325,010	12.30	15.50
1912	1,246,557	24,282,312	14.8	1.23 (c)	18,413,387	10.36	16.63
1911	1,246,596	24,452,912	14.8	1.14 (b)	18,388,193	9.28	.....
1910	1,217,720	25,669,913	15.9	1.28	19,346,566	9.37	.....

(a) Includes mining, transportation, stamping and taxes per ton of rock.

(b) 63,449 tons No. Kearsarge rock stamped at Tamarack mills at a cost of 27.28 cts. per ton.

(c) 77,937 tons No. Kearsarge rock stamped at Tamarack mills at a cost of 24.32 cts. per ton.

(d) 13,379 tons No. Kearsarge rock stamped at Tamarack mills at a cost of 27.88 cts. per ton.

In 1915 the mine costs per ton at the different mines operated by the company were as follows: Osceola, \$1.46; North Kearsarge, \$1.17; South Kearsarge, \$1.04.

Strike conditions and inefficiency of green labor in 1913-14 and the outbreak of the European war later in 1914 contributed to low production and high costs during that time. From Sept. 1, 1914, to Feb. 1, 1915, the mines were operated on a three-quarters time basis. Osceola is a low-grade mine whose profitable operation is ensured by the efficient management of the Calumet & Hecla control.

OSHKOSH-WYOMING MINING CO.

WYOMING

Address: 55 High St., Oshkosh, Wis. Mine near Dillon, Carbon Co., Wyo. **Officers:** O. A. Koch, pres.; E. E. Meeleus, v. p.; H. O. Granberg, sec.-treas. and gen. mgr. **Inc.** June 20; 1904, in Wyoming. **Cap.**, \$1,000,000; shares \$1 par.

Property: 11 claims, 220 acres, in the Battle Lake district, is said to carry fissure veins in gabbro, of 22' estimated average width, opened by shafts of 32' and 72' and a 22' tunnel, showing chalcopyrite and oxide ores of copper. Idle, but company pays taxes and keeps a watchman at the mine.

OSTON LEASING CO.

COLORADO

I. J. Russell, supt. Operates under lease the 7 upper levels of the Thompson shaft on the Elkton Cons. Mining & Milling Co.'s property on Gibbons hill, Elkton, Teller Co., Colo.

Shipments resumed in March, 1916, amounted to 980 tons, estimated to average \$8 per ton. Ore is shipped to the Golden Cycle mill at Colorado City.

OTEGO MINING CO.**WYOMING**

Hecla, Wyo. **Officers:** Horace E. Adams, pres.; A. G. McGregor, v. p.; Ray E. Lee, sec.-treas. **Inc.** in Wyo. **Cap.**, \$5,000,000; shares \$1 par.

Property: 3 claims, about 60 acres, in Secs. 25 and 26, T. 14 N., R. 70 W., in the Silver Crown mining district near Hecla, Laramie Co., Wyo. The Arizona mine is said to show granite and schist cut by an extensively fractured dike of diorite, about 200' wide and 2,000' long, outcropping at surface over a considerable distance. Ore at surface is oxidized and carries principally malachite, succeeded at depth by copper sulphides and native copper. Gold values occur in small quartz veinlets.

Development: by 160' shaft with 102' crosscut at the 80' level, 260' of crosscuts and drifts on the 130' level, and a 100' tunnel. Mine has been reported on by C. E. Jamison, State geologist of Wyoming (1912), and by Prof. H. C. Beeler (1907).

OTERO COPPER CO.**NEW MEXICO**

Brice, via Oro Grande, Otero Co., N. M. **Property:** the Garnet mine group, showing deposits of copper-gold ore in fissures, replacements and contact deposits near monzonite porphyry.

Development: by 500' shaft with an ore-shoot on the 230' level said to run 5% copper and \$6 gold. The mine is equipped with a gasoline hoist.

Property reported, Sept., 1913, under bond and lease to an English syndicate, represented by L. Maurice Cockerill, with J. W. Camphouse in charge as manager. No returns.

OTIS MINING CO.**MISSOURI**

Joplin, Mo. **Inc.** in Missouri. **Cap.**, \$20,000. Operates a lease on 15 acres of mineral bearing land in Sec. 7, T. 27, R. 33, near Joplin.

Development: by 2 shafts to depth of 185'. **Equipment:** includes 300-ton concentrating mill, Carterville crusher, 8 Wilfley and Ripley tables, 11 air drills, steam power hoist and pump. About 60 men employed. Producing since 1914.

OURAY SMELTING & REFINING CO.**COLORADO**

Office: 403 Wyoming Bldg., Denver, Colo. Thos. B. Crawford, pres.; Wm. E. Kreamer, sec.-treas. **Inc.** in Colo. **Cap.**, \$750,000; shares \$1 par; divided into 185,000 7% preferred shares, 82,000 outstanding, and 562,500 common stock, 150,000 shares outstanding.

Property: 435 acres, patented, on the Uncompahgre river, 4 miles from Ouray, Colo. **Development:** by 250' shaft and 3,500' of tunnels and drifts. The company became financially embarrassed in 1914 and the mine was closed down. The 350-ton smelter at Ouray was leased to the Wanakah Mng. Co. and at last accounts was treating about 200 tons of ore daily. The Ouray Smelting & Refining Co. receives 22½ cts. per ton royalty on all ore treated.

OVERLAND MINING CO.**ARIZONA**

Mine near Winkelman, Ariz., adjoins the London Range mine of the London Arizona Copper Co. and "79" mine on the south and west. Claims carry an extension of the main dike system of the London range, showing metamorphic contact orebodies. Hayden Junction is the nearest railway point. Mine reported under lease to M. H. Murphy and W. E. Dunlap, of Kingman, in 1915.

Company has hoist, boilers, etc.

OVERSIGHT MINING & MILLING CO.**WASHINGTON**

Idle. Mine near Republic, Wash. Described in Copper Handbook. Vol. XI.

OWL HEAD COPPER CO.**ARIZONA**

Office: Cameron Holding Corporation, 299 Madison Ave., New York.

Mine near Red Rock, Pinal Co., Ariz. **Officers:** Nott E. Guild, pres.; R. V. Thompson, v. p.; John W. Estell, treas.; J. B. Wright, sec.; with G. F. Kitt, Wm. P. Michel and John B. Frilb, directors. **Inc.** 1910 in Arizona. **Cap.**, \$10,000,000; shares \$10 par.

Property: 24 claims, the Apache Princess group, in the Tortillita mountains, Owl Head mining district, 16 miles N. E. of Red Rock. Lands show a zone, 150' wide, of reddened schist with eruptive dikes, the conditions being said to resemble those of the "porphyry" or disseminated deposits at Miami and Ray. The workings show copper impregnations in the schist and to some extent in the adjoining granite, which is said to give assays of 0.5% to 3% copper and 1 to 3 oz. silver per ton.

Development: by shaft, 150' deep in May, 1916, to be sunk 200'. Cross-cutting and churn drilling is planned. Property considered promising. A $\frac{2}{3}$ interest in the Owl Head Co. is owned by the Cameron Holding Corporation, which is financing the development work. Geological report of O. Metchke must not be taken seriously.

OWOSSO MINING CO.

MISSOURI

H. H. Culver, mgr., 1409 Wall St., Joplin, Mo. The mine is owned by J. L. Harris, Daniel Fisher, Jas. Fisher, Jr., T. G. Shubert, all of Hancock, Mich., and H. H. Culver.

Property: a 10-year lease on 1 claim, 40 acres, on Baker land, in S. E. $\frac{1}{4}$ of Sec. 33, T. 28, R. 32, Jasper Co., Mo., carrying lead and zinc ore in sheet ground formation. This is a virgin mine in the sheet ground field in Duenweg between the Lincoln and Coahuila mines. **Development:** by 242' vertical shaft and 12 drill holes reported all in ore.

Equipment: includes compressor, 8"x8" steam hoist, 3 Gardner pumps and 200-ton concentrating mill with jigs, crusher rolls and tables.

Production: for 1915, begun in Sept., 1915, amounted to 4,240 tons of ore, or \$9,872. Concentrates averaged 58% zinc and 78% lead. Plan addition of electric power and opening up of further ground in 1916.

OXFORD CONSOLIDATED MINING CO.

UTAH

Eureka, Utah. James Crooks, pres.; Geo. Owens, sec.-treas.; C. H. Spriggs, mgr. **Inc.** June, 1909, in Utah. **Cap.**, \$25,000; shares 5 cts. par; assessable.

Lands: 9 claims, patented, show copper and lead ores. Levied an assessment of one-half cent, early 1911, to pay indebtedness incurred through litigation. No work has been done since patent to property was issued.

OXFORD COPPER MINING CO.

IDAHO

Company dormant or defunct. Mine near Pierce, Idaho. Described in Copper Handbook, Vol. XI.

OXIDE COPPER CO.

ARIZONA

Office: 85 Ames Bldg., Boston, Mass. Mine at Silver Bell, near Red Rock, Pinal Co., Ariz. Albert C. Burrage, pres.; Chas. D. Burrage, sec.-treas.

Property: 31 claims, patented, known as the Copper Prince group, in the Silver Bell district, 7 miles south of the Imperial mine, shows contact metamorphic deposits carrying argentiferous copper sulphides in limestone gangue.

Development: by a 500' shaft and a 350' tunnel, with about one-half mile of workings. **Equipment:** includes gasoline power and an air compressor. Churn drilling was done, 1910, to locate disseminated ores, but apparently results were not especially encouraging. **Production** was 49,676 lbs. copper and 103 oz. silver in 1908, and less than \$3,750 worth of ore in 1910; none reported since.

OZARK SMELTING & MINING CO. KANSAS & NEW MEXICO

Office: 601 Canal Road, Cleveland, Ohio. Mine office: Magdalena, Socorro Co., N. M. Philip Argall & Sons, of Denver, Colo., cons. engrs. Smelter: Coffeyville, Montgomery Co., Kans. Geo. A. Martin, v. p. and gen. mgr.; Oliver Box, asst. gen. mgr.; L. P. Pressler, supt.; W. S. Stevens, mill supt.; W. E. Cortis, smelter supt. The company is a subsidiary of the Sherwin-Williams Paint Co.

Property: includes the Graphic mine, 30 claims, 227 acres, with total holdings of 800 acres, in the Magdalena district, showing limestone, shale and quartz, carrying contact ore deposits between limestone and schist, of about 50' proven width, 500' length, and known depth of 500'. The upper workings show large quantities of lead and zinc carbonates, ores being mainly smithsonite and sphalerite, with some cerussite and argentiferous galena, and occasional cuprite and native copper. Ores are mainly low in grade, with principal values in zinc. The ore-shoot, of about 500' length on the 7th, 8th and 9th levels, is about 100' wide on the 9th level.

Development: is by a 300' shaft, and two 1,500' cross-cut tunnels, with about 8 miles of workings, the lower levels showing a slightly argentiferous sulphide complex of zinc, lead and copper. Property regarded as one of the largest zinc deposits of America.

Equipment: mill was erected, 1912, to treat the large tonnage of low-grade complex zinc-lead-iron sulphide ore already developed, by the froth flotation process, using it as an adjunct to older methods of concentration. A 50-ton mill does dry concentration on ores above 20-mesh, and wet concentration on ores below that size. Electric power is used.

Production: mainly zinc ore, is shipped to the works at Coffeyville, for the manufacture of lead and zinc oxides, as the base for pigments, of which the Sherwin-Williams Co., in control of this corporation, is one of the largest American manufacturers. Company has an option on the Kelly mine at Kelly, N. Mex., owned by the Tri-Bullion Sm. & Dev. Co., and is working same with much success.

PACHUCA; COMPANIA BENEFICIADORA DE. MEXICO

See Santa Gertrudis Co., Ltd.

PACIFIC COPPER CO. MICHIGAN

Office: 701 Sears Bldg., Boston, Mass. Mine office: Leopold Bldg., Houghton, Houghton Co., Mich. **Officers:** Geo. P. Gardner, pres.; Chas. J. Paine, Jr., sec.-treas.; preceding, with W. Cameron Forbes, Chas. E. Perkins, Chas. J. Paine, E. V. Thayer, Geo. P. Gardner, T. N. Perkins, Walter Hunnewell and R. G. Goodell, directors; F. W. Nichols, agt. **Inc. Aug., 1890, in Michigan. Cap., \$1,250,000; shares \$25 par; issued, \$1,000,000, \$2 paid. Is controlled, through ownership of about 20,000 shares, by St. Mary's Mineral Land Co. Paid a \$1 dividend Nov. 18, 1910. Ended 1914 with \$26,087 cash on hand.**

Property: 820 acres, the N. W. $\frac{1}{4}$ and the S. W. diagonal half of the S. W. $\frac{1}{4}$ of the N. E. $\frac{1}{4}$ of Sec. 4, and Sec. 5, T. 54 N., R. 34 W. Land lies just N. W. of the Atlantic mine, and supposedly carries the northern extension of the Atlantic ashbed, on which a little exploratory work was done previous to organization. Has done no mining work since 1890.

Of the \$40,000 originally raised by sale of 20,000 shares, one-half was spent in prospecting work. The timber on the lands has been sold at various times and 140 acres sold to the Naumkeag Copper Co. From these sales and interest on funds, company has distributed 40,000 cash and 4,000 shares of Naumkeag Copper Co. stock to its stockholders.

PACIFIC COPPER CO., LTD.**MEXICO**

Address: F. C. Stephens, P. O. Box 1656, Mexico, D. F. Mine office: Petatlan, Galena, Guerrero, Mex. **Officers:** Dr. W. S. Cockrell, pres.; Thos. Milan, v. p.; J. P. Taylor, sec.; H. J. Morden, treas.; F. C. Stephens, gen. mgr.; preceding, with J. N. Gilbraith and Carlos Eisenmann, directors.

Inc. May 16, 1906, in Mexico. **Cap.**, 10,000,000 pesos; shares 100 pesos par; nonassessable; fully issued. Company holds direct title to its property through the Compania de Cobre del Pacifico, and is in turn controlled through stock ownership by the Pacific Copper & Pyrites Co.

Property: 1,000 pertenencias, 2,471 acres, known as El Rey del Cobre group, near the Rio Murga, in La Union district, 10 miles north of Petatlan and about 28 miles N. E. of Zihuatanejo, the nearest port. The property shows contact deposits in metamorphic schist, the main lode having a N. E. strike, traceable 3 miles. No. 3 orebody, reported to have a maximum width of 197', carrying lenses of cupriferous pyrite, is developed by 2 crosscut tunnels, drifts and raises to depth of 234' below the outcrop. No. 5 orebody, about 1 mile to the S. E., has only been slightly developed; the nature of the ore in both is said to be identical. Ore is estimated to average 1.5% copper and 40c in silver and gold per ton, with 48% sulphur and 42% iron.

Development: by "A" shaft of 109', "B" shaft of 70', El Socavon drift tunnel of 400', No. 3 crosscut tunnel of 404', No. 4 crosscut tunnel of 486', No. 5 tunnel of 243', and No. 1 tunnel of 407', with a total of 3,050' of workings. **Ore reserves:** estimated at 3,000,000 tons of ore blocked out, Jan., 1916.

Equipment: includes a hoist, not installed, good for 1,000' depth, and a small air compressor. There are about 35 buildings. Property lies in a very rugged country and is reached only by trails.

The property has been under development several years. Development work continued without interruption from the warring factions in the present revolution until 1915. Company is planning to build a railway to Zihuatanejo and to add equipment at the mines. The mine, though of low grade, apparently contains large orebodies and is considered promising.

PACIFIC COPPER MINING CO.**ARIZONA**

Office: 415 Board of Trade, Kansas City, Mo. Mine office: Crown King, Yavapai Co., Ariz. John Kelley, pres.; W. J. Morse, sec. **Inc.** Feb. 8, 1907, in Arizona. **Cap.**, \$3,000,000; shares \$1 par; nonassessable; issued, \$2,397,616.67.

Property: 30 claims, 10 patented, 600 acres, including a mill and smelter site, 4 miles from Harrington and 9 miles from a railway, in the Silver Mountain district of the Bradshaw mountains. Claims show a hornblende phase of Yavapai schist, with an intrusive porphyry dike of 50 to 150' width, carrying contact deposits of 9', of 14' and of 25' estimated average width, traceable 3,000', with N.-E. strike. Gossans are much leached, carrying honeycombed hematite and limonite, with occasional copper carbonates. **Ores:** malachite and azurite, succeeded at 50' by secondary chalcocite, bornite and chalcopyrite. The management estimates ore to range from 3 to 15% in copper, with good silver and gold values.

Development: consists of 1,500' of work, with a 500' shaft and several prospect workings.

Equipment: includes a 120-h. p. plant, with an 80-h. p. 3-cycle vertical engine, connected to a 4-drill Sullivan air compressor, a 20-k. w. triplex pump, and a 40-h. p. gasoline hoist. Presumably idle.

PACIFIC COPPER & PYRITES CO.**MEXICO**

Office: 1429 Monadnock Blk., Chicago. John Howard McElroy, pres.; C. B. Greenleaf, sec.; Eugene Atkins, treas. **Inc.** 1913 in Maine. **Cap.**,

\$7,500,000; shares \$50 par. Is a securities-holding company, controlling the Pacific Copper Co., Ltd., through ownership of over two-thirds of that company's outstanding share capital.

PACIFIC GOLD MINING & MILLING CO.

UTAH

(See Fissures Exploration Co.)

Office: American Fork, Utah. **Officers:** J. L. Craig, pres.; Jas. Chipman, Jr., v. p.-treas.; H. C. Johnson, sec.-mgr.; with A. B. Stevenson, A. K. Thornton, directors. **Inc.** 1900 in Utah. **Cap.**, \$100,000; shares 10 cts. par; assessable; \$400,000 shares outstanding. Annual meeting, 1st Monday in Feb.

Property: 6 patented claims, 120 acres, in American Fork mining district, Utah Co., Utah, shows quartzite and limestone, carrying several fissure veins varying in width from 17" to 15'. Veins strike N. 30° E. and dip 50° N. W. **Ore:** lead-silver sulphide, estimated by management to average 50% lead, 25 oz. silver, .02 oz. gold, 1.5% zinc, 15% iron, 0.1% copper, 22% sulphur.

Development: by 3 tunnels, 300', 700' and 1,000' long, with about 5,000' of workings, estimated to show 100,000 tons of ore blocked out for stoping, Dec., 1915. The main fissure was cut at depth of 500'. A drift was run on the vein 100' S. and another 500' N.; at the end of the latter a crosscut made to the hanging-wall was reported, May, 1916, to have disclosed 18" of copper glance assaying 22.7% copper and 512 oz. silver. Three carload shipments in 1915 gave average returns of \$50 per ton or \$7,300. Total production to date about \$32,000. Property operated under a 5-year lease, from 1914, by the Fissures Exploration Co., on a royalty basis.

PACIFIC MINES CORPORATION.

CALIFORNIA

Offices: 120 Broadway, New York, and Cutler Bldg., Rochester, N. Y. **Mine office:** Stagg, San Bernardino Co., Calif. **Officers:** J. N. Beckley, pres.; David I. Walsh, v. p.; J. H. Hobbs, sec.-treas.; Josiah Antstice, asst. sec.-treas.; above, with Jas. M. Curley, Col. Sir Henry Mill Pellatt and D. C. MacDonald, directors; Frank W. Royer, mgr. **Inc.** 1910 in New York. **Cap.**, \$1,000,000; shares \$5 par; reincorporated May 2, 1916, in Maine. **Cap.**, \$1,000,000; shares \$1 par; 642,000 shares issued; 300,000 shares treasury stock offered to the public, May, 1916.

International Trust Co., Boston, and U. S. Corporation Co., New York, transfer agents; Federal Trust Co., Boston, and U. S. Corporation Co., New York, registrars. Company is a consolidation of the Bagdad Chase Gold Mining Co. and the Roosevelt Mining & Milling Co. **Dividends:** to end of 1912, \$205,440. Last payment of 2% paid July, 1916. Listed for 642,000 shares on Boston Curb.

Property: 15 claims, patented, about 300 acres, in Bullion Mountain district, 9 miles from Ludlow. Country rock is trachyte porphyry and quartz monzonite. Orebodies occur in a silicified breccia along an E.-W. fault line, and have an average dip of about 35° N. Ores carry malachite and oxides with a little chalcocite and average 1.5% copper, 1.56 oz. silver and 0.36 oz. gold per ton.

Development: by about 8,000' of workings, including three shafts, deepest 300', and several tunnels. **Ore reserves:** estimated at 100,000 tons of \$10 ore and 200,000 tons of \$5 ore, according to report of F. W. Royer.

Equipment: includes an 85-h. p. Union gas engine, 3 hoists and a 10-drill compressor. Company also owns the Ludlow and Southern 9-mile standard-gauge railroad, with 2 locomotives.

Production: to end of 1915 is estimated at \$3,000,000. Production in 1914 and 1915 was about 100 tons per day. Shipments made under contract to United Verde smelter at Clarkdale, Ariz., reported to show net profit

of \$4.49 per ton. Management plans increasing shipments to 200 tons in 1916 and erecting a mill to treat the low-grade ore on the property.

PACIFIC SMELTING & MINING CO. MEXICO

Office: 42 Broadway, New York. Mine and smelter office: Fundicion, Sonora, Mex. **Officers:** Melbert B. Cary, pres.; Geo. M. Ryall, v. p.; Nelson S. Haughwout, sec-treas.; preceding, with Ronald E. Curtis, Howard McWilliams and Charles E. Wetmore, directors; Thornton C. Kirkland, asst. gen. mgr.

Inc. Oct. 6, 1909, in Maine. **Cap.,** \$8,000,000; shares \$5 par, issued in \$1,787,850 convertible cumulative 7% preferred stock and \$6,212,150 common stock; all issued. United States Corporation Co., New York, registrar. Annual meeting, third Monday in January, at Augusta, Maine. Listed on New York Curb.

General balance sheet: Dec. 31, 1915, shows property and securities, \$8,409,848; furniture, etc., \$200, and cash and accts. receivable, \$161,505, last item showing \$838 reduction, the others identical with 1914 statement. Liabilities: \$8,000,000 for stock, \$237,972 accts. payable, compared with \$235,241 in 1914, and \$333,581 surplus compared with \$337,150 in 1914.

Holdings: company controls the Douglas Copper Co. and Mexican Exploration & Mining Co. by ownership of 98% of the capital of each company. These constituent companies hold practically the whole of the capital of 3 other Mexican companies. The subsidiary Mexican corporations are the Anita Mines Co., Yaqui Mining Co. and the following smelting companies: Compania Metalurgica y Refinadora del Pacifico, S. A., owning the Fundicion smelter; the Mexican American Smelting & Refining Co., S. A., owning the Guaymas smelter and the Sinaloa Smelting Co., holding the Mazatlan, or Sinaloa, smelter concession.

Anita Copper Mines Co., S. A., owns the Anita, Consolidated, Baroyeca, London, Julia and Maria claims, 330 acres, belonging to the Anita mine, 25 miles north of the Fundicion smelter and the station of that name on the Southern Pacific Railroad of Mexico. This mine has been developed to a depth of 900' on the dip of the vein and is said to show ore reserves above the 7th level, amounting to 55,000 tons, that average \$2.58 gold, \$1.17 in silver and 3.99% copper.

Geology: the Anita (or El Cobre mine), has a shear zone of 115' width, with a diorite foot and trachyte, or rhyolite hanging wall. The shear zone, traceable for several thousand feet, with N.-S. strike and dip of about 45° W., carries ore in 5 lenses, or chimneys, the principal one being opened from the surface down to the 8th level, branching into 2 parts at the 6th level. Faulting, cross-faulting and brecciation occurs with displacements up to 200'. The ore is partly metasomatic replacement of diorite, and partly a contact metamorphic deposit. It contains the usual oxide minerals succeeded in depth by chalcopyrite.

Development: consists of a 900' inclined main shaft, No. 1, with 9 levels opened and about 7,415' of workings. There are also 4 other shafts. The management plans further work as soon as enough basic custom ore is available to supply a suitable furnace mixture. Courtenay de Kalb reported that his examination showed about 55,000 tons of ore blocked out, with good indications for development of further orebodies.

The surface equipment consists of 2 cross-compound 2-stage Rand compressors of 3,000-cu. ft. combined capacity; a Risdon second-motion duplex hoist, 14x21"; three 150-h. p. boilers; generator for light and power; rock-crushers, picking tables, shops, assay office, office buildings, warehouses, dwellings, supplies, etc.

El Cobre ranch owned by the company has approximately 10,000 acres of wood and timber land.

The Pirita mine, of the Anita Copper Mines Co., embraces Pirita No. 2 and Pirita No. 3 claims, 81 acres, located 5 to 7 miles from Victoria station on the Southern Pacific Railroad of Mexico. The mines contain a considerable tonnage of pyritic ore having small values in gold, silver and copper, but the deposit has not been extensively developed on account of poor transportation, though in time it will become of value to the company for fluxing purposes.

Yaqui Mining Co., S. A. owns 10 mining properties in Mexico, which are as yet but partly developed. The Rosamond and Aurora mines each have about 800' of development work, exposing a fair tonnage of commercial copper-silver ore. The company also owns a number of slightly-developed prospects and some old mines nearby.

Compania Metalurgica y Refinadora del Pacifico, S. A. owns the Fundicion smelter and other properties. The smelter was built originally to treat the ores of the Anita mine and to do general custom business. The smelting plant has a capacity of 350 tons a day, but was designed and in part equipped for 3 times that amount. The plant has one 42x160" blast furnace, sampling mill, power house, shops, administration buildings, etc. A railway connects all departments. Electric plant furnishes current for both lighting and power purposes, and all machinery excepting yard locomotives is motor driven. The plant is of modern design and in excellent condition.

The mine is 23 miles from a railway, and ore is hauled to the smelter by Saurer motor trucks. The road is good for 18 miles and bad for 5 miles, frequently muddy, with grades up to 12%.

The L'Aime lime quarry, located 2 miles from the railway near Victoria station, has 75 acres of limestone forming a hill 250' high, 300' wide and approximately 3,000' long. The rock is an excellent smelting flux, averaging but 1.2% silica, with about \$1 in gold; it was because of this gold content, determined by a special Government commission, that the company secured it as mineral land.

The Fundicion smelter was in blast for 9½ days in May, 1908, treating 300-tons charge daily, but owing to tap jacket troubles, about 15% of the value of the tonnage smelted was tied up in cleaning. As a result of this run, 3 carloads of matte, amounting to 73.5 tons, were shipped to the Nichols Copper Co. for refining. The shipment contained, as per report, 27,868 oz. silver, 172.2 oz. gold and 67,993 lbs. of copper and returned a net value of \$26,869.12. Mr. W. B. Budrow, who was the smelter superintendent at the time, and who had been connected in a similar capacity with several of the Guggenheim smelters, referring to the operation of the furnace, stated: "The performance of the furnace during this operation was very satisfactory, both from a metallurgical and economical point of view. The matte produced was clean and averaged over 46% copper, and notwithstanding the fact that it carried high values in both silver and gold, the slag losses in those metals were quite low."

Mexican-American Smelting & Refining Co., S. A., owns the Guaymas smelter with 250 acres, at Batuecas, a suburb of Guaymas, on tide water, lying between the Bay of Guaymas and the Southern Pacific Railroad of Mexico. The plant was originally erected by William C. Greene, founder of the Greene-Cananea Copper Co., and not having been operated for some years will need extensive alterations.

The Sinaloa Smelting & Refining Co., S. A., owns a concession from the Government for a smelter at Mazatlan, or elsewhere in the state, for a

period of 20 years from the 27th day of April, 1906, and is particularly exclusive in its terms.

The smelters have been closed down since 1910.

Reported in May, 1916, that several carloads of ore, assaying 4-5% copper and \$4 gold per ton, had been shipped to El Paso.

PACKARD EXTENSION MINES CO.

NEVADA

Lovelock, Nev. **Officers:** Anton Lassen, pres.; W. R. Chadwick, v. p.; David H. Skea, sec.-treas. and cons. engr.; with R. H. Young, V. A. Twig, and F. J. Howard, directors. **Inc.** Jan. 6, 1916, in Nevada. **Cap.**, \$1,250,000; shares \$1 par; 750,000 shares issued.

Property: 5 claims, unpatented, 90 acres, in Rochester mining district, Humboldt Co., adjoining the Nevada Packard ground, shows a shear zone of rhyolite with fissure veins, said to be 3-15' wide, with N. E. strike and dip of from 20-30°. Veins carry silver chloride and free gold. David H. Skea, consulting engineer for the Packard Extension, reports that the claims owned by the company cover the actual extension of the Packard ore shoots on the downward rake in a course to the S. W., and that the great ore zone of the Packard mine should be found in Extension ground at a depth of about 250-300' beneath the surface. Company plans sinking a 300' shaft in 1916. Wm. Coyle is developing the Argentite No. 1, and Argentite Fraction under lease.

PACKARD NORTH EXTENSION MINING CO.

NEVADA

Lovelock, Nev. **Officers:** T. P. Ebert, pres.; Frank Margrave, v. p.; J. W. Kromer, sec.-gen. mgr. **Inc.** 1916, in Nevada. **Cap.**, \$1,000,000; shares \$1 par.

Property: 4 claims, adjoins the Nevada Packard ground, at Lovelock. **Management reports:** "Our property is so closely associated with that owned by the Nevada Packard Mines Co., that a description of their vein system is practically a description of ours. Their veins run N. and S. and presumably all enter our ground, though but one outcrops. It is on this vein we are working and upon which our lessee is working. It is our intention to drive a tunnel which will cut all veins at considerable depth." The vein was cut in tunnel B, about 250' from the portal and drifts run N. and S. for 125', in March, 1916. Property is still in the prospect class.

PALISADE COPPER CO.

NEVADA

Address: T. W. Smith, supt., Bullion via Elko, Nevada. Owen Goldsmith & Co., Elko, Nev., are largely interested, but company is controlled in Boston, Mass.

Property: the old Heckla & Silver King mines, 2 claims, patented, at Bullion, Nev., held under bond and lease. In May a large body of high-grade copper ore was found in cleaning out an old tunnel; four 40-ton cars of \$50 copper ore were shipped, May 22, 1916. Property is an old silver-lead mine, idle for many years.

PALO VERDE COPPER CO.

ARIZONA

Office: Akron, Ohio. C. H. Howland, Cuyahoga Falls, Ohio, mgr. **Officers:** Will Christy, pres.; J. P. Loomis, v. p.; I. M. Shively, sec., with Chas. Currie, E. E. Quirk and C. H. Howland, directors. **Inc.** in Arizona. **Cap.**, \$2,000,000; shares \$1 par; issued \$1,000,000.

Property: 8 claims, is a copper prospect about 40 miles west of Phoenix, in the Saddleback mountains, between White Tanks and Eagle Tails districts, Maricopa Co., Ariz.

Mine is opened by shafts of 50, 112 and 210' depth and a 130' tunnel. Surface ores said to contain 2 to 15% copper. Plans to resume work in 1916.

PALOMA EXTENSION MINING CO.

UTAH

Office: 218 Judge Bldg., Salt Lake City, Utah. Thos. Marioneaux, pres.; Lorin Hall, sec. Inc. in Utah. Cap., \$50,000; shares 5c par; assessable; 645,000 shares outstanding. Listed in Salt Lake City.

Property: 300 acres in Star mining district, Beaver county, shows N. E. fissures carrying silver-lead-copper ore. These fissures cross contacts between limestone beds running N. and dipping E., quartzite that runs E. and dips N., and a granite or quartz monzonite. Ore occurs where the contacts are crossed by the fissures.

Development: by a new shaft, to be sunk 200' in Summer of 1916. Property a prospect.

PALOMA GOLD AND SILVER MINING CO.

UTAH

Office: Judge Bldg., Salt Lake City, Utah. Mines and works: Moscow, Beaver Co., Utah. Officers: M. P. Braffet, pres.; Chas. W. Olson, v. p.; with W. Scowcroft, H. B. Cole and B. F. Caffey, directors. R. D. Pomeroy, sec.-treas.; W. B. Hall, supt.

Inc. in Utah. Cap., \$100,000; shares 10 cts. par; assessable, last assessment levied Aug., 1916. Stock is listed on the Salt Lake Exchange.

Property: 14 claims in Star district, near Moscow, said to cover 3,000' along a limestone-monzonite contact intersected by 2 fissure veins, carrying silver, lead and copper ore. In April 1916, management reported encountering what is believed to be the extension of the Hoosier Boy east-west fissure.

Development: by 500' of trenching and an old 400' incline shaft, which was being deepened in June, 1916, and will be used as a main working shaft.

PANDORA COPPER MINING CO., LTD.

IDAHO

Address: Box 170, Wallace, Idaho. Mine office: Larson, Shoshone Co., Idaho. Walter H. Hanson, pres.; John C. Weatherhead, sec.-treas. and gen. mgr.; preceding officers and C. M. Baillie, directors.

Inc. Oct., 1906, in Idaho. Cap., \$1,000,000; shares \$1 par; assessable; issued, \$450,000. Annual meeting, fourth Wednesday in October.

Lands: 10 claims, 150 acres, adjoining the Snowstorm mine on the east, and supposed to carry about 3,000' of the Snowstorm ore zone. Property shows St. Regis and Revett quartzites, with copper impregnations in the latter. Development: includes 1,700' main, or working tunnel, which has not yet crosscut the vein. Only assessment work was done in 1915.

PANDORA SYNDICATE

ALASKA

L. J. McAtee, sec.-treas., 104 8th St., Spokane, Wash. Property: the Pandora mine, on Knight's Island, bonded by Burns, Jordan & Welch Co. to this new syndicate for \$650,000, May, 1916. Mine has 40' ledge of copper ore said to run 2%-6% with \$2 gold.

PANTHER CITY MINING CO.

NEVADA

Office: c/o M. R. Sanguinet, sec.-treas., 1st National Bank Bldg., Fort Worth, Tex. Wm. Bryce, pres.

Property: 7 patented claims in 2 groups, the Panther City and Olinda, in Salmon River mining district, Elko Co., Nev. Ore said to carry copper, silver and a trace of gold. Plans to start development work in 1916.

PARADISE MINING CO.

ARIZONA

Paradise, Cochise Co., Ariz., is controlled through ownership of 60% of stock, by Bisbee-Sonora Development Co., which see.

PARAGON CONSOLIDATED MINING CO.

IDAHO

Office: 436 Sibley St., St. Paul, Minn. Mine office: Paragon, Idaho. Officers: Geo. S. Monson, pres.; M. O. Nelson, v. p.; F. O. Hammer, sec.-treas., with W. W. Dunn, Geo. J. Rank, R. C. Patterson, mgr. L. W. Stedman, supt., and N. A. Stockett, directors.

Inc. Nov., 1908, in Minnesota. **Cap.**, \$1,500,000; shares \$10 par; non-assessable; outstanding, \$1,203,680. Bonds: authorized \$100,000; outstanding, \$15,000. Annual meeting in November.

Balance sheet for year ending Nov. 1, 1915, shows total disbursements, \$14,461, of which development and operations took \$9,927. Sales of ore yielded \$10,663.

Property: 43 claims, 19 patented, about 850 acres, in the Coeur d'Alene district, shows fissure and contact orebodies. Values are in lead, zinc, silver and gold. Extent of workings, about 16,000'.

Ore is concentrated in a mill, capacity about 100 tons, leased from the Black Horse Co. Mainly zinc concentrates are shipped. Power is developed at water-fall nearby, but operations have been hampered by scarcity of water. The mine has been an intermittent shipper during the past few years.

PARAGON MINING CO.

COLORADO

Henry C. Demming, gen. mgr., 15 N. 3rd St., Harrisburg, Pa. Is successor of Tirbircio Gold Mining Co.

Property: 400 acres of lode and placer claims near La Plata, La Plata Co., Colorado, is developed by 1,500' of adits. **Equipment:** includes 1,000-ton rock crusher, a 50-stamp and a 10-stamp mill. Manager reports March 20, 1916, "The company expects to have in bank by 1st of May, about \$50,000 to pay for the necessary additions and improvements and to start up the mills as soon as the improvements have been made."

PARCIONERA CONSOLIDATED MINING CO.

MEXICO

Address: Jos. S. Qualey, pres., 25 Pine St., New York city. Mine office: Santa Eulalia, Chihuahua, Mex. Ernest Henderson, sec. Is a close corporation, shares \$100 par. **Property:** a silver-lead mine, with some copper. Idle on account of Mexican revolution.

PARK CITY MINES CO.

UTAH

Care of American Flag Mine, Park City, Utah. **Officers:** J. H. Leavell, pres.; H. R. MacMillan, v. p.; John Pingree, sec.-treas. Inc. in Utah. **Cap.**, \$1,000,000; shares \$1 par; 521,526 shares issued, 36,000 in treasury, June, 1916. Listed on Salt Lake City Exchange.

Company has bond and lease on the American Flag mine at Park City, for \$250,000 and owns 34,000 bonds and 65,000 shares of American Flag stock. **Development:** 1,150' shaft, with levels and drifts. Ore reserves estimated at 10,000 tons. Production to June, 1916, \$400,000, the ore averaging \$31 (\$20 net).

PARKER GROUP OF MINES

COLORADO

John H. Meager, owner, Silverton, San Juan Co., Colo. **Property:** 5 claims, about 2 miles N. E. of Silverton, said to show a fissure vein in andesite-lime-porphry formation, traceable at surface for several thousand feet. The ore is a sulphide, containing copper, silver, gold, iron and molybdenum.

Development: by several tunnels and crosscuts. A prospect.

PARRY SOUND COPPER MINING CO., LTD.

ONTARIO

Office: 500 Germania Life Bldg., St. Paul, Minn. Mine office: Parry Sound, Ont. **Officers:** Frank Johnson, pres.; Otto Monson, sec.-treas.; preceding with John Ogren, A. Linderholm, and F. X. Benning, directors. Inc. March 23, 1899, in Ontario. **Cap.**, \$5,000,000; shares \$1 par; issued, \$4,500,000. Liabilities are given at \$45,000 floating indebtedness, and a \$3,000 mortgage at 6% on 200 acres of land. Annual meeting, second Tuesday in August.

Property: 10 claims, 1,000 acres, one-half freehold and one-fifth held

subject to a \$3,000 mortgage, on the eastern shore of Georgian bay, property including the McGowan and Wilcox mines.

The Wilcox mine has outcroppings of 4 parallel veins in a width of about a quarter mile, with a 145' shaft on a 20' vein in granite-gneiss, traceable 1,000', carrying auriferous and argentiferous bornite, assaying 2.8 to 11% copper. There also is an opencut, 20x150', 18' deep, showing 3% chalcocopyrite.

The McGowan mine has shafts of 100', 100' and 250', and a 150' crosscut tunnel, showing bornite and occasional chalcocopyrite, with quartz gangue. A smelter shipment of 240 tons of selected ore returned 17% copper and \$5 per ton in combined gold and silver values.

Equipment: includes a 10-stamp mill, hoisting machinery and several buildings. Idle, but management plans further work.

PATAGONIA MINES & DEVELOPMENT CO. ARIZONA

Office: Schmid-Shattuck Bldg., Patagonia, Santa Cruz Co., Ariz. Thos. Ewing, pres. and gen. mgr.; John A. Campbell, sec.-treas.; D. W. R. Davis and Charles Wighard, directors. **Cap.**, \$1,000,000; shares \$1 par; 850,000 shares in treasury.

Lands: 4 claims, including the Santa Rita in Josephine canyon, Patagonia, the Oklahoma group of 8 claims, and the San Antonio mine, in the Sierra Azul mountains, 30 miles S. W. of Cananea, Mexico.

Shipments from Patagonia in 1914 to the Copper Queen smelter assayed 30 oz. silver, 13.72% copper, netting \$46.28 per ton. No returns reported since.

PATRIQUIN QUICKSILVER MINE CALIFORNIA

Owned by Louis and A. G. Patriquin, Parkfield, Monterey Co., Calif. Gross earnings for 1915 were \$60,000 and operating expenses, \$12,000.

Property: 6 claims, 110 acres, in Sec. 2, T. 23 S., R 14 E.; near Parkfield, is said to show cinnabar ore in veins and in chamber deposit in serpentine. Orebody said to be 3,000' long, with N. W. strike and dip of 60° N. E.

Development: by 360' tunnel and a total of 3,200' of workings. **Equipment:** includes a 2-ton Johnson McKay retort furnace. A 1-12" pipe retort furnace was under construction, March, 1916. About 1,800 tons of 5% ore were treated in 1915, yielding 340 flasks of quicksilver.

PATUXENT MINE IDAHO

Jas. F. Callahan, owner, Wallace, Idaho. **Property:** adjoining the Cons. Interstate-Callahan on the S., in the Coeur d'Alene district, near Wallace, reported to show a 4' vein of high-grade lead-zinc ore, cut in Dec., 1915, in a fissure zone 50' wide.

PAWNEE MINING CO. ARIZONA

Idle. Mine near San Simon, Cochise Co., Ariz. Described in Copper Handbook, Vol. XI.

PAY CAR MINES CO. ARIZONA

Dead. Stock worthless. Property, near Bouse, Ariz., held by United Mines Co. of Arizona.

PEABODY CONSOLIDATED COPPER CO. ARIZONA

Office: 111 Broadway, New York. Mine office: Johnson, Cochise Co., Ariz. **Officers:** Leo Schlesinger, pres.; Alex T. Wells, v. p.; I. Niner, sec.; J. Born, treas., with Jos. B. Mayer, Morgan J. O'Brien, Jr., Herbert R. Limburg, G. M. Minzesheimer and Jas. Muir, directors. John H. Banks, cons. engr. W. T. Eberhardt, mgr.

Inc. in Ariz. **Cap.**, \$1,500,000; shares \$5 par; fully paid and non-assessable. Empire Trust Co., New York, transfer agent. Listed on New York Curb.

Property: 12 claims, 5 patented, 230 acres, covering 2,000' along the ore belt at the Johnson camp, bought of the Bonanza Belt Copper Co., includes the Peabody mine, located 1879. Mine has a contact deposit between diabase and limestone and replacement veins, all within a 100' belt. Mine is credited with a production of about \$411,970. Ore is a mixture of zinc blende and chalcopyrite in a garnetized lime gangue and is oxidized to a depth of 200'. The ore shipped runs 4%-6% copper, with 5% iron, 15%-20% lime and 55% insoluble; silver averages ½ oz. to each percent copper.

Development: by a 300' shaft, with crosscuts on the 200' and 300' levels. On the 3rd level a crosscut is being driven toward the contact. No ore reserves reported.

Shipments: 300 tons per month are made to the Cons. Kansas City S. & R. Co. (El Paso smelter), a subsidiary of the A. S. & R. Co., under a 3-year contract.

Prospectus issued by company is regarded as rather unduly optimistic. Property is an old one, having been operated intermittently for 20 years. Company plans installing new hoist and 8-drill compressor, 1916.

PEARL LAKE GOLD MINES

ONTARIO

Bankrupt. Property acquired, 1915, by McIntyre Extension Mines, Ltd., a subsidiary of the McIntyre Porcupine Mines, Ltd.

PECOS COPPER CO.

NEW MEXICO

Office: the Arcade, Cleveland, Ohio. Mine office: Cowles, San Miguel Co., N. M. **Officers:** Alfred H. Cowles, pres.; I. C. Gifford, v. p.; Frederick W. Swan, sec. **Inc.** 1904, in Michigan. **Cap.**, \$100,000; shares \$25 par; fully issued and fully paid. The company has a floating debt of \$65,000, owed to stockholders, of whom there are only 5, the company being a close corporation.

Property: 15 claims, 268 acres, and 552 acres including valuable coal veins and placer ground, all patented, in the Hamilton district, 12 miles from Santa Fe. Holdings include water rights to the Pecos river for 2½ miles, with 2,000-h. p. available for development.

Lands show granite, slate and quartzite, underlying lower Carboniferous limestone in which the valley of the Pecos river is cut. The property carries a contact deposit, with ferruginous quartzite on the south, and granite to the north, the mineralized zone, ranging up to 225' in width, traced 1,000', carrying orebodies of 12' width. A brecciated intrusive diorite follows the vein. Ores contain massive chalcopyrite, sphalerite and occasional galena, said to give assays of 7.5% copper, 3-4 oz. silver, 3% lead per ton. The ore, being complex, is difficult of treatment.

Development: includes the 60' Katydid shaft and 370' Evangeline shaft, with 450' of tunnels, claimed to show 210,380 tons of ore, blocked out for stoping, of an estimated value of \$3,560,000. The mine, discovered 1881, was worked for a short time only owing to the zinc ores near the surface proving unworkable, and was taken over 1905, by the present company.

Equipment: includes a 165-h. p. steam plant, with 2 hoists, 1 good for 600' depth, and a 3-drill Rand compressor. Shipments in 1915 reported to have netted \$4.50 per carload. Requests for information ignored.

PECOS MINING CO.

TEXAS

J. Y. Canon and James Dougherty, of Van Horn, Tex., principal shareholders.

Property: the Pecos mine, 3 miles N. E. of the Hazel silver mine in El Paso county, 19 miles from Van Horn, shows a N. E.-S. W. vein in brown igneous tuffs, traceable 2 miles across the mountains to the Red Maverick mine.

Development: by a 105' shaft with a level at 90', showing seams a few

inches thick of copper-silver ore, said to assay 70% copper; the seams in places aggregate 2' in thickness. The mine was first operated in 1888, abandoned after working and relocated 1903, by Geo. Briggs and T. R. Owen, forfeited by technicality of Land Commission and located by J. Y. Canon. Presumably idle.

PEER GOLD MINING CO.**NEVADA**

Clyde Garrett, Gurney Gordon and Harry Cutler, chief stockholders, Reno, Nev.

Property: in Pine Nut range at Como, 8 miles south of Dayton, shows wide vein in andesite. High-grade ore discovered Jan., 1916, showed values of \$73 to \$150. Title to property was attacked 1914 by Dr. R. H. Hartzell and W. E. Vaughn, of Reno, for failure to do annual assessment work.

PEERLESS MINING & MILLING CO.**COLORADO**

Salida, Chaffee Co., Colo. H. F. Schnellker, pres. and gen. mgr.; I. W. Haight, sec.-treas. Inc. Nov., 1904, in Colorado. Cap., \$500,000; shares \$1 par; nonassessable.

Property: the North Pole group, 6 claims, 70 acres, with 10 acres timbered, on Cyclone mountain, in the Monarch district, 16 miles west of Salida, showing several fissure veins in granite. Veins have auriferous and argentiferous lead and copper sulphides, with lead values predominating. The mine has a 1,600' crosscut tunnel and a 65' shaft sunk on the vein. Company resumed operations in 1915 after an idleness of several years.

PELICAN MINING & MILLING CORPORATION.**COLORADO**

Office: 141 Milk St., Boston, Mass. Mine office: Lake City, Hinsdale Co., Colo. Mine is developed by tunnel and has electric power and air compressor. Reported producing in 1916.

PENN CANADIAN MINES, LTD.**ONTARIO**

Office: 1011 Chestnut St., Philadelphia, Pa. Mine office: Cobalt, Ont. **Officers:** Wm. J. Haines, pres.; R. B. Haines, sec.-treas.; with J. D. Haines, E. C. R. Laidlaw, S. D. Wright, A. S. Elliott, directors; B. Neilly, supt. Inc. 1912 in Ont. Cap., \$1,500,000.

Property: the Cobalt Central Silver mine at Glen Lake, in Cobalt district. **Development:** by 17,500' of drifts, crosscuts, raises and winzes.

Equipment: includes mill with 6 Wilfley tables, ball mills and a 75-h. p. motor. The mill treated 24,510 tons of ore during fiscal year ending April 15, 1915, and shipments to American and Canadian smelters amounted to 448 tons.

PENN MINING CO.**CALIFORNIA**

Office: 901 Foster Bldg., Denver, Colo. Mine and works office: Campo Seco, Calaveras Co., Calif. **Officers:** Chas. Loughridge, pres.; Wm. D. McIlvaine, sec.-treas.; Alfred P. Busey, Jr., gen. mgr.; D. C. Smith, metallurgist and smelter supt.

Inc. June 1, 1910, in Wyoming, as successor of Penn Chemical Works. Cap., \$250,000; shares \$1 par. Is operated as a close corporation.

Property: the Campo Seco, Hecla, Little Satellite and Satellite, patented claims, near Campo Seco, in the Foothill copper belt, 80 acres, with a 20-acre smelter-site and 2,305 acres of timber and miscellaneous lands, giving total holdings of 2,405 acres. **Ore:** the ore deposit, having a maximum width of 30' at depth of 400', lies between amphibolite schist and talcose shale, and north of the Campo Seco shaft splits into veins known as the East and West, which continue parallel. Ore is mainly chalcopyrite, associated with sphalerite, sometimes occurring in considerable quantities, and pyrite, and also includes occasional chalcocite and bornite. The average assay of ore smelted in 1914 was 5.5% copper, 2.75 oz. silver, 5% zinc, \$1.65

gold and 23% iron. The gangue ranges from talcose schist, through clay, to quartz.

Development: includes the 1,550' working shaft, No. 3, and a tunnel, also 4 other shafts, 2 on the East vein at the Campo Seco and Hecla mines and 2 on the West vein at the Satellite mine. No. 1 shaft, 300' deep, is useful only for ventilation; No. 2 shaft, 750' deep, at the Campo Seco mine, is the main working shaft, with a compressed air hoist; No. 3 shaft, at the Satellite mine, about 1,300' from No. 2, is 1,550' deep, with levels at 150' intervals, and has a steam hoist; No. 4 shaft, at the Satellite mine, 200' deep, is used as an air shaft and manway; No. 5 shaft, at the Hecla mine, 400' deep, is used as an air shaft. **Ore reserves:** estimated sufficient for two years.

Equipment: includes a 175-h. p. steam plant at the mine, with 50-h. p. and 125-h. p. hoists, good for 1,000' and 2,000', respectively. The smelter has a 400-h. p. steam and electric plant, ice plant, pumping plant and a Nordberg air compressor, capacity 1,400 cu. ft., to supply the mine and smelter. Fuel is crude petroleum, which also is burned in the locomotives. The Southern Pacific railway is 6 miles distant, at Valley Springs, and transportation between that point and the mine is by wagons, making one round trip daily. A short private railway connects the mines and works.

Smelter: the 300-ton smelter, a quarter of a mile from the mine, has a 75-ton 36x72" blast furnace and two 150-ton reverberatory furnaces, latter burning petroleum, and eight 16-ton McDougal calciners. The blast furnace, using semi-pyritic smelting, has not been in operation for several years. A 50% matte, made in two fusions, from the reverberatories goes to the American Metal Co., Ltd., for conversion and refining. The smelter railway, for charging and slags, has electric locomotives. Some cement copper is produced from mine water.

The company has experimented on the Thiogen process for elimination of sulphur. The smelter has been in continuous operation for over 16 years.

Production:	Tons Ore Treated	Lbs. Refined Copper
1915 (a).....	.....	.....
1914.....	42,928	4,007,149
1913.....	50,427	.....
1912.....	51,163	5,175,875

(a) 1915 figures not reported, but management states production about the same as in 1914.

The company has been in litigation for 2 years with surrounding farmers, who claim \$200,000 damages from fumes. Suit was not brought voluntarily by the farmers, but at solicitation of a firm of San Francisco attorneys, who are reported to have offered to stand the expense and divide the spoils.

PENNIAC GOLD REEF MINES CO. CANADA

See Star Lake Gold Mines, Limited.

PENNSYLVANIA-COBALT SILVER MNG. CO. ONTARIO

See Temiskaming Mining Co., Ltd.

PENNSYLVANIA MNG., POWER & REDUCTION CO. COLORADO

Wm. Wright, pres., Boynton, Pa. - Leopold Sternberger, business manager, P. O. Box 972, Denver, Colo. Is presumably a reorganization of the Pennsylvania Mining Co.

Property: at Idaho Springs, Clear Creek Co., the Pennsylvania group, 356 patented and 60 unpatented claims, including several millsites and placers, covers about 2,000 acres. Shows fissure veins with complex lead-

zinc-copper ore, containing silver and gold, also uranium, molybdenum and tungsten.

Development: by shafts and tunnels, including the Lucania tunnel, over 8,000' long. **Equipment:** includes steam and water-power plants, air compressors, a new 10-stamp mill and 2 Wilfley tables. Mine operated by lessees.

PENOLAS MINING CO. (CIA. MINERA DE PÉNOLES). MEXICO

Office: 61 Broadway, New York. Smelting works and mines at Mapimí, Durango, Méx. H. S. Mulliken, mgr. Controlled by the Metallurgische Gesellschaft of Germany.

Cap., 4,000,000 pesos, increased 1910 from 250,000 pesos; shares 100 pesos par. Has paid \$6,500,000 in dividends. **Property:** the Ojuela mine with silver-lead ores in limestone, the San Juan mine, Paloma mines and options on the Cabrillas and Mariposa mines. Company produces iron, lead and silver, with a little copper as a byproduct.

Development: by shafts and tunnels to depth of 3,000', showing porphyry, diorite, lime and shale. The main veins strike N. W. with 45° dip. Twenty-two veins are traceable at surface, showing only carbonates or oxides of iron of little value down to 300'. **Equipment:** includes steam and electric power, hoist, a 5-mile narrow-gauge railroad connecting the mine with Mapimi and a 1,500-ton smelter.

PENNUVA COPPER CO.

UTAH

J. R. Austin, pres., Salina, Utah; G. D. O'Conner, v. p.-mgr.; W. R. McPherson, sec.-treas.; W. N. Beatty and Jas. Spelman, directors. **Inc.** 1916 in Utah. **Cap.,** \$25,000; shares 2c par.

Property: 10 claims, unpatented, and 2 under 10-year lease, situated on Promontory Point, next to the Lakeview zinc mine and 2 miles from Salina on the S. P. R. R.

Development: 100' shaft on quartz shale bed showing bunches of chalcocopyrite ore assaying 20-30% copper.

PEREGRINA MINING & MILLING CO.

MEXICO

Controlled by Guanajuato Dev. Co., which see.

PERTH AMBOY SMELTER.

NEW JERSEY

Owned by American Smelting & Refining Co. at Perth Amboy, which see. Has 600-ton copper-lead smelter, 200-ton lead refinery and a 300-ton electrolytic copper refinery, employing about 2,000 men.

PETERSON LAKE SILVER COBALT MINING CO., LTD. ONTARIO

Offices: 420 Traders Bank Bldg., Toronto, and Cobalt, Ont. **Officers:** Col. Sir Henry M. Pellatt, pres.; Hugh Plain, 1st v. p.; J. W. Scott, 2nd v. p.; with Alex. M. Hay and J. A. Murray, directors; C. H. Manaton, sec.-treas.; R. B. Lamb, cons. engr.

Inc. 1906 in Ontario. **Cap.,** \$3,000,000; issued, \$2,401,820; shares \$1 par. Trusts & Guarantee Company, Ltd., Toronto, transfer agent. Listed in Toronto and on New York Curb.

Comparative General Balance Sheet: (year ending April 30)

Assets—	Property	Dev. Expl.	Plant Supplies	Current	Total
1915.....	\$2,309,323	\$136,666	\$16,897	\$223,920	\$2,686,807
1914.....	2,463,507	136,666	19,701	177,033	2,642,723
Liabilities—	Capital Stock		Current	Surplus	Total
1915.....	\$2,401,820		\$7,610	\$277,377	\$2,686,807
1914.....	2,401,820		8,690	232,213	2,642,723

Comparative Income Statement:

	Royalties on Ore	Miscel. Income	Total Expend.	Profit
1915.....	\$296,498	\$6,685	\$89,892	\$213,291
1914.....	191,156	9,826	60,557	140,424

Dividends: fiscal year ending April 30, 1915, Nos. 1 to 4 inc., \$168,127; April 30, 1916, Nos. 5 to 8 inc., \$168,127, at rate of 1¾% quarterly.

Property: 200 acres underlying Peterson Lake at Cobalt, almost surrounded by holdings of the Nipissing Co. Is operated chiefly as a leasing company. The most important lease was that of Seneca-Superior, on the Cart Lake portion of the property. Ore reserves were practically depleted by end of fiscal year, and development not having disclosed any new ore-bodies, the lease was closed down in April, 1916. The Gould lease was taken over by a new company, the Mercer Silver Mines, Ltd., and one shipment made up to May 1, 1916.

Development: the Peterson Lake area has been prospected through shafts Nos. 2 and 3 and the Nova Scotia territory opened up; several veins have been found here, but to date commercial ore has not been found in paying quantities. During the year new work in the Peterson Lake mine totaled 4,479', at a cost of \$13.79 per foot. In February, 1916, company took an option on the Reliance Claim, adjoining the Nova Scotia area; this is being prospected.

Recent production: (ounces silver)

	Seneca-Sup. Lease	Gould Lease	Mercer Lease	Pet. Lake Mine	Total
1915.....	2,148,297	.....	81,998	.....	2,230,295
1914.....	1,507,805	73,889	.....	26,856	1,608,550
1913.....	1,170,511	60,221	.....	.....	1,230,732

The company's territory has been well prospected outside of the area held by the Mercer, and results have not been encouraging. It is very evident Peterson Lake has seen its best days; while development work may open up new orebodies, it is doubtful if these will be of great importance.

PHARMACIST GOLD MINING CO. COLORADO

Officers: L. G. Carlton, pres.; Thos. J. Ward, v. p.; V. H. Mann, sec.-treas.

Inc. Jan. 3, 1912. **Cap.**, \$15,000; shares 1 ct. par. In treasury Jan. 1, 1916, 55,000 shares and \$672 cash. Stock listed on Colorado Springs Exchange. Paid dividends to Feb., 1910, \$7,500; none since.

Property: 10 patented acres on Bull Hill, Cripple Creek district, Teller Co., Colo. **Development:** being carried on from the 500' level of the Isabella Mines Company shaft in 1916.

Production: in 1915 was \$10,694. Operated by lessees.

PHEODORA SILVER-LEAD MINING CO. IDAHO

Kellogg, Idaho. **Officers:** Wm. Schaefer, pres.-gen. mgr.; Geo. Moison, v. p.; W. W. Papesch, sec.-treas.; with Elmer Brown and Chas. Bollinger, directors. **Officers,** with exception of vice-president, reported to have resigned June, 1916.

Property: 12 lead-silver claims, adjoining the Jack Waite, in Eagle district, near Murray, Shoshone Co., Idaho, has been under development since 1909.

PHELPS, DODGE & CO., INC. UNITED STATES & MEXICO

Office: 99 John St., New York. **Officers:** Dr. Jas. Douglas, pres.; Cleveland H. Dodge, Arthur Curtiss James, Jas. McLean and Walter Douglas, vice-presidents; Geo. Notman, sec.-treas.; preceding, with Geo. B. Agnew, Francis L. Hine, Wm. Church Osborn and E. Hayward Ferry, directors; S. W. French, gen. mgr.; A. V. Dye, asst. gen. mgr.; J. Millard Jones, British agent.

Company was organized as the successor of the firm of Phelps, Dodge & Co., which had a history of nearly a century, its founder, Wm. Earle

Dodge, having been one of the great pioneer merchants of America and a noted philanthropist.

Inc. Dec. 14, 1908, in New York. Capital stock: authorized, \$50,000,000; outstanding, \$45,000,000; shares \$100. The capital stock was issued for the purchase of the entire stock of the Copper Queen Consolidated Mining Co., at \$135 for each \$10 share, \$27,000,000; Moctezuma Copper Co., at \$307 9-13 for each \$100 share, \$8,000,000; Detroit Copper Mining Co. of Arizona, at \$150 for each \$25 share, \$6,000,000; Stag Canon Fuel Co., at \$800 for each \$100 share, \$4,000,000; held for future issue \$5,000,000; total, \$50,000,000. Stock listed on New York Stock Exchange. Annual meeting, first Tuesday after first Monday in April, at 99 John St., New York. Books close 10 days before and reopen day after annual meeting. Stock transferred at office of the company. Farmers' Loan & Trust Co., New York, registrar.

Comparative General Balance Sheet:

	Assets—	Property & Equip.	Deferred	Cash	Other Current	Total
1915.....	\$38,550,942 (a)	\$2,130,583	\$5,889,305	\$11,375,526	\$57,946,356	
1914.....	49,392,281	264,076	4,891,697	4,687,999	59,236,053	
	Liabilities—	Capital Stock	Current	Surplus	Total	
1915.....	\$45,000,000	\$4,608,492	\$8,337,864 (b)	57,946,356		
1914.....	45,000,000	7,224,944	7,011,109	59,236,053		

(a) After deducting \$6,853,466 for depletion of ore and coal and \$4,850,-854 for depreciation. (b) Balance Dec. 31, 1914, \$7,617,388; earnings for 1915, \$10,981,512; deduct ore depletion and plant depreciation, \$1,261,037; and dividends, \$9,000,000.

Earnings: \$6,025,740 in 1909; \$9,099,910 in 1910; \$7,283,509 in 1911; \$10,411,535 in 1912; \$9,581,494 in 1913; \$6,891,651 in 1914; \$10,981,512 in 1915.

Dividends: company pays a regular quarterly dividend of \$2.50 per share and also extra dividends; these were \$2 each per share in 1909, 1910, 1911; \$5 in 1912; \$6.50 in 1913; \$4 in 1914; \$10 in 1915; \$7 to July, 1916. Total dividends to July, 1916, \$51,071,527.

Company controls through personal holdings of its officers, the Old Dominion Co., Old Dominion Copper Mining & Smelting Co., United Globe Mines and Commercial Mining Co. Members of the old firm also control the El Paso & Southwestern railway, a road that, while built originally as an outlet for the Copper Queen mine, has expanded steadily and bids fair to develop eventually into a transcontinental trunk line. The same interests are very large shareholders in the Rock Island and Great Northern railways.

The company controls some of the richest and most productive copper mines in existence, all able to make copper at unusually low costs, as is evidenced by the great increase in dividends of subsidiaries in 1910 over 1909, in a year when decreased dividends were the rule with a great majority of the large copper producers of the world.

The company also controls the Burro Mountain Copper and Phelps-Dodge Mercantile Co.

In 1915 purchase was made of the Tombstone Cons. Mines Co. and others in the Tombstone district; these will be operated as a constituent company under name of Bunker Hill Mines Co. Reported in April, 1916, that company had taken a bond on a number of the principal properties in the Organ mountain mining district, New Mexico.

Production: comparative statement of total production from subsidiary companies' mines, years ending Dec. 31—

	Tons of Ore			Co. Ore Smelted	Copper Lbs.	Silver Oz.	Gold Oz.	Lead Lbs.
	Extr'd	Milled	Smelted					
1915....	1,588,364	800,600	1,129,766	1,016,746	140,478,008	1,655,669	31,696	9,525,584
1914....	1,777,243	1,046,728	917,204	855,594	131,662,324	1,769,626	28,518	8,986,074
1913....	1,976,892	1,122,372	1,085,367	856,520	155,665,712	1,870,162	81,141	8,701,628
1912....	1,898,244		1,061,315	863,741	148,678,889	1,689,152	27,687	
1911....	1,841,210	1,017,852	980,331	822,647	184,149,627	1,794,895	27,154	

Company also took over the metals selling agency of the old firm, and in addition to marketing the product of its own mines, acts as sales agent for the Calumet & Arizona and other producers.

Comparative Statement of Copper Sales:

	Total	Subsid. Comp's	Outside Product on Comm.	Domestic Trade	Foreign Trade	Aver. Price Cts.
1915....	194,925,668	139,351,785	55,573,883	97,122,436	97,803,232	16.079
1914....	188,687,378	134,553,404	54,133,974	80,978,884	107,708,494	13.57
1913....	201,489,796	151,080,018	50,409,778	83,552,432	117,937,364	15.37
1912....	192,297,374	139,759,515	52,537,859	98,267,037	94,030,337	15.51
1911....	180,301,965	131,327,002	48,974,963	69,483,782	110,818,183	12.36
1910....	194,138,698	139,297,409	54,841,289	100,819,254	93,319,444	12.826

Phelps, Dodge & Co., Inc., is one of the few new companies in the copper mining industry that is undercapitalized rather than overcapitalized, and this is but a detail in a general business policy that, while thoroughly progressive and abreast with the times, retains the fundamentally sound and conservative policies developed by the old firm in nearly a century of honorable and markedly successful business life.

PHILADELPHIA MINES CO.

COLORADO

Mine office: Montezuma, Colo. **Officers:** E. F. Pooley, pres.; F. P. Rosengarten, v. p.; W. F. Wagner, sec., 16th & Indiana Sts., Philadelphia, Pa.; W. B. Le Wald, treas.-mgr.; with T. W. Bunnell, directors; F. E. French, supt.

Inc. May, 1913, in Colo. Cap., \$1,250,000; shares \$1 par; \$755,760 outstanding. Reported gross earnings for 1915, \$8,000, and operating expenses, \$16,000.

Property: 75 claims, 16 patented, about 365 acres, in Montezuma mining district, Summit Co., Colo., carries a sulphide ore in fissure veins traversing Montezuma granite and porphyry, said to give average assays of 1.07 oz. gold; 8.7 oz. silver; 15.05% lead; 26.6% zinc; 40% copper. The main ore-body is reported to be from 8" to 8' wide and 900' long, running N.-W., with dip of 45°.

Development: by 6 tunnels, the 405' Jumbo, 150' Monitor, 450' Tip Top, 1,490' Philadelphia, 3,400' Colorado-Toledo and 112' Cross Lode, with total workings of 7,500'.

Equipment: includes Blaisdell compressor, electric power and 100-ton wet concentrating mill. About 1,000 tons of ore were treated in 1915 and shipments of concentrates, started in November, totaled 350 tons, averaging \$35 per ton. Plan adding Ball mill and flotation unit in 1916 to treat the slime.

PHILIPSBURG MINING CO.

MONTANA

Office: 821 Security Bldg., St. Louis, Mo. Mine office: Philipsburg, Mont. **Officers:** John P. Meyer, pres.; John H. Dieckman, v. p.; Jos. P. Hartnett, sec.; F. D. Fusz, treas.; with John L. Taussig, Max Kosany, L. M. Rumsey, Jr., H. S. Rumsey, E. S. Orr, A. L. Shopleigh, Louis Barkloje, directors.

Inc. 1910 in Missouri. Cap., \$30,000; shares \$1 par; all outstanding. Annual meeting, 4th Friday in March.

Property: 450 acres at Philipsburg, Granite Co., Montana. Ore occurs in contact deposit and quartz fissure veins between limestone and granite, carrying gold, silver, copper, zinc, lead and manganese. Company is successor to Hope Mining Co. Not operating.

PHOENIX CONSOLIDATED COPPER CO.

MICHIGAN

Controlled by Keeweenaw Copper Co.

Office: Calumet, Mich. Mine near Phoenix, Keweenaw Co., Mich.
Officers: Thos. F. Cole, pres.; Spencer R. Hill, v. p.; Chas. A. Wright, Jr., sec.-treas.; preceding, with Capt. Thos. Hoatson, directors; W. J. Uren, gen. mgr. Inc. April, 1899, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; \$14.50 paid in. Is controlled by the Keweenaw Copper Co., through ownership of about 90% of the share capital, acquired by an exchange of shares on the basis of 10 shares of Phoenix for 1 share of Keweenaw.

Report for year ended Dec. 31, 1915, showed assets of \$1,640,171, which includes: real estate, \$505,208; development and exploration expense prior to 1915, \$962,732; exploration and development during 1915, \$96,149; cash, \$7,010. **Liabilities:** Keweenaw Copper Co., \$65,035; mine accounts and liabilities, \$24,897. Last assessment was \$2 per share, July, 1915.

Property: 2,505 acres, carrying 5 different fissure veins, on which more or less mining has been done, at various times. The old Phoenix mine, included in the present consolidation, is famous for having produced the largest mass of native copper ever found, weighing upwards of 500 tons. The Phoenix fissure, on which work was begun 1846, was opened to a depth of only about 90', yielding considerable mass copper and silver. There also are possibilities on the Ashbed lode, which has been slightly developed by an exploratory tunnel. The mine has extensive openings and a modern equipment, and was worked for 6 years without success, until closed down, June 15, 1905.

Diamond drilling on the Ashbed, 1910, gave encouraging results in 6 holes, covering 2,700' along the lode, 1 hole giving upwards of 60' of copper cores. A continuation of this work was begun late 1913, after several years of idleness, and 1,200' of diamond drilling in 1913 and 2,785' in 1914 on the Ashbed lode showed fair copper values.

In 1915 No. 1 shaft was sunk to 15' below the 12th level, a depth of 1,415', and 7,478' of new drifting and 583' of crosscutting was done, mainly on the 6th, 7th and 8th levels. Early in 1916 the shaft was deepened to 1,600', or the 14th level, each level above from the 3rd-10th showing good commercial rock. The Phoenix fissure, intercepted by an E. drift on the 7th level in April, 1916, is reported to show 26' of ore.

Equipment: at power plant at No. 1 shaft includes 3 boilers, 2 air compressors, hoisting engine and pumps. The stamp-mill is being overhauled preparatory to resumption of mill tests.

PHOENIX GOLD & COPPER MNG. & MILLING CO. WASHINGTON

Succeeded by National Lead-Silver Co., which see.

PHOENIX MINING CO.

MISSOURI

Not incorporated. E. N. Cunningham, mgr., Joplin, Mo. **Property:** 40 acres in S. W. $\frac{1}{4}$ N. W. $\frac{1}{4}$ Sec. 22, T. 28, R. 33, Jasper Co., Mo., carries lead-zinc ore in a soft limestone formation.

Development: by 176' vertical shaft and total workings of 600'. **Equipment:** includes steam power, hoist, pump and 150-ton concentrating mill.

Production: in 1913 was 3,222,450 lbs. zinc and 1,003,450 lbs. lead; in 1914, 5,524,310 lbs. zinc and 428,080 lbs. lead.

Mine was idle from Oct., 1914, to Dec., 1915. Diamond-drill exploratory work in progress in 1916.

PHOENIX MINING CO.

UTAH

See Utah Apex Mining Co.

PHOENIX MINING & MILLING CO., LTD.

IDAHO

Wallace, Ida. Norman Ebbley, pres.; Jos. Whelan, sec. **Cap.**, \$1,000,000; shares \$1 par; assessable; 800,000 shares outstanding. Annual meeting, 2nd Monday in May.

Property: 14 claims, in Coeur d'Alene district, near Wallace. Unproductive.

PHOENIX MINING, SM. & DEV. CO., LTD. BRITISH COLUMBIA
Phoenix. Boundary district, B. C. Inc. June, 1908, in British Columbia. Cap., \$1,000,000; shares \$1 par.

Property: 2 claims, 1 fractional, in the Wellington camp, about 3 miles from Phoenix, developed by a 60' shaft, on the Lucky Shot claim, and the Woodburn tunnel, showing silver-copper ore.

Letters returned and mine presumably closed down in 1916.

PICACHO MINING CO. (CIA. MINERA DE PICACHO). MEXICO

J. S. Douglas, Cananea, Sonora, and associates, owners. **Property:** 35 miles south of Cananea, has a deposit of cupriferous silver ore that has been under development since about 1909 and has been shipping ore to the Copper Queen smelter at Douglas.

PICHER LEAD CO

MISSOURI-OKLAHOMA

Merged, June, 1916, with the Eagle White Lead Co., of Cincinnati, and a new company organized called the Eagle Picher Lead Co., which see.

PIEDRAS VERDES y ANEXAS; COMPANIA MINERA. MEXICO

Alamos, Sonora, Mex. Angel Almado, pres., at last accounts. **Property:** about 15 miles N. W. of Alamos, and 2 miles north of the Rio Mayo, includes the Piedras Verdes, Union and Sonora mines, having a mineralized zone of about 1 mile width, and 4 miles length. Claims show red schists carrying copper carbonate stains at surface, with quartz dikes and numerous dioritic intrusions, the veins outcropping 10 to 40' in width and carrying considerable oxidized ore of good grade, with occasional native copper in masses of considerable size. **Development:** by a 350' shaft and a 375' tunnel. Some churn drilling was done by the General Development Co., 1910.

Equipment: includes steam power, and a small matting furnace. Presumably idle.

PIKE HILL MINES.

VERMONT

Office: Room 709, No. 82 Beaver St., New York. **Mine office:** Corinth, Orange Co., Vt. **Officers:** John H. Allen, pres.; John J. Coakley, sec.-treas.; preceding, with C. A. Andrews, George Marshall and D. S. Conant, directors; H. G. Hunter, mgr. **Inc.** Jan. 9, 1906, in Vermont. **Cap.**, \$200,000; shares \$100 par; outstanding, \$160,300.

Property: 101 acres, freehold, in the Corinth district, 14 miles from the Boston & Maine railway, shows mica-schist carrying lenses of chalcopryrite disseminated in pyrrhotite, of 3.5% estimated average copper tenor. The mine was worked in a small way at intervals during the nineteenth century.

Equipment: includes a 75-h. p. steam plant, held in reserve, and a power plant with 20-h. p. and 80-h. p. gas engines and a 25-k. w. electric generator.

The wooden concentrator has a 9x15" Blake crusher, 3 rolls and 2 magnetic separators, with roaster and dryer.

Production: 131,911 lbs.; fine copper in 1905; 304,377 lbs. copper and 1,698 oz. silver in 1906; 425,367 lbs. copper and 2,292 oz. silver in 1907. Inactive from Nov., 1907, until Oct., 1915, when experiments with the flotation process were started. Shipments from Oct., 1915, to Jan., 1916, about 210 tons, claimed to run 10% copper and 1 oz. silver per ton.

PILLEY'S ISLAND PYRITES CO.

NEWFOUNDLAND

Mine shut down on account of depleted ore reserves, equipment rotting and company is presumably dead. See Vol. XI, Copper Handbook.

PILOT BUTTE MINING CO.

MONTANA

Office: Daly Bank Bldg., Butte, Mont.

Property sold to Anaconda Copper Mining Co. for \$1,125,000 in 1916.

and cash distributed to stockholders. Company to be dissolved. Fully described in Vol. XI, Copper Handbook, p. 715.

PILOT KNOB GROUP.**NEVADA**

Property: 5 claims in Snake Creek range, 2½ miles S. of Osceola, White Pine Co., Nev., developed by 400' tunnel and 200' shaft. **Ore:** tungsten, occurs in quartz veins in limestone formation. Equipment includes a 20-stamp mill.

Reported, June, 1916, that Uvada Tungsten Co. was to be organized by A. V. Taylor, L. Jeffs and C. H. Thompson, of Salt Lake City, to take over the property.

PILOT RANGE MINE.**NEVADA**

Luning, Mineral Co., Nev. Mrs. Fermina Serrias, owner and mgr. Mine bonded 1913. **Property:** known as the Spanish Woman's mine, 40 claims, unpatented, 800 acres, in the Santa Fe district, 8 miles from the Southern Pacific railroad, shows syenite, andesite and limestone. **Ores** are azurite, malachite, bornite and chalcocopyrite, reported to average 6% copper, 2 oz. silver and \$2 gold per ton.

Development: by shafts and tunnels with total of over 750' of workings. **Equipment:** includes steam plant and several mine buildings.

Shipments of about 50 tons daily made to the Thompson smelter in 1914, and intermittently to Hazen, in 1916.

PINAL DEVELOPMENT CO.**ARIZONA**

J. C. Devine, mgr., Ray, Ariz. **Property:** the Renfro mine, adjoining the Troy-Manhattan, at Troy, 6 miles E. of Ray, Pinal Co., Ariz., said to show a good grade of copper ore. Developed by 1,200' tunnel and incline shaft. Management plans adding compressor and machine drills, 1916. Trial shipments made to Hayden smelter.

PINE CANYON & BINGHAM TUNNEL CO.**UTAH**

Officers: J. B. Moreton, pres.; Richard Savage, v. p.; Homer Benton, 2nd v. p.; Louis Levine, sec. **Inc.** July, 1916, in Utah. **Cap.**, \$1,500,000; \$1 par.

Property: 42 claims, 150 acres patented, covering apex of mountain, west of Bingham, shows two N. E.-S. W. fissures, a bedded contact deposit and the Star vein, all in quartzite, carrying limestone beds and cut by monzonite.

Plans driving tunnel from Pine Canyon to Bingham at 5,600' elevation. As the Great Western Mines Co. has a similar tunnel already well started, though at 300' higher elevation, the project seems unwise.

PINE CREEK DEVELOPMENT CO.**IDAHO**

Kellogg, Shoshone Co., Idaho. **Inc.** in 1916 by W. W. Papesh, Geo. H. McKinnis, J. A. Rock and others, to operate the Sherman group on Pine Creek, Kellogg, under 2-year bond and lease.

Property: 6 claims, owned by the Sherman Mining Co. and developed by 1,000' of underground workings, said to show zinc and lead values.

PINE CREEK MINING CO.**IDAHO**

Wallace, Idaho. **Inc.** April, 1916, in Idaho by Thos. M. Brennan, Harold Williams and O. W. Lewis. **Cap.**, \$150,000; shares 10c par.

Property: the Lee group on Pine Creek, adjoining the Hilarity, is to be prospected in 1916.

PINE MARTIN MINING CO.**COLORADO**

Office: 954 Gas and Electric Bldg., Denver, Colo. **Officers:** E. P. Young, pres.-supt.; B. F. Bachman, v. p.; Chas. B. Bovier, sec.; Wm. G. Krape, mgr.-treas.; with W. A. Sanders, directors.

Inc. March 27, 1915. **Cap.**, \$250,000; shares 10 cts. par; 1,139,400 shares issued. Annual meeting, 1st Wednesday in March.

Property: 10 patented claims, about 50 acres, at Red Cliff, Eagle Co., Colo., said to show a blanket quartz vein in porphyry-granite formation, carrying gold and silver values. The orebody strikes N. and is almost flat.

Development: by 8,000' of old workings, mainly tunnels. Management estimates 300,000 tons of ore developed and on dumps. Company endeavoring to raise necessary funds for new milling machinery in 1916. Operated by lessees in 1915.

PINGUICO MINES CO.

MEXICO

Controlled by Guanajuato Dev. Co., which see.

PINOS ALTOS MINING & MILLING CO.

NEW MEXICO

Pinos Altos, N. Mex. **Officers:** Ira L. Wright, pres.-mgr.; C. A. Layne, v. p.; I. J. Stauber, sec.-treas.-mgr.; above, with A. L. McCarty, W. D. Murray, W. S. Cox and T. L. Lowe, directors.

Inc. 1915 in New Mexico. **Cap.**, \$50,000; shares \$10 par; \$32,000 outstanding.

Property: a lease and bond on 14 claims, belonging to the Savannah Copper Co., in the Pinos Altos district, about 7 miles N. E. of Silver City. The claims show fissure veins, 2' wide, in diorite, carrying complex sulphide ores. The property was a producer under former owners and is said to have large bodies of copper and zinc sulphides, assaying 0.25 oz. gold, 8 oz. silver, 2.5% copper, 10% zinc, 2% lead.

Development: by 2 incline shafts, 300' long and several thousand feet of workings, to depth of 900'. **Equipment:** includes 25-h. p. gasoline hoist, pump, 50-ton concentrator with tables and Huff electrostatic separator.

Two products are made, copper and iron, containing gold and silver, which go direct to a shipping bin, and zinc, barite, manganese and waste. The high-grade zinc concentrate is sent direct from the Huff machine to shipping bins. The tailing is conserved for future treatment. There are 3 bins of concentrates: first, lead with gold and silver, valued at \$60 per ton; second, copper-iron, valued at \$60 per ton; third, zinc concentrates, valued at \$50 per ton. Final recovery is from 60-65% of the original value.

Fifty men are employed. Shipments of concentrates in 1916 average two cars of copper and one of lead and zinc per month. The zinc concentrate goes to Altoona, Kansas, all other shipments to El Paso.

PINTADO CONSOLIDATED COPPER CO.

NEW MEXICO

J. L. Matt, supt., Santa Rosa, Guadalupe Co., N. Mex. **Property:** covers a 12' layer of copper-bearing sandstone, overlaid by 6' of barren sandstone in Pintado canyon. Carload lots shipped to El Paso smelter averaged 3% copper. The ore will be quarried, and leached in a 100-ton leaching plant, under construction August, 1916.

PIOCHE-BRISTOL MINING CO.

NEVADA

Jos. J. Daynes, Jr., pres., 1542 S. Fifth St., E., Salt Lake City, Utah; John Stringham, sec.-treas.; Harry L. Parker, supt. **Inc.** Feb. 19, 1916, in Utah. **Cap.**, 1,000,000 shares; 5c par; 615,000 shares issued. Stock listed on Salt Lake Exchange.

Property: 6 claims, surveyed for patent, in the Jack Rabbit mining district, adjoining the Day Bristol, near Pioche, Lincoln Co., Nev. Claims said to show lead-silver-copper ore. Shipped 300 tons of ore 1915-16, reported to have netted \$15,000. Systematic development commenced in Spring of 1916.

PIOCHE METALS CO.

NEVADA

Address: F. B. Cooke, treas., 1009 Newhouse Bldg., Salt Lake City, Utah. Company levied an assessment of 1c a share in March, 1915. **Property:** at Pioche, Nev., has been shut down save for annual representation work.

PIONEER CHIEF GOLD MINING CO.**CALIFORNIA**

Office: 923 Monadnock Bldg., San Francisco, Calif. **Mine office:** San Andreas, Calif. **Officers:** N. J. Martin, pres.-mgr.; B. F. Marshall, v. p.; Judge W. F. Crist, sec.-treas.; with M. V. Van Fleet and G. G. Damon, directors; J. E. King, supt.

Inc. Aug. 26, 1915, in Calif. **Cap.**, \$300,000; shares \$10 par; assessable; 23,603 shares outstanding. **Transfer office:** 923 Monadnock Bldg., San Francisco, Calif.

Property: 15 patented claims, 200 acres, on the footwall belt of the Mother Lode, near San Andreas, Calaveras Co., said to show gold ore occurring in veins with slate hanging and diabase footwall. Veins have N. 30° W. strike and dip 65° E. Management reports pay ore in shoots 7' wide and 200' long, containing quartz, sulphides, chalcopyrite, pyrite and galena, with average assay of \$9 in gold.

Development: by 2-compartment, 350' shaft, being sunk to 500' in 1916. **Equipment:** includes electric power, 40-h. p. single-drum hoist and 600-cu. ft. compressor. Management plans erecting 100-ton mill.

PIONEER CONSOLIDATED MINES CO.**NEVADA**

Pioneer, Nev. Officers: Wm. J. Tobin, pres.-mgr.; Richard F. Tobin, v. p.; Chas. J. Clayton, sec.; with Roland G. Holt and J. K. Turner, directors; E. A. Danielson, supt.

Inc. May 5, 1909, in Wyo. **Cap.**, \$5,000,000; shares \$1 par; 3,881,562 shares outstanding, Jan. 1, 1916. Stock is listed on San Francisco Exchange. Central Sav. Bank & Trust Co., Denver, transfer agents. **Annual meeting,** Jan. 4th, at Cheyenne, Wyo. **Gross earnings** in 1915 were \$32,000 from ore sales.

Property: 12 claims, 8 patented, 180 acres, at Pioneer, Nye Co., shows decomposed rhyolite, porphyry and quartz. **Ore:** occurs as a contact deposit between quartzite and limestone, of 30' average width, reported by management to assay \$6 to \$20 per ton, values being in gold with a little silver. The mine has been operated since organization of the company, but results have been retarded owing to lack of sufficient funds and failure to pick up the main Pioneer vein, believed to contain high-grade ore. A cave-in destroyed the timbering of the Bonanza stope in Dec., 1914, and the mine was closed until May, 1915.

Development: by 430' vertical tunnel and 15,000' of workings. In 1915 development work totaled 615' of drifting and crosscutting, mainly on the 170' level. New work is progressing on the 100', 170' and 250' levels in 1916.

Equipment: includes electric power, 3-drill compressor, 40-h. p. hoist and 10-stamp 30-ton amalgamation and cyanide mill. The mill treated 2,000 tons of \$6 per ton ore in last 4 months of 1915, and in 1916 is reported treating sufficient \$6 ore to cover all operating expenses. **Recovery** by amalgamation is from 60-70%.

Total production to date reported at \$500,000.

Company plans enlarging mill in 1916. Lessees are operating on the 600' level of the Bi-Metallic No. 3 claim.

PIONEER EXTENSION MINES CO.**NEVADA**

Office: 109 Boston Bldg., Denver, Colo. **Mine office:** Pioneer, Nye Co., Nevada. **Col. A. J. Trone,** pres.-treas.-gen. mgr.; **Edwin S. Giles,** supt.

Inc. in Arizona. **Cap.**, \$1,500,000; shares \$1 par; 400,000 shares in treasury.

Property: the Jolly Jane claim, 20 patented acres, adjoining the Pioneer Cons., at Pioneer. **Development:** by 200' shaft. A crosscut is being driven from this level through rhyolite to prospect a contact 175' E. of the Jolly

Jane shaft. Mine reported under 3-year lease to Jolly Jane Leasing Co., from 1916. A prospect.

PIONEER MNG., MILLING, POWER & TUNNEL CO. COLORADO

Fred H. Thompson, supt., Apex, Gilpin Co., Colo. **Property:** 7 claims, 5 patented, said to have 2 veins from 2-8" wide, showing gold-silver-copper values, and averaging 20% tungstic acid, with porphyry hanging-wall and granite footwall.

Development: by 665' tunnel, reported to have cut the Martin vein, in May, 1916. **Equipment:** includes stamp mill and power house. Company also owns 3 miles of water rights on Pine and Clear creeks to generate electricity.

PIONEER MINING & SMELTING CO. ARIZONA

Offices: 1178 Broadway, N. Y., and Tucson, Ariz. **Officers:** Garret B. Kip, pres., Tarrytown, N. Y.; W. C. Moore, sec.-treas.; with G. H. Corwin and Edw. Benedict, directors.

Inc. Aug. 19, 1913, in Arizona, as a reorganization of the Pioneer Smelting Co., which went into bankruptcy in 1913. Cap., \$1,000,000; shares \$1 par; \$690,647 issued; nonassessable. Transfer office: 1178 Broadway, New York. Annual meeting, second Monday in May.

Property: formerly held by the Pioneer Smelting Co., 14 unpatented claims, 260 acres, including the Plumed Knight mine and control of the Gould mine, also a custom smelter.

The Plumed Knight mine, in the San Xavier district, 18 miles from Tucson, is opened by shafts to a depth of 335', showing ore rich in iron, lime and silica at and above the 100' level, succeeded by bornite at depth. Ore is said to average 4.25% copper, with small gold and silver values.

The Gould mine, 12 miles west of Tucson, idle several years, is said to contain good fluxing ores carrying about 3% copper. Development is by 2 shallow shafts.

The smelter, 1½ miles west of Sahuarita, and 20 miles south of Tucson, on the Twin Buttes railroad, is of 150 tons daily capacity. The plant has a 106x42" blast furnace, built by the Colorado Iron Works Co. The smelter was in blast for a short time in 1912, but has since been idle, as property could not pay expenses.

PIONEER SMELTING CO. ARIZONA

Went into bankruptcy 1913. Succeeded by the Pioneer Mining & Smelting Co.

PITTSBURGH CONSOLIDATED MINING CO. UTAH

American Fork, Utah Co., Utah. A. H. Tarbet, pres.-mgr.; H. H. Green, v. p.; J. G. Doolittle, sec.-treas.; with B. Snyder and P. S. Keoch, directors; J. Benton Leggat, cons. engr.

Inc. 1903. Cap., \$500,000; shares \$1 par; 300,000 shares issued.

Property: 19 claims, including the Pioneer group of 10 patented claims, and 6 claims that were in litigation with the Mountain Lake Extension Mining Co., ground being in both Salt Lake and Utah counties, mainly on the American Fork side of the divide. Ore occurs in fissure veins.

Development: by 3 tunnels from American Fork canyon, is on the Pittsburgh fissure. A 500' upper tunnel is credited with a production of 11,000 tons under former management. The tunnels are in 500' and are connected by winzes and raises. Operations were resumed in 1914 after an examination of the property by J. Benton Leggat. In No. 2 tunnel a 12' orebody of solid lead-zinc sulphide is said to have been exposed, assaying 25% lead, 34% zinc, 40c gold, 5 oz. silver, 26% sulphur and 5% iron per ton.

In 1915 the 3 tunnels were connected and drifts run along the several fissures. A fourth tunnel, started to top the Pittsburgh fissure 150' lower

than No. 3, will be driven 1,200' and is to serve as a means of transportation. A wagon road has recently been completed to Alta.

Equipment: includes necessary mine buildings and dwellings.

PITTSBURGH-DOLORES MINING CO. NEVADA

Yerington, Nev. **Officers:** H. S. McKee, pres., Pittsburgh, Pa.; A. Vignos, v. p.; R. J. Palmer, sec.; H. W. McIntosh, treas.; E. J. Schrader, gen. mgr.; J. B. Perry, mine supt.; C. R. Olson, mill supt.

Inc. 1912 in Arizona. **Cap.**, \$1,500,000; shares \$1 par; issued 1,000,000.

Bonds: authorized and outstanding, \$175,000. Annual meeting in March.

Gross earnings for first six months of 1915 were \$70,648; operating expenses, \$5,007; leaving a profit of \$20,577. Because of alterations the mill was operated only 70% of the time.

Property: 16 unpatented claims at Rockland, Mineral Co., 27 miles S. of Yerington, comprises the claims of the old Rockland mine, discovered in 1868. Ore was at first hauled to Pinegrove for treatment, but a 10-stamp mill was installed in 1870. Fire destroyed the mill soon after and the property remained idle until it came into possession of Gov. Blasdell, who erected another 10-stamp mill, which was in turn destroyed by fire. In 1902 the Nevada Chief Mining Co. acquired the property and began cyaniding the ore with indifferent success until in 1912 the present company took over the mine.

Ore: quartz, containing 1% pyrite with gold and silver values, occurs in a fissure vein from 1½ to 9' wide, with rhyolite hanging-wall and granodiorite footwall. Vein strikes N. E., dips 40° E., and carries pay ore in shoots. Ore treated averages about 0.44 oz. gold and 3.4 oz. silver, value about \$10.50.

Development: by tunnels, greatest depth of workings being 1,300' and horizontal extension about 13,000'. Ore is extracted by the fill method, stulls being used in timbering. A Sullivan Angle compressor furnishes air, and power for operating mine and mill is taken from the Truckee River General Electric Co.

The remodeled mill, using continuous counter-current decantation, with capacity of 60-100 tons daily, went into operation June, 1915. Blake crusher and Humphrey rolls prepare ore for treatment, trommels aiding in separation and distribution of sizes, and a 5'x18' Allis-Chalmers tube mill, driven by a variable-speed motor and silent chain drive, delivers the slime, crushed in solution, to the treatment tanks. The tube mill has Belmont ribbed liners and uses mine rock for pebbles. Three Dorr agitators and 5 thickeners, operated continuously, give time and treatment for extraction. Solution, after clarifying through vacuum filter leaves, is precipitated in zinc boxes, and the precipitates melted directly in a tilting Case furnace to bullion having a fineness of 850 to 900 in silver and 5 to 6 in gold. Extraction for the first 6 months was 92%.

Abundant water is piped from nearby springs. Milling cost for a recent month was \$2.69 per ton, including labor, superintendence, supplies and power. Owing to the distance of the property from the railroad, 27 miles, transportation of supplies is expensive, \$12 per ton.

PITTSBURGH-ELY COPPER CO. NEVADA

Idle. Ely, White Pine Co., Nev. **Officers:** H. P. Harder, pres.; Louis H. Bock, v. p.; J. A. Varney, sec.; Frank Straub, treas., trustee and gen. mgr. **Inc.** Dec., 1906, in Arizona. **Cap.**, \$5,000,000; shares \$5 par; non-assessable; 695,285 shares outstanding at last reports.

Property: 11 claims, unpatented, 220 acres, including the Keyboard group of 6 claims, 120 acres, near the Keystone mine of the Nevada Consolidated, and a small group near the Cumberland-Ely mine of the same

company. Lands show porphyry and limestone, and company reports having copper oxides and sulphides, assaying 3 to 12% copper. **Development:** by 2 shallow shafts and tunnels of 160' and 40'. **Equipment:** includes a 40-h. p. steam hoist. Inactive, except for annual assessment work, since 1907.

PITTSBURGH-IDAHO CO., LTD.**IDAHO**

Office: 223 Fourth Ave., Pittsburgh, Pa. Mine office: Gilmore, Idaho. **Officers:** A. S. Ross, pres.; Irvan Neckermann, 1st v. p.; Robt. B. Little, 2nd v. p.; W. A. McCutcheon, sec.-treas.; with H. S. Knight, J. S. Alexander, directors; F. A. Earles, supt.

Inc. in Idaho. **Cap.**, \$1,000,000; shares \$1 par; 809,407 shares issued. Authorized bond issue, \$150,000; \$23,000 outstanding. Commonwealth Trust Co., Pittsburgh, registrar; 223 Fourth Ave., Pittsburgh, transfer office. Annual meeting, 1st Monday in July. Stock listed on Salt Lake City Exchange. Balance sheet for 10 months ending Dec. 31, 1915, shows, operating expenses, \$59,167; gross earnings, \$105,634; net earnings, \$43,245.

Property: 25 claims, 5 patented, about 500 acres, at Gilmore, Lemhi County, said to show fissure veins in limestone, from 3 to 26' wide and 150 to 450' long. Veins strike N.-S., with dip of about 45°. Ores are carbonate-oxides, reported to carry 26% lead, 12 oz. silver and 75 cts. gold per ton of crude ore.

Development: to depth of 600' with productive levels at 400', 500' and 600'. **Production:** in 1915 was at the rate of 1,200-1,500 tons a month from company and lessees' operations.

PITTSBURGH-IDAHO MINING & MILLING CO.**IDAHO**

Office: Kamiah, Idaho. Mine office: Gilmore, Idaho. A. S. Ross, pres.-gen. mgr. **Inc.** Jan., 1903, in Idaho, as successor of Pittsburgh-Idaho Mining Co. **Cap.**, \$1,000,000; shares \$1 par.

Property: 19 claims, 380 acres, in the Lo Lo district, near the Montana line. Claims said to show 6 contact veins, between gneiss and quartz-porphyry, of which two, of 50 to 100' width, carry cuprite, malachite, bornite and chalcopryrite, giving assays up to 12% copper, 14 oz. silver and \$20 gold per ton.

Development: to 600' level by shafts and tunnels of 40', 290' and 600'. A winze sunk 50' from the 600' level on a 3' vein showed lead carbonate ore with high lead and silver values. Company employed 28 men in 1915 and granted 30 leases. Gasoline power is used.

Production: was at the rate of 2,000 tons per month in 1912; 800-900 tons in 1913; 200 tons in 1914.

PITTSBURGH-JEROME COPPER CO.**ARIZONA**

Office: 202 Fitzsimons Bldg., Pittsburgh, Pa. Mine office: Jerome, Yavapai Co., Ariz. **Officers:** Jos. K. Aikins, pres.; C. M. George, v. p.; E. F. Thompson, sec.-treas.

Inc. 1904 in Arizona. **Cap.** increased, March 9, 1906, to \$3,000,000; shares \$1 par; issued, \$1,482,699.

Property: 26 claims, 520 acres, lying 2. to 3 miles south of Jerome, nearly N. W. of the Black Hills property, and about midway between the United Verde and Equator mines. **Development:** by the 500' Pittsburgh shaft, said to show argentiferous and auriferous sulphide ore of about 4% copper tenor at 358' depth.

Equipment: includes a 50-h. p. Fairbanks & Morse hoist, and an Ingersoll-Rand 2-stage air compressor. Inactive most of the time from June, 1907, until Jan., 1916, when operations were resumed. Shaft was unwatered in March, and crosscuts are being driven south and west; the latter is said to show ore.

PITTSBURGH LEAD MINING CO.**IDAHO**

O. B. Wallace, mgr. **Directors:** Stanley A. Easton, Kellogg, Idaho; Henry L. Collins, G. B. Oberall, of Pittsburgh; W. M. Rumley and Christopher Murphy, of Chicago, and Senator A. Kerns. Merged with California Cons. Mng. Co. and Panhandle M. & M. Co., July, 1916.

Properties: of the three above named companies are in Nine Mile Creek section, or Placer Center district.

Pittsburgh property: formerly a shipper but idle several years, comprises a small group only. **California Consolidated:** the Black Cloud group, 4 patented claims, idle since 1901, but owns mill 2 miles above Wallace, leased and operated until recently by the Marsh Co.

Panhandle group: 2 patented claims on Nine Mile Creek.

PITTSBURG LIBERTY MINE**CALIFORNIA**

Masonic, Mono Co., Calif. **Property:** purchased at receiver's sale in 1914 for \$20,000 by the Stahl Bros., was formerly owned by the Pittsburg Liberty Mining Co. The mine, near Masonic, was located in 1902 and started shipping to Selby smelter in 1907, operated until 1910 with a reported production of \$600,000; idle until 1915 when work was resumed.

Ore: which carries gold, is found in 5 veins, occurring in metamorphic schist, quartzite and slate; the intrusive is granite. Veins strike N. 25° W. and dip to the east. **Development:** by 172' shaft and 2 adits, cutting the vein at 271' and 413' depth.

Equipment: includes 100-h. p. gasoline engine, and the 60-ton Pittsburg-Liberty mill, which was remodeled and equipped with cyanide plant and tube mill in 1915.

PITTSBURGH AND LORRAIN SYNDICATE**ONTARIO**

J. A. Rice, mgr. **Property:** the Currie Mine, adjoining the Wettlaufer, in South Lorrain, Ontario, Canada, said to show veins 6" wide, carrying silver and cobalt ore. **Development:** is by shaft. A prospect.

PITTSBURG MINE**COLORADO**

Owned and operated by Cashier Gold Mining Co., which see.

PITTSBURG MINING & MILLING CO.**ARIZONA**

Oatman, Ariz. **Officers:** L. P. Hansen, pres.-treas.; M. J. Walsh, v. p.; S. R. Porter, asst. sec.; above are directors; Jas. McLachlan, sec.

Inc. Jan. 31, 1912, in Arizona. **Cap.**, \$1,500,000; outstanding April 1, 1916, \$723,300; shares \$1 par. Security, Transfer & Registrar Co., New York City, transfer agent and registrar. Listed on New York Curb as a prospect.

Balance sheet of April 4, 1916, shows assets of \$1,500,000, which includes: mining claims, \$504,000; unissued stock, \$776,700; discount on stock, \$169,487; development and construction account, \$46,142; general expense, \$3,671.

Property: 11 claims, 220 acres, 1 mile W. from Goldroads and 1½ miles N. W. from Oatman, is said to show 3 distinct veins. The main vein strikes E.-W., dips N. 80° and has a width of 6' to 40' along an outcrop said to be traceable for over 5,000' in which distance it shows two faults. Vein filling is chiefly quartz with some calcite. Paralleling the main vein and 20' from it there is another vein 4' to 8' in width and nearly vertical, which is supposed to intersect the main vein. Near the center of the property these two veins merge and form one vein 40' wide. A third or footwall vein parallels the main vein and has a similar dip; at east end of property this vein is 200' back in the footwall; but is supposed to join main vein near center of property.

Development: 100' double compartment vertical shaft, sunk on E. end of Pittsburgh claim between main and hanging-wall veins; water prevented

sinking deeper; at this level 125' of work has been done, but to date the ledge where opened has been low-grade. **Equipment:** includes a 20-h. p. gasoline hoist.

PITTSBURGH & MOUNT SHASTA GOLD M. & M. CO. CALIFORNIA

Office: 403 Real Estate Savings Bldg., Pittsburgh, Pa. Mine office: Keswick, Shasta Co., Calif. **Officers:** J. J. Schneider, pres., Buffalo, N. Y.; R. Schmitt, v. p.; T. V. Scott, sec.-treas.

Inc. 1903, in West Virginia. **Cap.**, \$2,500,000; shares \$1 par. Bonded debt. \$130,000 (\$200,000 authorized) 6% first mortgage notes, due May 20, 1917.

Property: 10 claims, patented, 170 acres, known as the Bennington group, in the Flat Creek district, north of Redding, said to have been bought for \$18,000 cash and \$60,000 shares, also 23 unpatented claims, the Allegheny group. Company claims to have been working continuously, with exception of 3 months in 1913, since 1906 and to have made shipments of gold ore.

Development: has consisted of diamond drilling and several thousand feet of underground work. A 4,400' main tunnel and 2 other tunnels show a vein of gold and silver-bearing copper ore of varying tenor. **Equipment:** includes 15-stamp mill, carpenter shop, smithy, boarding house and 3 bunk-houses, with electric power.

PITTSBURG-SILVER PEAK GOLD MINING CO. CALIFORNIA

Office: 912 California Bank Bldg., Pittsburg, Pa. **Officers:** Wm. Flinn, pres.; Geo. T. Oliver, v. p.; T. J. Crump, sec.-treas.; Wm. A. Bradley, gen. mgr.; John Mocine, supt.; B. A. Rives, res. pur agt

Inc. May 25, 1906. **Cap.**, \$3,000,000; shares \$1 par; 2,793,733 shares outstanding. Annual meeting, first Monday in May. Stock is listed on San Francisco and Pittsburg Exchanges. Owns all the stock of the Silver Peak Gold Mng. Co., 99¼% of the stock of the Mohawk-Alpine Mng. Co., and all the stock of the Silver Peak R. R., running 17½ miles from Blair, Nevada, to the Tonopah-Goldfield R. R., at Blair junction.

The annual report for year ending Dec. 31, 1914, shows net earnings of \$73,970. Last dividend paid July 1, 1914, was 2 cts. per share, with total dividends to date of \$784,800 or 28%.

Property: about 2,000 acres of mineral-bearing land at Blair, Esmeralda Co., Nev., was formerly one of the largest producers of low-grade ore in the state. The orebodies became exhausted in 1914 and the property was abandoned. Company acquired the Rawhide gold mine near Sonora, Tuolumne Co., Calif., in 1915, and has moved the 120-ton mill and cyanide plant from Blair to the new property.

The Rawhide mine is developed by an old 1,800' shaft, which has been unwatered to the 500' level. Work progressing on the 300' and 400' levels.

PITTSMONT COPPER CO.

MONTANA

Controlled by East Butte Copper Co. Office: 1126 Farmers Bank Bldg., Pittsburgh, Pa. Mine office: Butte, Mont. **Officers:** R. H. Gross, pres.; J. H. Reed, v. p.; F. Ward Paine, sec.-treas.; R. T. Rossell, asst. sec.-treas.; Oscar Rohn, gen. mgr.; preceding with Wm. A. Paine, directors.

Inc. April 21, 1906, in West Virginia, as Pittsburg & Western Copper Co., and changed name, Jan. 21, 1908, to present title. **Cap.**, \$11,000,000; par value \$5, divided into 2,000,000 shares common stock and 200,000 shares 6% cumulative preferred stock. Of the authorized common stock 1,000,000 shares are reserved for retirement of its 6% bonds. \$2,500,000 authorized and \$1,286,258 outstanding Sept. 1, 1914.

The East Butte Copper Co. owns \$4,002,800 of the common and all the preferred stock. \$910,716 bonds outstanding Dec. 31, 1915, have since been retired. Annual meeting, first Monday in April, at Pittsburgh.

The 1915 report showed \$172 cash; \$163,468 accounts receivable; supplies \$218,696.

Company acquired the property of the Pittsburg & Montana Copper Co., under foreclosure proceedings, July, 1909, selling it to the East Butte Copper Mining Co., which agreed to purchase bonds enough of the Pitts-mont Copper Co., to fund its floating debt, aggregating at that time \$2,300,000, and also agreed, until these bonds were fully paid for, to advance all funds necessary for development and operation of the property and interest on the company's indebtedness. In consideration of this agreement the Pitts-mont Copper Co. contributed \$4,000,000 of its common stock to the East Butte Copper Mining Co., the latter purchasing \$1,000,000 of Pitts-mont preferred stock and \$110,000 of demand notes, issuing its own stock therefor.

Under this agreement made April 8, 1909, and renewed subsequently the East Butte Copper Mining Co. operates the company's property and the net proceeds have been paid as rentals to apply, deducting interest, in payment of the outstanding Pitts-mont Copper Co. bond issue. This debt is now entirely paid. See East Butte Copper Co.

PLACER CREEK MINING & MILLING CO.

IDAHO

Officers: F. C. Bailey, mgr., 2903 Sinto St., Spokane, Wash.; J. W. Westworth, pres.; Geo. Yancy, v. p.; Ray E. Bigelow, sec.-treas., with Elmer West and R. G. Mack, directors.

Cap., \$1,000,000; shares \$1 par; 400,000 shares treasury stock and 50% of the issued stock reported under 1-year option from April 18, 1916, to F. C. Bailey, who is developing the mine.

Property: 5 claims, on Placer Creek, 6 miles from Wallace, Shoshone Co., Idaho, developed by a 1,400' tunnel, said to cut the vein at a vertical depth of 600'.

PLATA-FINA MINING & DEVELOPMENT CO.

MEXICO

Office: Pomona, Kansas. Mine office: Alamos, Sonora, Mex. **Officers:** E. G. Swayze, pres.; Dr. L. R. King, v. p.; C. N. Emery, sec.; E. A. May, treas.; T. P. Brinegar, mgr.; above with J. M. Nolan, A. P. Elder and J. W. Churchill, directors.

Inc. March, 1911, in Arizona. **Cap.**, \$500,000, reduced to \$300,000; shares \$2 par; 110,000 shares issued.

Property: Plata-Fina group, 9¼ hectares; Cacharamba group, 8, and the Otilia group, a recent purchase, 10 hectares, about 67 acres in all, 4¾ miles from a railway, in the Alamos district, shows several contact veins between granite and porphyry, in a zone 40' wide.

Development: by 5 shafts, deepest 115', with about 3,000' of under-ground workings. Ore is said to show native silver in copper carbonate and chalcocite and is reported to assay from 2 to 20% copper, 6 to 5,000 oz. silver and \$1 to \$70 gold per ton, which figures are misleading. Development work is being done in spite of the revolution, about \$15,000 having been spent during 1914-1915. All drilling is done by hand.

PLATANOS, S. A.; CIA. EXPLORADORA DE LOS

MEXICO

Is the Mexican holding company of Los Platanos Mining Co.

PLATINUM MINING & MILLING CO.

WYOMING

Address: 912 Main St., Merrill, Wis. Mine address: Holmes, Albany Co., Wyo. **Officers:** Julius Thielman, pres.-mgr.; David Finn, v. p.; Robert Thielman, sec.-treas.; preceding with F. C. Sheldon and E. F. Hanf, directors. Leo von Rosenberg, cons. engr.; John A. Johnson, supt.

Inc. Jan., 1912, in Wyoming. **Cap.**, \$200,000; shares \$1 par, issued \$50,000. Annual meeting, second Monday in January.

Mine was located in 1870 for gold, relocated 1900 for copper and worked 1906 by Rambler Mining & Smelting Co., consolidated 1908 with New Lincoln Copper Co., as Rambler Copper & Platinum Co.

Property: the Rambler mine, held by 15-year lease, with 13 claims patented, 260 acres, in the Douglas district. Claims show a fissure vein reported as 20' wide in granite, running N. W. and dipping at 45° E. **Development:** includes a 200' vertical shaft with drifting on the vein on the 100' and 200' levels. Total amount of underground work is about 5,000'. Average assays give 2% copper and 0.25 oz. platinum.

Work was begun June, 1912, but neither mine nor mill was operated during 1913, as mill was being remodeled and a 50-ton Peck centrifugal concentrator installed. Operations were resumed in 1914, and in 1915, 2,000 tons of ore was treated. Company claims gross earnings for 1914-15 of \$19,650, with operating expenses of \$12,000. **Equipment:** includes a steam hoist. Planned to start the mill on Jan. 15, 1916.

PLENTIFUL MINING AND MILLING CO.

UTAH

American Fork, Utah. **Officers:** E. E. McBride, pres.; F. W. Wright, v. p.; W. S. McBride, sec.; E. J. Seastrand, treas.; with Alexander Cunningham, V. C. McBride, directors.

Inc. June, 1915, in Utah. Cap., \$30,000; shares 5 cts. par; 485,000 shares outstanding.

Property: 9 claims, 186 acres, near American Fork, Tooele Co., shows galena and carbonate ore in fissure vein cutting blue and gray limestone, with N.-S. strike and dip of 70° W. Pay ore reported to occur in shoots from 6" to 4' wide, running as high as 40% lead, 6 oz. silver, 2% copper and \$2 gold.

Development: by 3 incline shafts, deepest 193'. Management plans driving a 700' tunnel in 1916.

PLUMAS EUREKA MINES CO.

CALIFORNIA

Chas. D. Stark, Jr., mgr., Johnsville, Calif. Company was reorganized in 1915. **Property:** one of the oldest and most prosperous gold quartz mines of California, having distributed over \$2,800,000 dividends.

PLUTO GOLD & COPPER MINING CO.

WYOMING

Idle. **Office:** 55 High St., Oshkosh, Wis. Mine near Dillon, Carbon Co., Wyo. Ole Granberg, pres. and gen. mgr.; H. Thorsgaard, v. p.; H. O. Granber, sec.-treas.

Inc. Dec. 15, 1902, in Wyoming. Cap., \$1,000,000; shares \$1 par.

Property: 11 claims, patented, 220 acres, and a 40-acre mill site, in the Battle Lake district, near the Ferris-Haggerty mine, said to show both fissure veins in quartzite and contact deposits between diorite and quartzite, ranging from 2 to 30' in width, and carrying copper ore, with average assays of 1% copper, a trace of silver and \$3 gold per ton.

Development: by numerous pits of 10 to 20' depth, 5 shafts of 55 to 100' depth, and a tunnel of 1,004' with about 2,000' of underground workings. **Equipment:** includes a 40-h. p. steam plant and 3-drill air compressor. Inactive, except for annual assessment work, since 1907.

PLUTUS MINING CO.

UTAH

Office: care Knight Investment Co., Provo, Utah. Mine office: Eureka, Juab Co., Utah. **Officers:** Jesse Knight, pres.; Jacob Evans, v. p.; R. Eugene Allen, sec.-treas. **Inc. 1907, in Utah. Cap.**, \$100,000; shares 10 cts. par, fully issued; assessable. Last assessment of 1/5 ct. per share, delinquent Sept. 15, 1914. Absorbed the Tetro Mining Co., Jan., 1909. Shares are listed on the Salt Lake Stock Exchange.

Property: 14 claims, patented, including the Tetro group of 3 claims, from which the Tetro Mining Co. paid \$18,000 in dividends. Mine carries auriferous and argentiferous lead and copper ores, developed by a 600' shaft, about 3,700' of tunnels, and 1,250' of other workings. Under 2 years' lease to Fairbairn Exploration Co., a Colorado concern, operating the Godiva mine, immediately to the east.

Equipment: includes a 75-h. p. electric motor, hoist and air compressor. Buildings include necessary shops and an office.

PLYMOUTH CONS. GOLD MINES, LTD. CALIFORNIA

Office: 20 Copthall Ave., London, E. C., Eng. Mine office: Plymouth, Calif. Manager's office: Bewick Moreing & Co., 62 London Wall, London, E. C. Eng. Albert Burch, cons. engr., Crocker Bldg., San Francisco, Calif.

Officers: C. Wanklyn, chairman; C. A. Moreing, W. J. Loring, John Barry, J. P. and David Richards, directors. F. A. Crew, sec.; Jas. F. Parks, supt., Plymouth, Calif.

Inc. Jan. 15, 1914, in England. **Cap.**, £240,000; shares £1 par; all issued. Gross earnings for 1915 were \$846,491; operating expenses, \$500,257 and net earnings, \$273,253.

Dividends: in 1915, were 3s per share, or \$173,000. Balance brought forward for 1916 was \$12,000, as against \$1,060 in 1915.

Property: the Plymouth Consolidated group of 13 claims, partly patented, and a tract of agricultural land, about 500 acres, at Plymouth, Amador Co., Calif. The holdings cover 4,800' along the Mother Lode, showing 3 fissure veins in Mariposa slate. The veins run N.-S. with dip 60° E. Ore is partly sulphide, occurring in shoots 6'-30' wide and 150'-300' long, said to average 0.30 oz. gold and 0.14 oz. silver, per ton.

Development: by several incline shafts and 7,600' of workings to depth of 2,450'. The main or Pacific shaft is a vertical 3-compartment shaft, 2,450' deep, sunk in the footwall of the Empire-Pacific veins from the 1,600' level, with crosscuts every 100' from the 950' to the 2,450' level. Work in 1915 amounted to 4,517', mainly crosscuts and raises.

Equipment: includes electric hoist, 1,800 cu. ft. compressor, a 30-stamp 360-ton mill, for amalgamation and concentration of ores which makes an extraction of 90.58%. The mill is equipped with No. 5 Gates gyratory crusher, Hardinge mills, Richard classifier, tables and vanners. The concentrates averaging \$111 per ton, and the tailings run about 60 cts. per ton. Total cost per ton was \$3. Management estimated ore reserves at 90,000 tons of \$6.73 ore, Feb., 1916.

Production: 44,773 tons of ore in 1914, yielding 11,132 oz. gold; 129,500 tons of ore in 1915, yielding 31,193 oz. gold and 8,652 oz. silver, gross value \$846,491. Total production to date amounts to 174,273 tons.

The property is an old mine, for a long time dormant, but made into a successful producer through the able judgment and operating ability shown by Bewick Moreing & Co.

POCAHONTAS COPPER QUEEN MINING CO. ARIZONA

Office: Pocahtontas, Ark. Mine office: Mayer, Yavapai Co., Ariz. **Officers:** W. H. Skinner, pres. and gen. mgr.; T. J. Burns, v. p.; D. A. Chapin, sec.; Benj. A. Brown, treas.

Inc. 1906, as successor of Big Bug Gold & Copper Mining Co. **Cap.**, \$1,000,000.

Property: 14 claims, 4 miles N. W. of Mayer, in 2 groups, about 1,000' t. The smaller group of 4 patented claims carries gold-copper ore. Spar group of 10 claims has a vein up to 14' in width, carrying mainly

gold and silver-lead values, and the mine is said to have shipped 23 carloads of high-grade ore, under former ownership, that gave sufficient returns to pay the purchase price and the cost of development. The mine has a 200' two-compartment shaft and a 120' shaft. A level at this depth was being extended to develop 2½' of ore, said to assay \$49 in gold, silver, lead, cut in the bottom of the shaft, in 1914.

POCAHONTAS MINING CO.**CALIFORNIA**

Office: 112 Market St., San Francisco. **Mine office:** Lewis, Mariposa Co., Calif. **Property:** 326 acres, patented, including the Great Northern mine, in the White Rock district, shows several veins of cupriferous iron ore, between diorite, with altered diabase gangue. The main ore-body, about 100' in width, occurs in a mineralized zone up to 1,000' across, having an oxidized zone of about 100' depth, from which a limited production of high-grade ores was made many years ago.

Development: by a 300' shaft, 200' tunnel and 900' of drifting. **Equipment:** includes steam power and a hoist, and buildings include an office, laboratory, smithy and bunkhouses. Making small shipments to the Selby smelter. Property worked by lessees in 1915-16.

POCATELLO GOLD & COPPER MINING CO.**IDAHO**

Pocatello, Bannock Co., Idaho. H. W. Lockhart, pres. Inc. Dec. 1, 1902, in Idaho. **Cap.**, \$1,000,000; shares 50 cts. par.

Property: 7 claims, 140 acres, in the Fort Hall district, 12 miles east of Pocatello, shows a vein of about 3' average width, reported to give assays of 30% copper, 13.8 oz. silver and \$1 gold per ton, from bornite and chalcocopyrite ore. Ore is mainly of milling grade with a small paystreak of rich ore, from which shipments to the White Knob smelter gave returns of 17 to 30% copper and 15 to 18 oz. silver per ton. Development is mainly by short tunnels, with about 1,000' of workings. Presumably idle.

POLAND MINING CO.**ARIZONA**

Office: Room 514, 49 Wall St., New York. **Mine office:** Prescott, Ariz. F. M. Murphy, pres.; George D. Morris, sec.-treas.

Property: 37 claims, about 750 acres, extending through a highly mineralized mountain, lying between the Big Bug and Lynx mining districts, Yavapai county, about 35 miles from Prescott by rail, or 15 miles by wagon road. The claims cover a granite mountain intersected by a number of well-defined, persistent fissure veins, disclosed in a tunnel which goes through the mountain a distance of some 8,000'. Two of these veins, the Poland and Accidental, have been extensively developed.

The property is equipped with air compressors, drills, cars and tools, and a thoroughly modern 20-stamp 100-ton mill.

The tunnel will be of considerable value as a transportation tunnel when a railroad is built from Lynx Creek end, connecting the mines in the Walker district with the Prescott and Eastern Railroad at the Poland end of the tunnel.

Company's tunnel and mill are under lease to the Major Mining & Milling Co.

POLARIS MINING & MILLING CO.**ARIZONA**

Clifton, Graham Co., Ariz. **Officers:** C. A. Van Dorn, pres.; Sam. Abraham, v. p.; J. H. Kerby, sec.; J. R. Hampton, treas. Inc. March 15, 1902, in Arizona. **Cap.**, \$2,500,000; shares \$1 par.

Property: 40 claims, 700 acres, also a 70-acre mill site and 400 acres miscellaneous lands, in the Greenlee district, on the San Francisco river, about 7 miles from Clifton, the nearest rail point. The claims lie N. W. of the Clifton Consolidated and New England mines and show granite, with porphyry dikes at acute and right angles to the vein system, carrying ore

in contact deposits between limestone and igneous rocks, and as disseminated ores in porphyry. The orebodies are of 8 to 100' estimated average width, traceable 6,000', carrying oxide carbonate and sulphide ores, estimated to average 3% copper, 4 to 15 oz. silver and \$4 to \$15 gold per ton. The lower workings show mainly chalcopyrite.

Development: by the 105' Black Prince shaft, the 100' Nonesuch shaft, the 140' Golden Eagle shaft, the 560' Black Prince tunnel, the 320' Fraction tunnel, the 307' Golden Eagle tunnel and the 532' Phonolite tunnel, with about 2,500' of workings. The property was under lease to the Southwestern Development & Improvement Co., 1912. Idle.

PONAMONA ANTIMONY MINE

NEVADA

I. C. Bateman, Alameda, Calif., owner. **Property:** 4 claims, on Pass Creek in Pine Forest range, a few miles N. W. of Queen river crossing has been under development six years and ore shipped. Bought in 1916 and development started by new owner.

PONDERAY SMELTER

IDAHO

Sandpoint, Bonner Co., Idaho. Owned by Idaho Smelting & Refining Co., whose properties were sold at sheriff's sale to Union Trust & Bank Co., of Spokane. A new company will be formed by the bondholders.

PONSARDIN MINE

COLORADO

W. E. Bowden, mgr., Leadville, Colo. **Property:** on Yankee Hill, near Leadville. Lessees reported to have uncovered a body of sulphide ore, 70' long and 15' high, on the 430' level, containing 23-31% zinc, 19% lead, 6 oz. silver, and to be shipping at the rate of 50 tons daily in 1916.

PONUPO MANGANESE CO.

CUBA

Offices: 71 Broadway, New York and Santiago de Cuba, Cuba. **Directors:** Chas. F. Rand, pres.-treas., New York; Pedro Aguilera, v. p., Santiago de Cuba; Chas. F. Smith, sec.

Inc. in New Jersey. **Cap.**, \$30,000; shares \$100 par; all outstanding. **Gross earnings** in 1915, \$567,800, of which \$315,748 was from iron ore sales. **Operating expenses** in 1915, \$250,568.

Property: company owns iron, manganese and copper mines, the iron mines being the only ones operated at present. They are worked as open quarries. **Production:** in 1915, 72,387 tons ore, assaying 60% iron, silica 10%, phosphorus 0.015%. **Average value ore shipped**, \$4.44 in the U. S.

PORCUPINE CROWN GOLD MINING CO.

ONTARIO

Offices: Dominion Exp. Bldg., St. James St., Montreal, Que.; 59 Victoria St., Toronto and Porcupine, Ont. **Officers:** J. W. Carson, pres.; W. I. Gear, 1st v. p.; J. G. Ross, 2nd v. p.; James Cooper, sec.-treas.; John Reid, asst. sec.-treas.; J. W. Carson, W. I. Gear, J. G. Ross, C. A. Smart, J. W. Ross, A. G. Gardner, R. W. Redford, F. S. Meighen, Ziba Gallagher, James Cooper, directors. Samuel W. Cohen, Cobalt, Ont., gen. mgr.; M. W. Summerhayes, mgr.

Inc. in Oct., 1913. **Cap.**, \$2,000,000; shares \$1 par. Crown Trust Co., Montreal, registrar and transfer agent. Traded on New York Curb.

Balance sheet of Dec. 31, 1915, showed net profit for the year of \$299,116, making total with balance brought forward of \$516,310; dividends, 12%, absorbed \$240,000, other accounts \$6,333, leaving surplus of \$269,977. To 1916 company paid in dividends 24%, \$480,000.

Property: one patented claim, 40 acres, at Porcupine, Ont., shows quartz ore with free gold and sulphides in veins in schist. Orebody is 5' wide and 1,100' long. Vein strikes N. and has dip of 70° S.

Development: 500' vertical shaft with various levels. Ore mined by shrinkage stoping. **Ore reserves:** management reports 150,000 tons of ore blocked out with total reserves of \$1,250,000.

Equipment: includes 150-ton cyanide mill. Costs per ton for 1915 were: mining, \$2.93; hoisting and tramming, 32½ cts.; mill operations, \$1.09; power, heat and maintenance, \$1.23; general mine expense, 52 cts., administration, depreciation, insurance and taxes, 62½ cts.; total, \$6.72.

	Tons		Extraction	Net Value Bullion
	Treated	Value Per Ton		
1915.....	41,326(a)	\$14.46	97.70%	\$613,565
1914.....	40,857	17.18	97.26%	689,151

(a) In addition there was treated 5,093 tons from impounded tailing of the first amalgamation mill, assaying \$3.15 per ton, extraction 85.77%.

PORCUPINE EXCELSIOR MINING CO., LTD. ONTARIO

Porcupine, Ont., Canada. **Officers:** P. Cameron, pres.; Wm. Duncan, sec.; G. L. Wheeler, asst. sec. **Property:** claims, Nos. 13890, 13891 and 900 P. in Shaw Twp., Nipissing district, Ont., formerly owned by the Tommy Burns Mining Co.

PORCUPINE MINES SYNDICATE ONTARIO

Care Mark Harris, Mutual Life Bldg., Buffalo, N. Y. Is a new scheme of the above named promoter; will acquire the Cross Veteran location, 160 acres, in Tisdale Twp., Porcupine district. Not regarded favorably.

PORCUPINE PET GOLD MINES, LTD. ONTARIO

Bankrupt. C. L. Sherrill, pres., Timmins, Ont. Controlled by Porcupine Homestakes Mines, Ltd., a Buffalo syndicate. Inc. April 27, 1914, in Ont. **Cap.**, \$1,000,000. Property and 2-stamp Nissen mill shut down. Development work proved unsatisfactory. See Report Ont. Bureau of Mines, 1915, pp. 52, 57.

PORCUPINE PREMIER GOLD MINING CO., LTD. ONTARIO

Office: G. W. Fields, treas.-gen. mgr., 53 State St., Boston, Mass. B. M. Walton, supt. Inc. in Mass. **Cap.**, \$1,000,000; shares \$1 par. Traded on Boston Curb.

Property: 40 acres in Whitney Twp., 110 acres in Deloro Twp., Porcupine district, Ont., Can. Also said to own Standard group of about 110 acres, south of Dome Lake property. Is reported, 1916, to have bought the Virtue Mine near Baker, Oregon.

Development: on the Porcupine property consists of two 35' shafts on an 18" vein. Mines are in the prospect stage and are outside of the proven belt, but are regarded as worthy of prospecting. Company's promoter is treasurer and general manager, which is a handicap, to put it mildly.

PORCUPINE VIPOND MINES, LTD. ONTARIO

Office: 63 Wall St., New York. Mine office: Schumacher, Ontario, Canada. **Officers:** Henry H. Ward, pres.; H. A. Poillon, v. p.; Chas. C. Dickson, v. p.-treas.; H. F. Karst, sec.; C. H. Poirier, mgr., with L. A. Sorenson, and J. A. Carey, directors. H. W. Heine, supt.

Inc. April 29, 1914, in Ontario. **Cap.**, \$1,500,000; shares \$1 par; 900,000 shares outstanding Feb., 1916. **Bonds:** authorized, \$125,000 7%, 1-year; \$50,000 outstanding, due June 14, 1916. Annual meeting, first Monday in April. Security, Transfer & Registrar Co., New York, and Trust and Guarantee Co., Ltd., Toronto, registrar and transfer agents. Traded on New York Curb, and in Toronto.

Balance sheet of Dec. 31, 1915, shows: assets, \$1,014,484, which includes mine and plant, \$979,964; bullion on hand and in transit, \$23,211; liabilities: notes and acct's payable, \$37,380; surplus, \$26,204. Gross income for year ending March 31, 1916, from ore sales was \$248,312 and net income \$34,135.

Property: company owns outright the Vipond mine, 3 patented claims, 120 acres, in Porcupine mining district, formerly owned by the Porcupine

Gold Mines, Ltd. The purchase price was \$750,000, paid in stock of the Vipond company, at the rate of 3 shares of new for 8 shares of old stock. Also owns the Ward Porcupine Mines Co., Ltd., and has 3-year lease and bond from May 1, 1915, on $\frac{3}{4}$ interest in the Aitchison McDougal Cochenour group of 6 claims, also in Porcupine.

Ore: gold quartz occurs in fissure veins, said to be 3'-10' wide, which run N. E.-S. W. and are vertical. Payore occurs in a shoot 900' long. Formation is an amygdaloidal basalt.

Development: to April, 1916, 7,946', with 500' vertical shaft. In 1915 work amounted to 1,799', mainly drifting with 524' of diamond drilling. Drifts on the 200' level, extended to the West limits of the North Vipond tract, are reported to have proved the continuation of the ore-bearing zone. In 1915 a vertical 2-compartment winze was sunk on the Davidson vein, 220' below the 300' level and exploratory work in 1916 is being done on the 400' and 500' levels. Early in 1916 an ore-shoot 5' thick, was opened up for 135' in length on the 400' level, the ore being reported to run \$15 per ton.

Ore reserves: April 1, 1916, estimated at 68,145 tons in place, valued at \$8 per ton, and 22,850 tons already broken, but not pulled, averaging \$6.25 per ton, a total of 91,000 tons, valued at \$688,600.

Equipment: includes hoist, Sullivan compressor, hydro-electric and steam power, and 140-ton mill, which employs the continuous decantation process and is equipped with Buchanan crusher, 6' Hardinge ball mill, classifiers, Dorr agitators and Dorr thickeners.

The mill treated 35,899 tons of ore in 1915, with the following results:

Gold Bullion produced, 11,978.66 fine oz.....	\$247,598.56
Silver Bullion, 1,455.39 fine oz.....	713.73
Total value recovered.....	248,312.29
Total value lost in tailings.....	21,355.13
Gross value of ore treated.....	269,667.42
Average value p. t. treated.....	7.51
Loss p. t. treated (tailings).....	.59
Recovery p. t. milled.....	6.92
Extraction p. t. milled.....	92.1%
Cost per ton milled.....	5.47

Although the grade of ore milled was lower than in previous years owing to the narrowing of veins and complex faulting of the ore shoots, milling costs were only \$5.47 in 1915, as compared with \$6.44 in 1914.

The mill capacity has been increased from 3,000 to 4000 tons per month.

Production: for 3 months ending March 31, 1916, was 11,816 tons of ore, yielding \$5.24 per ton or \$53,348 in bullion.

PORTAGE LAKE & BISBEE MINING CO.

ARIZONA

Office: care John Funkey, Hancock, Mich. Mine address: Bisbee, Ariz. Chas. Lewis, treas. Inc. April, 1903, in Arizona. Cap., \$1,000,000; shares \$1 par; succeeding Portage Lake & Calumet Development Co.

Property: 12 claims, 3 fractional, 191 acres, several patented, 3 miles S. E. of Bisbee, showing country rock of limestone, with a porphyry contact. The mine has a 2-compartment 302' shaft, with a small air compressor, Worthington pump, 75-h. p. hoist, boarding house, bunkhouse and smithy. Inactive many years.

PORTLAND CANAL TUNNELS, LTD.

BRITISH COLUMBIA

E. J. Hearn, sec., P. O. Box 718, Victoria, B. C. **Officers:** R. I. Elliott, K. C., pres.; J. A. Mara, H. A. Munn, R. M. Stewart and J. R. Waghorn, directors.

Inc. Aug. 23, 1912, in British Columbia. **Cap.**, \$700,000; shares 25 cts. par.

Property: 10 claims. Crown granted, near Stewart, Portland Canal, B. C. Company was organized to drive a crosscut tunnel to intersect the vein series of Glacier Creek, previously worked in the Portland Canal and in the Stewart Mining Co.'s properties. The tunnel, over 3,000' long, has so far failed to disclose orebodies of permanent commercial values. Idle, owing to lack of funds.

PORTLAND CONSOLIDATED COPPER CO. WYOMING

Office: 20 Broad St., New York. **Officers:** Phil. S. Delany, pres.; Myer Newberger, v. p.; Thos. C. Delany, sec.-treas.; above with Herbert Frankenberger and Wm. H. D'Esterre, directors.

Inc. 1916, in Wyoming. **Cap.**, \$2,000,000; shares \$1 par; 1,015,000 shares outstanding; fully paid and nonassessable. Metropolitan Trust Co., New York, registrar; Company office, transfer office.

Property: formerly owned by the West Virginia-Wyoming Copper Mining Co. and the Portland Copper Mining Co., comprises 203½ acres, 153¾ acres patented, at Encampment, Carbon Co., Wyo., said to cover over a mile along a mineralized zone of diorite and limestone. The Portland group is reported to be traversed for 1,800' by a system of veins, which runs westerly into and through the West Virginia-Wyoming for another 1,800', veins said to vary from 12" to 40' in width, and to average 3% copper and some gold. Ore minerals are chiefly pyrite, chalcocite, bornite and malachite.

Development: 2,350' of underground workings, of which 1,400' are on the Portland, consisting of a 900' tunnel and 248' main shaft. Management estimates reserves blocked out at 300,000 tons of probable mill ore, containing 2-3% copper and 40 cts. gold and 50,000 tons probable smelting ore, containing 10-25% copper and \$1-\$6 gold per ton. Further development necessary to prove value of the property.

PORTLAND GOLD MINING CO. COLORADO

Office: 310 Mining Exchange Bldg., Colorado Springs, Colo. Mines at Victor, Colo. Mills at Colorado Springs and Victor, Colo. **Officers:** Irving Holman, chairman; Frank G. Peck, pres.; Dr. D. H. Rice, v. p.; Thos. F. Burns, sec.-treas.; above with Ira Harris, directors. Harry V. Holman, purch. agent. Frank L. Smale, mine mgr.; Fred Jones, mine supt.; O. A. Willson, engr.; Geo. M. Taylor, gen. mgr. of mills; Jas. B. Heffernan, mill supt. at Colo. Springs; Thos. B. Crowe, mill supt. at Victor. Hills & Willis, cons. engr.

Inc. 1894, in Iowa. **Cap.**, \$3,000,000; reorganized 1905, in Wyo., same capitalization; shares \$1 par; all issued. Colo. Title & Trust Co., registrar. Stock transferred at company's office. Listed on Colo. Springs Exchange. Annual meeting, 3rd Monday in February, at Cheyenne, Wyo. Controls the Amazon Mining Co.

Comparative General Balance Sheet:

Assets—Jan. 1st—

	Property	Equip.	Supplies	Sec't's, Ins. Furn., Etc.	Current	Total
1916.	\$3,823,771	\$165,915	\$189,522	\$68,628	\$564,303	\$4,812,139
1915.	3,717,408	184,509	141,702	40,344	592,883	4,676,846

Liabilities—

	Cap. Stock	Current	Surplus	Total
1916.	\$3,000,000	\$ 8,695	\$1,803,444	\$4,812,139
1915.	3,000,000	14,968	1,661,878	4,676,846

Comparative Profit and Loss Account:

	Net Optg.		Balance		Deduct's	Divid's	Balance
	Profit	Total	Jan. 1	Deprec.			
1916.....	\$798,460	\$799,739	\$1,661,878	\$298,172	\$360,000	\$1,803,444(a)	
1915.....	590,594	591,046	1,767,789	336,957	360,000	1,661,878(b)	

(a) Jan. 1, 1916. (b) Jan. 1, 1915.

Dividends: 16% per year, paid quarterly, from Jan. 15, 1907, to and including Jan. 15, 1909; April 15, 1909, 3%; July 15 and Oct. 15, 1909, 2% each; 1910, 1911, 1912, 8% each; 1913, 10%; 1914, 12%; 1915, 12%. Total dividends to 1916, \$10,177,080.

Property: the Portland and Independence mines, 253 acres, in Cripple Creek district, Teller Co., Colo., carrying gold ore in quartz veins. The Independence mine and mill, comprising 110 acres on Battle Mtn., were purchased from the Stratton-Independence, Ltd., a British corporation, in July, 1915, for \$325,000. The Independence mine has over 15 miles of workings and is credited with a gross production to July, 1915, of \$23,621,728.

Development: the Portland mine, worked continuously for 23 years, has a total of 55½ miles of underground workings. Total work in 1915 was 19,808', as compared with 15,592' in 1914.

For geology of the district, see U. S. G. S. Prof. Paper, No. 54, also Vindicator Cons. G. M. Co.

Mine is worked by 2 shafts, No. 2 sunk 154' in 1915, to 1,870' depth, or the 18th level. The mine is drained to 400' below this level by the Roosevelt tunnel. On the 17th level, 6,134' of work performed in 1915, including 5,816' of crosscutting, disclosed nothing aside from the main vein systems. Drifting on the 18th level exposed No. 1 vein for 1,480', showing 600' of shipping grade, 200' of possible ore, 350' of mill dirt and 330' of barren ground. The ground on this level is broken and fissured. The North vein is larger than on the 17th, but of lower grade; to the S. the vein splits, following the granite contact to the W. and the phonolite dike to the E. The East vein is reported to be 5' wide and shows \$25 ore. Management considers the showing on this level highly promising. The shaft was sunk to the 19th level and about 6' from the station the main Portland No. 1 vein was opened in May, 1916, showing 6' of ore and reported to assay from \$50-\$125 per ton. No. 1 shaft is being sunk on the Bobtail vein, said to show 5' of \$30 ore.

Production comes from every level in the mine workings. The 200' level and the territory above the adit tunnel level are being worked by lessees. These operations net the company 29% in royalties, above all expenses and all mill ore from development and reject from ore houses.

Company operates two mills at Victor, Colo., with a capacity of 1,200 tons daily, and reduction works at Colorado Springs, treating 400 tons daily. The Colorado Springs mill, which treats only high-grade ore, ran almost to capacity in 1915, treating 55,339 tons company ore, running \$24.68 per ton and yielding \$1,366,099 and 12,067 tons custom ores (lessee's operations) running \$22.75 per ton and yielding \$274,675.

The Independence mill at Victor, taken over in July, 1915, was completely remodeled into an oil-flotation plant for treatment of the low-grade ores and enlarged to 1,000 tons daily capacity. The mill treated to Dec. 31, 1915, 213,122 tons of \$3 ore, yielding \$646,724. Total production from both mills was 282,192 tons, with gross value of \$819,432. Costs per ton crude ore was \$1.7965; total mining cost was \$676,152; milling cost was \$12.2180 at Colorado Springs and \$2.5186 at both mills.

Production: from the Portland mine in 1912, 44,562,045 tons, gross

value, \$987,416; in 1913, 53,245,500 tons, gross value, \$1,380,713; in 1914, 62,997,538 tons, gross value, \$1,467,005; in 1915, 72,192 tons, gross value, \$1,710,277, with a grand total from April, 1894, to Dec., 1915, 1,384,061.287 tons, gross value, \$37,834,725. Total production to date from both mines is 3,653,969 tons of ore, with gross value of \$64,426,370.

Management estimates from 12-15,000,000 tons of low-grade ore in the mines and on the dump.

Company has a co-operative insurance fund and maintains a hospital at Victor jointly with the Vindicator company, for the benefit of the employees. The management is excellent and the outlook promising for many years of profitable operations and substantial dividends.

POWERS GULCH DEVELOPMENT CO.

ARIZONA

John Matson, supt. Property: 23 claims in Powers gulch, near Globe, Gila Co., is said to show a vein carrying bornite and chalcopyrite ore associated with pyrite. Mine, idle for a long time, was reopened in 1915 and a strike of tungsten ore reported in April, 1916. Development: by 2 shallow shafts and 2 short tunnels.

POZO GILPIN MINING CO.

COLORADO

Mine near Idaho Springs, Clear Creek Co., Colo., has lead-copper ore mined for its gold-silver values, by shaft and tunnel work. Company was idle during 1915, but the Engineering Mining Co. operating a lease on the property, sank a 100' shaft below the tunnel level. Work was suspended in Oct., 1915, pending addition of electric power to handle the water encountered in this work. Equipment: includes steam power plant with Ingersoll-Rand compressor.

PRECIOUS METALS CORPORATION

COLORADO

Office: 109 W. 26th St., New York. Mines in Mill gulch, San Juan Co., Colo. Officers: Chas. E. Force, pres.-treas.; F. W. Force, v. p.-sec.; and A. Fricke, directors.

Inc. Nov. 7, 1905, in Colorado. Cap., \$5,000,000; shares \$5 par; issued, \$4,250,000. Columbia Trust Co., New York, registrar. Annual meeting, third Monday in November. Company owned the entire stock issue of the East Canada Smelting Co., Ltd., which owned the McDonald copper-sulphur mine at Weedon, Quebec. The Canadian holdings were sold in 1915 to Weedon Mining Co., Ltd.

Company owns the Silver Crown group, 12 claims, 9 patented, and 4 mill sites, about 7 miles from Silverton; also the Forest and John mines, 9 miles distant, patented and freehold. Ore occurs in quartz veins in andesite, carrying lead and silver values. Developed by 2,500' of tunneling. Idle in 1915-1916.

PRESIDIO MINING AND MILLING CO.

TEXAS

Office: 255 California St., San Francisco, Calif. Mine office: Shafter, Texas. Officers: W. S. Noyes, pres.-mgr.; E. M. Gleim, mgr.

Cap., \$150,000; shares \$1 par; all issued. President controls the company through ownership of 97,933 shares. Operated as a close corporation.

Property: the Shafter Mine, at Shafter, Presidio county, has a production record of \$14,000,000 since 1883. Ore: mainly silver, with gold and lead values. Development: by about 25 miles of workings.

Equipment: includes 1 mile aerial tram, a 15-stamp 100-ton mill and a cyanide plant. The mill is equipped with 2 tube mills, Oliver filter, Pachuca tanks, Dorr thickener and 100-h. p. de La Vergne oil engine.

Production: in 1914 amounted to about \$300,000. In 1915 minority stockholders, representing 22,753 shares, filed a suit, asking for appointment of receiver and an accounting from the president, who is alleged to have so manipulated the company's finances as to obtain personal title to min-

ing property in Texas, which should belong to the company. This suit is presumably still pending.

PRESTON EAST DOME MINES, LTD. ONTARIO

Office: 7 Melinda St., Toronto, Ont., Canada. **Officers:** Lt. Col. D. M. Robertson, pres.; Gordon Taylor, sec.-treas., with C. L. Sherrill, R. L. Shellington and D. L. White, Jr., directors.

Inc. 1911, in Ont. **Cap.**, \$3,000,000; shares \$1 par; 2,500,000 shares outstanding. Stock listed on New York Curb. Toronto General Trusts Corp'n, Toronto, transfer agents.

Property: 3 claims; patented, in Tisdale Twp., Porcupine, Ont., adjoining the Dome Mines, Ltd. **Ore:** which occurs in narrow veins in quartz-porphry, carries coarse gold, associated with pyrite and zinc-blende. Company is idle, pending outcome of further development on the Dome Mines property. Secretary reports a small cash balance on hand, Jan., 1916.

PRICE MINING CO. UTAH

Office: 17 S. 7 W. St., Salt Lake City, Utah. **Officers:** Fred W. Price, pres.; J. C. Barnard, v. p.; D. C. Dart, sec.-treas., with John Brandborg and Wm. M. McCrea, directors.

Inc. April, 1915. **Cap.**, \$250,000; shares 25 cts. par. Stock is listed on the Salt Lake Exchange.

Property: 15 claims, 380 acres, in South Fork canyon, Alta-Cottonwood mining district, Salt Lake Co., Utah, believed to carry the Cardiff contact, which is intersected at right angles by several fissure veins. Samples taken at depth of 15' on the Nettie claim, reported to have assayed 64.2% lead, 50 oz. silver and \$12 gold per ton.

A tunnel is now being driven to intersect this orebody at depth of 200'. Plans adding electric power, compressor and drills. A prospect.

PRICKLY PEAR MINING CO. MONTANA

Office: care J. C. Murray, pres., Helena, Mont. Mine P. O.: Jefferson City, Mont. Lee Dever, v. p.; H. M. Brooks, sec.-treas. Company owns the Prickly Pear mine, 2 miles from Jefferson, opened by a 350' tunnel, showing gold and silver-bearing copper ore. Has no power equipment. Production not reported.

PRIMOS CHEMICAL CO. COLORADO

Primos, Delaware Co., Pa. Walter M. Stein, pres.; Gideon Boericke, sec.; Felix Boericke, treas. Operates its mining department as the Primos Mining & Milling Co.

Inc. Aug., 1912, in Colo. **Cap.**, \$500,000. Is the largest buyer and producer of vanadium, radium and tungsten ores in the United States.

Primos Exploration Co.

Subsidiary of the Primos Chemical Co.

Inc. Nov. 24, 1915, in Delaware. **Cap.**, \$200,000, to explore for ores and minerals. H. E. Latter, Norman P. Coffin, Wilmington, Del. and Clement M. Egner, Elkton, Md., incorporators.

Primos Mining & Milling Co.

Lakewood, Boulder Co., Colo. Is a close corporation controlled by Primos Chemical Co., the largest dealer in rare minerals in the world. **Officers:** Walter M. Stein, pres.; C. F. Lake, v. p.-mgr.; Gideon Boericke, treas.; Harold Boericke, sec.

Company owns many properties at widely scattered localities which are operated by different departments.

Vanadium Department.

The company owns at Vanadium, Colo., about 5,000 acres of roscoelite bearing land locally known as the Bear Creek property. At this place the company operates a 400' shaft, mining both on its own account and

through a large number of lessees who pay 25% royalty. About 65 men employed in the mine and 40 at the mill.

The output of this property and that at Placerville, Colo., also worked for vanadium, is treated in a mill and the concentrate reduced in the reduction plant to ferro-vanadium, which is shipped to the parent company at Primos, Pa.

Molybdenite Department.

This department operates the Young and Lively mine, A. H. Yale, supt., the first mine in America to be worked for molybdenite ore exclusively. The mine is in the Dailey district, about 11 miles above Empire, Clear Creek Co., Colo. The ore occurs in veins mined through tunnels and an open cut, the product being sacked and shipped to Pittsburgh. The mine is equipped with compressor and employs 40 to 60 men.

Tungsten Department.

The company has large and extremely valuable holdings in the Boulder Co., Colo., tungsten field adjacent to Nederland. **Property:** 1,680 acres distributed over 5 sq. miles in the northern part of the Nederland field. The rocks are gneissoid granite and a granitic schist which grades into quartz and mica-schist. These rocks are cut by dikes of pegmatite in which the ores occur as veins and streaks carrying ferberite, the black tungstate of iron, in a matrix of quartz and feldspar, and crushed rock. The veins run N.-S. and usually dip steeply, rarely as little as 45°.

The **Conger** is the principal mine, but two others are operated. At the Conger mine three veins are open, the Conger, Middle and East veins. The first two unite on the strike on the 450' level where a large orebody occurs. The ore-shoots are lens shaped and show rapid pinching and enlargement. On the 200' level the vein has been stoped for a total distance of 800' and a big ore-shoot has been stoped for 250' long, 90' high and 8' wide.

Development: the shaft is said to be 1,100' deep, making it the deepest tungsten mine in the world. Levels are about 100' apart and shrinkage stoping is employed. A working tunnel taps the shaft at the 150' level.

Equipment: includes a Hendrie-Bolthoff second motion hoist and a Norwalk 300 cu. ft. compressor. Two-mile tramway from mine to mill, hauls the ore in trains of 5 cars of 1½ tons capacity by a 3½ ton General Electric storage battery motor.

Company also operates the Reddig mine, 600' deep, the Lily mine, 160' deep, and the Crow mine, about 75 sets of lessees were working on these properties early in 1916.

The Quaker and Oregon mines about 4 miles from Lakewood, have a relatively small output which is delivered to the mill by wagon. The Lone Tree mine, half a mile from Lakewood, has a high-grade orebody 100' long, stoped for 70' high and as much as 20' wide. The Quaker shaft is 325' deep.

The **Primos mill** at Lakewood handles 60 tons daily of 3%-5% ore. It has a 100-ton bin for company ore and six 15-ton bins for custom ore. After sampling the ore goes over 1½" grizzlies, oversize to Blake crusher, to 10-stamp battery of 1,000 lbs. stamps, each stamp delivering 3½ to 4 tons 20-mesh pulp per 24 hours. Battery pulp goes to No. 6 Wilfley tables, making concentrates sent to settling tanks above Frue vanners, whose tails go through settling tanks, with discharge to Dorr classifiers and sand to Prosser tube mill, whose product with part of settlers' goes to Frue vanners. Tails of vanners go to canvas tables. Milling practice produces concentrates carrying from 40% to 65% tungstic acid, with recoveries ranging from 65% to 85%.

Arizona Mines. The Primos Co. operates a property at Wolfram, 5

miles from Johnson, Cochise Co., Ariz. Owen T. Smith, mgr. The ore, in part placer gravel and in part vein quartz, found in deposits in the low hills nearby, is treated in a 30-ton concentration mill, equipped with jigs and tables. The product is sacked and shipped to Clifton, Pa.

Company is operated as a close corporation and does not give out any information about its operations or the properties.

PRINCE ALBERT MINE

COLORADO

Formerly owned by the Prince Albert Cons. Mining Co., and purchased at foreclosure sale in Dec., 1914, by Frank Johannngmann, of Cincinnati, for \$31,496.

Property: on Beacon hill, near Cripple Creek, Teller Co., Colo., operated under 3-year bond and lease from 1916 by Frank Vetter, who is reported, July, 1916, to have organized the Albert Beacon Gold Mining Co. to take over the mine. Developing through the Hand tunnel.

PRINCE ALBERT MINING & MILLING CO.

ARIZONA

Mark Bradley, mgr., Groom Creek P. O., Yavapai Co., Ariz. **Property:** shows gold bearing veins in schist, developed by 200' shaft. Equipped with Fairbanks Morse hoist and Sullivan 240 cu. ft. compressor.

PRINCE CONS. MINING & SMELTING CO.

NEVADA

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Lincoln Co., Nev. **Officers:** A. H. Godbe, pres.; E. L. Godbe, v. p.; M. C. Godbe, sec.-gen. mgr.; John Pingree, treas.; above with Geo. F. Wasson and D. L. Wertheimer, directors. Jas. Quirk, supt.

Cap., \$2,000,000; shares \$2 par. Stock listed on Salt Lake Exchange.

Annual report for 1915 shows total receipts, \$311,234, which includes cash on hand, \$119,650; profit from operations, \$158,544; notes receivable, \$12,923; expenditures amounting to \$154,465, included development, \$69,379; notes payable, \$54,070; dividends No. 1-4, \$124,924. Net operating profit for the year was \$158,554. **Dividends:** to Sept. 1, 1916, total \$300,000; paid since July 1st, 1915.

Property: 14 claims S. W. of Pioche, in Ely mining district, contains large orebodies of iron manganese, outcropping on surface for 800', having an aggregate thickness of 120', width of 500' and proven for a length of 1,200'. The ore occurs in large deposits in Cambrian quartzite and in bedded planes of lime and shale and is reported to average 3-4% lead, 34% iron, 13% manganese, 3 oz. silver and some gold, 3% lime, 11% insol. and 14% silica, valued at from \$7.50 to \$9.50 per ton. Owing to large percentage of iron, the ore is especially valuable as a flux to the lead smelters, the iron commanding a bonus over the cost of smelting, with silver, gold and lead values coming in as a profit. From this source alone the ore yields \$3-\$4 per ton.

Company also owns the Pioche King group of 9 claims, has a $\frac{2}{3}$ interest in the adjoining property of the Virginia-Louise Mining Co., and about 1,000 acres of patented land at Dry Valley and Bullionville, 12 miles from Pioche, said to contain 120,000 tons of tailings on dumps, showing 5.34% lead, 10 oz. silver, 0.11 oz. gold per ton and estimated by C. F. Sherwood to average \$5 per ton. A 200-ton oil flotation mill was erected to treat these tailings in 1916.

The Prince mine is developed by 550' main shaft with several miles of drifts. A body of high-grade lead-silver sulphide ore, said to be 16' wide, is being prospected by diamond drilling on the 550' level and a 3-compartment winze sunk from this level to the 800' level. **Ore reserves:** estimated at approximately 1,000,000 tons.

Equipment: includes electric power, hoist, compressor and 9-mile rail-

way connecting with the Salt Lake route from Pioche. Freight rate is \$1.25 per ton.

Shipping 12,000 tons of ore per month in 1916. Employs 80 men. Present management deserves credit for putting the mine on a dividend paying basis, with large ore reserves and \$100,000 cash surplus in less than 3 years, although present high prices are largely responsible for augmented earnings of company.

PRINCE OF WALES MINING CO.

UTAH

Idle. Address: Walker Bros., Salt Lake City, Utah. Property: at Alta, 60 acres, has been idle since a snowslide destroyed its equipment in 1914. Mine has 950' incline shaft from which \$2,000,000 worth of ore was mined, 1870-1875, until the influx of water stopped operations. Alta T. & T. Co. tunnel will entirely drain the ground.

PRINCEMONT MINING CO.

IDAHO

Wallace, Idaho. Inc. Feb., 1916, in Idaho, by S. B. Holbert, N. B. Thrist, Chas. F. Briggs, W. J. Williams and A. G. Holms, of Pittsburg; E. F. Holbert of Fairmont, Pa., and W. H. Batting of Coeur d'Alene. Cap., \$2,000,000, shares \$1 par. Properties in Southern Idaho.

PRINCESS COPPER CO.

NEVADA

Address: C. W. Freed, pres., 1007 First Ave., Salt Lake City, Utah. Mine office: Ely, White Pine Co., Nev. F. J. Austin, sec.; H. P. Clark, treas.

Inc. 1911. Cap., \$1,000,000; shares \$1 par.

Property: 30 claims, about 550 acres, acquired of the Ely Resurrection Copper Co., in the Robinson district, lying a little north and east of Ely.

Mine has 2 short tunnels and a 140' shaft, said to show 18' of ore assaying up to 5% copper, with gold and silver values, and some high-grade ore assaying up to 46% lead and 110 oz. silver per ton, with gold values. Management plans resumption of development work.

PROGRESS MINING & MILLING CO.

COLORADO

Address: 120 E. Chestnut St., Leadville, Colo. Wm. B. Brooks, mgr. Property: the Wilson mine and mill at Robinson, near Leadville, developed by 1,400' shaft and said to have been a large producer of lead-zinc ore, under former management. Equipped with 250-ton concentrator, to be replaced in 1916 by a flotation plant. Operations to be resumed.

PROGRESSIVE MINING CO.

UTAH

Office: 229 South West Temple St., Salt Lake City, Utah. Mine near Milford, Beaver Co., Utah. Officers: L. B. Bohn, pres.; I. Lessing, v. p. and mgr.; C. T. Mixer, 549 Elizabeth St., sec.-treas. and cons. engr.; preceding with F. J. Nichols, C. C. Crismon and Jas. Barrett, directors.

Inc. Aug. 20, 1906, in Utah. Cap., \$250,000; shares 50 cts. par; assessable; fully issued. Total assessments to date, \$10,000.

Property: 6 claims, 80 acres, patented, in the Star district, 8 miles from a railway, carrying argentiferous copper and lead ores. The mine has a 150' incline shaft, with about 1,000' of workings, developing a 3' vein, said to carry ore assaying up to 8% copper, 35 oz. silver and \$1 gold per ton. A few small shipments have been made. Idle in 1915, but operations to be resumed.

PROMONTORIO CONSOLIDATED MINING CO.

MEXICO

Office: 99 John St., New York. Mine office: Lampazos, Moctezuma district, Sonora, Mex.

Property: 11 groups, 1,410 acres, 3 miles from the forks of the Yaqui river; also a 12,000-acre ranch and the Marguerite and Inez claims, adjoining the mineral lands. Includes the Promontorio mine, 35 miles S. E. of Moctezuma, and about 30 miles from the nearest railway at Tonichi, an

antigua, said to have produced the copper from which were cast the bells on the old church at Moctezuma, built 1640. During the American Civil War some bornite from this mine was packed on mules, 40 miles to Guaymas and shipped to Swansea for smelting.

The claim shows diorite, granite and limestone, carrying orebodies in a shear zone between granite and diorite, with high-grade bornite and low-grade disseminated chalcopyrite ore. The low-grade zone is upward of 200' in width, with a granite footwall, also carrying low-grade impregnations of copper.

The Inez mine shows a large gossan, mined for flux, underneath which is cupriferous pyrrhotite, carrying small gold and silver values, and the Inez is also said to have another orebody of promise, carrying auriferous and argentiferous copper ore.

Presumably closed down since 1913.

PROMONTORY MINING CO.

UTAH

Office: 54 Commercial Bldg., Salt Lake City, Utah. **Mine office:** Promontory, Box Elder Co., Utah. **B. D. Siegfus, pres. and mgr. Cap., \$600,000; shares \$1; issued, 450,000.**

Property: about 7 miles north of Promontory point, shows a contact deposit between dolomite and porphyry.

Development: by a 105' shaft, sunk on an 8' vein, showing copper ore with a paystreak said to give assays of 5 to 18% copper, 1 to 40 oz. silver and about \$9 gold per ton. A 6' vein of low-grade zinc ore reported under development in 1916. See Lakeview Mining Co.

PROPRIETARY MINES COMPANY OF AMERICA

MEXICO

Office: 15 Broad St., New York. **Officers:** D. C. Catlin, pres.; E. J. Page, v.-p.; Chas. E. Pope, 2nd v.-p.; C. W. Pope, sec.-treas.; above with Horace E. Parker, Wm. A. Robinson, Jr., Robt. V. Norris and W. B. Cogswell, directors.

Inc., 1907, in Nevada. Cap., \$3,000,000; shares \$5 par; \$2,250,500 issued. Bonds: authorized, \$750,000, 6% convertible; outstanding, \$703,400. New York Trust Company, registrar. Stock transferred at company's office. Annual meeting, second Monday in June. Is a holding company, controlling through stock ownership the Mineral Development Co., and the Proviencia M. & M. Co. of Guanajuato, Mexico.

Latest financial report available, year ending May 31, 1914, shows **assets:** property, \$2,249,000; stock, bonds and notes of subsidiary and other companies, \$560,542; accounts receivable, \$31,076; cash, \$5,427; furniture, \$313; accounts since organization of company, \$132,632; loss and gain, \$8,700. **Liabilities,** amounting to \$3,737,193, include outstanding stock, \$2,250,500; outstanding bonds, \$703,400; stock exchanged for Min. Dev. Co. shares, \$6,380; accounts payable, \$5,996; contingent, \$21,417.

The 1915 annual report contains a reference to necessary "additional financing" when the orebodies of the Nueva Luz mine have been more thoroughly developed and when political conditions in Mexico permit the reopening of the Tajo de Dolores mine.

It contains no figures and only indefinite and incomplete information as to progress and plans of the operating companies. Owing to disturbed conditions in Mexico, rail connection with Guanajuato was suspended in Spring of 1916, and the mines were closed down when supplies became exhausted.

Mineral Development Company.

H. Vincent Wallace, gen. mgr., Guanajuato, Mex. Cap., \$1,000,000; shares \$1 par; \$800,000 issued. Property: the Nueva Luz mine, the La Planta and Torre mines. La Nueva Luz mine, adjoining the Valenciana, is

developed by a 2,035' shaft and a 1,130' crosscut, driven through the Veta Madre, below the Valenciana workings, which cut 3 veins reported to be from 5' to 32' wide, and to carry iron pyrite, zinc blende, lead sulphide, chalcopryrite, silver and gold. The 3rd vein intersected 1,069' from the shaft was 5' wide, and assayed 480 grams silver, $\frac{1}{4}$ gram gold and 10% zinc, per ton. Management plans drifting on the lowest level and diamond drilling to ascertain dimensions of these orebodies. Although the general manager, an Englishman, remains at the property, it is doubtful if active development work can be continued at the present time.

Providencia Mining & Milling Co.

Cap., \$1,250,000, of which \$250,000 is 7% preferred, convertible at 110, and \$1,000,000 common stock, 250,000 shares common in treasury.

Property: the Tajo de Dolores mine at Guanajuato, Mexico. The mine was closed down in April, 1914, and the outlook for an early resumption of operations is not bright. The 200-ton mill and cyanide plant has been leased for 3 years to the Cubo Mining & Milling Company for a yearly rental of \$20,000 U. S. currency and an option to purchase at \$100,000. Interest at the rate of 6% is charged until the option is exercised, rent paid is credited to purchase price. The Cubo Co. agrees to mill Tajo de Dolores ore for a period of 7 years at cost plus 10% until exercise of option and at cost plus 20% thereafter. The lease becomes operative when supplies can be shipped into the camp.

PROSPERITY MILLING CO.

MISSOURI

Prosperity, Mo. Operates a lease on 40 acres of mineral bearing land belonging to W. E. Saum, in Sec. 21, T. 28, R. 32, at Prosperity, Jasper Co., Mo.

Development: by 5 shafts to depth of 175'. **Equipment:** includes 150-ton concentrating plant, 3 air drills, steam power, Carterville crusher and air compressor. About 25 men employed.

PROTECTORA y ANEXAS; COMPAÑIA MINERA LA. MEXICO

San Salvador, Mazapil, Zacatecas, Mex. Percy A. Babb; pres. and gen. mgr.; J. L. Miranda, sec.

Inc. 1907, in Mexico. **Cap.**, 100,000 pesos; fully paid. **Property;** 68 hectares, including La Protectora y Anexas and San Francisco mines carrying oxide ores, with copper, lead and zinc occurring as replacements in limestone. Low-grade ores average 2.5 to 5% and high-grade ores 12 to 19% copper. Mine has a depth of 100 meters with about 1,500 meters of workings. **Equipment:** includes a 15-h. p. gasoline hoist. Was working with about 200 men, early 1913, and shipping around 250 tons of high-grade ore monthly. No recent reports received and presumably closed down.

PROVIDENCE EXTENSION GOLD MINING CO. NEVADA

Office: Morris, Ill. **Officers:** I. F. Hatcher, pres.; W. F. Buck, v. p.; G. A. Leach, sec.-tres.; with Dr. O. M. Barker, directors.

Inc. 1908, in Nev. **Cap.**, \$1,500,000; shares \$1 par; 1,100,000 shares outstanding.

Property: 3 patented claims and a fraction at Seven Troughs, Humboldt Co., Nev., reported by management to show free milling quartz ore in fissure veins, 4" to 2' wide and to carry from \$14 to \$17 gold per ton. **Development:** by 170' vertical shaft. Idle, pending refinancing of the company.

PROVIDENCIA MINING & MILLING CO.

MEXICO

Subsidiary of the Proprietary Mines Co. of America and described thereunder.

PRUDENTIAL COPPER MINING CO.

ARIZONA

Idle. **Office:** 322 Federal St., Chicago, Ill. **Mine Office:** 35 Bank of

Arizona Bldg., Prescott, Ariz. H. H. Linney, agt., Geo. T. Clark, pres.; Shea Smith, v. p.; Geo. H. Jenkins, treas.; Fletcher B. Gibbs, sec.; Ernest A. Haggott, cons. engr.; preceding with Geo. T. Aimer and Alice R. Woods, directors.

Cap. is 500,000 shares and company is controlled, through the ownership of 422,778 shares, by the Estate of Maj. Shea Smith. Lands: 12 claims, patented.

PTARMIGAN MINES, LTD.

BRITISH COLUMBIA

Address: care H. H. Johnson, Victoria, B. C. Property: 8 claims near the mouth of Bear River, on Bedwell Sound, Vancouver Island. Considerable development work was contemplated on this property, but all work was suspended shortly after the outbreak of the European war.

PUEBLA SMELTING & REFINING CO.

MEXICO

Office: 35 Nassau St., New York. Mexican office: Isabella Catalica No. 33, Mexico City, Mex. Mine office: Cuyuaco, Pueblo, Mex. Officers: Harvey C. Garber, v.-p.; H. H. Nieman, sec.; B. P. Thom, treas.; preceding with P. W. Lupper, Wm. B. Reed, Jr., and I. W. Lofland, directors.

Inc. Oct., 1912, in Delaware. Cap., \$5,000,000; shares \$5 par; non-assessable. Debentures, \$1,000,000 at 6%. Guaranty Trust Co., New York, registrar. Owns a 72% stock interest in the Cia. Minera Explotadora El Magistral y Anexas, and also sundry lands acquired from the Bankers Mining & Development Co. for \$4,250,000 in stock and bonds of the Puebla Smelting & Refining Co.

Property: 28 claims, 1,600 acres mineral lands, 120 acres timber lands, 800 acres coal lands, a 25-acre smelter site and 100 acres miscellaneous lands, in the Majistral district.

Ore: property shows limestone porphyry and diorite, orebodies occurring as contact deposits between limestone and diorite, and as replacements in the limestone. Ores carry oxides and carbonates of copper with small quantities of silver bromides, sulphides and free gold in the oxidized zone. The deeper workings show chalcopyrite associated with hematite having a garnetiferous quartz gangue in the sulphide zone.

Development: by numerous tunnels of from 200 to 750', with about 6,700' of workings, showing ore said to average 3.5% copper, 70 grams silver and 1.5 grams gold per ton.

Equipment: company claims to have a power plant consisting of two 400-h. p. Babcock & Wilcox water-tube boilers, a 300-h. p. Allis-Corliss engine, a 200-h. p. Hughes-Philips Corliss engine, and a 225-k. w. Westinghouse generator.

Due to the revolution the property has not been operating since 1913.

PUEBLO SMELTER.

COLORADO

Is owned by the American Smelting & Refining Co., which see.

PUGET SOUND REDUCTION CO.

WASHINGTON

Everett, Snohomish Co., Wash. Is controlled, through stock ownership, by American Smelters Securities Co. The works have three 30x180" blast furnaces, 1 running on copper ores, making a 50% matte, which is blown up to blister copper in a reverberatory furnace and shipped east for electrolytic refining. Also includes an arsenic plant.

PURITAN MINE.

COLORADO

Geo. R. Stewart, owner, Alice, Colo. Property: 78 claims, 44 patented, 307.1 acres in Lincoln mining district, Clear Creek Co., said to show quartz fissure veins, up to 26' in width, in granite, porphyry, and schist. Ore: is a sulphide running high in silica, from 20-30% sulphur, with gold-silver-copper values in iron.

Development: by 2 tunnels, 1,320' and 150' long. Shipments to start in 1916. No equipment, but owner plans adding compressor and engine.

PURITAN MINING CO.**IDAHO**

Wallace, Idaho. **Officers:** Frank Boutin, pres.; Theo. Anderson, v.-p.; Jas. F. Callahan, treas.; Chas. A. Solberg, sec.; above with O. B. Olsson and John H. Robbers, directors.

Property: a group of lead-silver claims in Placer Center mining district, Shoshone Co., W. of the Tamarack & Chesapeake. **Development:** by 1,100' tunnel. Patent applied for in 1914. No recent information published.

PURITAN MINING CO.**SOUTH DAKOTA**

Address: Deadwood, S. D. Inc. Oct., 1915, in S. D. **Directors:** Wm. J. McGoffin, Dr. F. M. Gantz, J. R. Russell, Jas. R. Richardson. **Cap.**, \$1,500,000; 500,000 shares in treasury

Property: formerly owned by the Alta Mining Co. and the Puritan Mining Co., on Strawberry gulch, near Deadwood, said to show sulphide ore, carrying gold, silver and lead values. **Equipment:** includes cyanide mill and hoist.

PUZZLE LEASING CO.**COLORADO**

John W. Prout, mgr., Rico, Colo. Operates the Puzzle and Puzzle Extension mines at Breckenridge, Summit Co., Colo., said to carry a vein from 2 to 6' wide, with gold-silver-lead values.

Development: by 2,600' tunnel, winze, drift and an old 135' shaft. Equipped with electric hoist and pump.

Property: is credited with past production of \$300,000. Carload shipments made to Chamberlain sampler at Breckenridge in 1915-16. 20 men employed.

Q. S. COPPER CO.**WASHINGTON**

Office: 229 North Division St., Spokane, Wash. **Mine office:** Q. S. Ranch, Cuess, via Loomis, Wash. **Officers:** M. E. Jesseph, pres.; A. M. Dewey, v. p.-gen. mgr.; J. P. Heckert, sec.; A. F. Suksdorf, treas.; preceding with Wm. F. Harrah, Niles, Mich., trustees.

Inc. April 10, 1914, in Washington. **Cap.**, \$2,000,000; shares \$1 par. Is successor of the Q. S. Mining Co., which corporation was sold out by a Receiver appointed by the Washington courts. Property was purchased by the new corporation, which paid all the debts, amounting to more than \$25,000, and issued stock at 2 cts. a share to the old stockholders; forfeited stock was left in the treasury, which gave the corporation a majority of the stock. Bad management in 1912 wrecked the former company and led to a receivership, no annual meeting being held that year. Property was sold for taxes, but sale set aside by the courts when the receiver was appointed.

Property: 13 claims, with 10 acres of mill sites, and water rights on Sinlahekin creek, about midway between Loomis and Conconully, along the flank and crest of Æneas mountain, in the Salmon River district. The property shows fissure veins in diorite carrying mainly low-grade copper ores. The company claims an orebody 300' wide at surface, which has been cross-cut for 238' at a depth of 800' below the outcrop without reaching the wall, and traced by stripping for 6,000' on surface, showing a ledge of 212' width at the north, 300' in the middle and 285' at the southern end of the property.

Development: begun 1897, is by 2 open cuts at either end, a pit of 50x 150' in the middle, and a tunnel 1,063' long cutting the vein at depth of 800', with another tunnel, intended for the main avenue of extraction, 540' long, planned to cut the orebody at depth of 2,000'. One tunnel shows chalcocopyrite ore said to give assays of 11.4% copper and estimated to average 2 to 4% copper, with small and variable silver values and about \$1 gold per

ton. The company claims an average ore value of \$14 per ton from several hundred assays.

Assessment work only has been done since new company came into control.

Q. S. MINING CO.

Succeeded by Q. S. Copper Co., which see.

QUAKER GOLD MINES CO.

WASHINGTON

ARIZONA

Address: care H. M. Meriwether, New England Bldg., Kansas City, Mo.

Property: 10 claims, patented, the Gold Note and Richinbar mines, 12 miles from railway, in Harper district, Bradshaw Mts., Yavapai Co., Ariz., shows quartz vein carrying gold ores, reported to average \$8 per ton. **Development:** 5,000' of work, in shafts, levels and tunnels.

Equipment: includes 20-stamp mill, hoist, etc., with electric power. Is a big low-grade proposition.

QUALEY MINE.

NEVADA

See Excelsior Mtn. Copper Co.

QUATSINO COPPER CO.

BRITISH COLUMBIA

Address: care Maurice W. Bacon, Birks Bldg., Vancouver, B. C., and Old Nat'l Bank Bldg., Spokane, Wash. **Mine address:** Quatsino, Vancouver, Id., B. C. W. Clancy, supt.

Inc. 1915 in B. C. **Cap.,** \$5,000,000; shares \$5 par. Company to be reorganized, 1916.

Property: known as the Old Sport or Elk Lake group, comprises 27 claims, bonded for \$500,000 in 1913, by Messrs. Cullen and Bryant, who did extensive stripping, open cut work and diamond drilling. The claims of the Alert Bay Syndicate were bonded for two years for \$100,000 in the summer of 1915. Company holdings now comprise a total of 43 claims, all situated near Alert Bay, Quatsino Sound, Vancouver Id., 15 miles from the shore.

Ore: consists of magnetite, carrying pyrrhotite and chalcopyrite with accessory bornite, garnet, epidote and quartz, found in a "vein" in diorite traceable for 6,000' across the claims and said to be 4' to 33' wide. Limestone appears at surface, but is only surficial, both walls of orebody being diorite, as proven by the petrographic work of Harold Tomlinson.

Development: comprises 64 open cuts, 3 tunnels and 5 diamond drill holes, deepest 500' below surface and 100' lower than the tunnel. A 500' tunnel with 500' of drifting from it develops ore 14' wide on which systematic sampling is said to show an average of 2% copper with \$1.66 gold and 0.21 oz. silver per ton, the ore carrying 36% iron, 32% insoluble and 4-5% lime. Reports have been made by W. G. Norrie and Lavenasaler of the Tacoma smelter. (See Old Sport Group, Copper Handbook, Vol. XI.)

Experimental work shows that crushed to 40-60 mesh and treated with oil in Callow machines, a recovery of 90% of the copper is possible. Employing about 30 men, 1916. Wm. Clancy is quoted as estimating reserves at 400,000 tons of commercial ore, in 1915.

QUEEN COPPER MINING CO.

ARIZONA

Property sold to Magma Copper Co.

QUEEN GOLD MINING CO.

COLORADO

John Lind, supt., Cripple Creek, Colo. A close corporation, reported controlled by John T. Milliken of St. Louis. T. B. Burbridge, pres.; Thornton Brown, sec.-treas.

Property: 90 patented acres on Battle Mtn. and Raven hill, including the Eclipse mine, between the Elkton and Cresson mines, at Cripple Creek, formerly owned by the El Oro Mng. & Dev. Co., and purchased by present company in 1915. Mine is said to show 2 parallel veins, carrying \$15 gold ore.

Development: by 1,000' shaft, with levels every 100'. Equipped with machine drills, hoist, pumps and electric power. Shipping 2 cars of milling ore daily, April, 1916. Employs 8 men.

QUEEN ISABELLA MINES CO.

UTAH

Officers: Alex. Caldwell, pres., Eureka, Tooele Co., Utah; Alex. Ray Irvine, v. p.; S. R. Thurman, sec.-treas., with Daniel Caldwell and Bert Thurman, directors.

Inc. 1916 in Calif. Cap., \$50,000.

Property: 14 claims adjoining the Sharp mine, Tintic district, and carrying the extension of the Sharp vein. The Sharp mine while under 2-year lease and bond to Mr. Alex. Caldwell produced 15 carloads of silver-lead ore, netting \$15 to \$20 per ton, and 100 tons not yet shipped are said to have a higher value. The new company will develop the prospect.

QUEEN MINES, INC.

BRITISH COLUMBIA

Address: E. V. Buckley, mgr., Salmo, B. C. Company controlled by M. E. Cannon, pres., Appleton, Wis.

Property: the Queen, Yellowstone and Alexandria mines and a mill-site on Sheeps Creek, near Salmo, said to show several veins containing gold ore. Recent work has been concentrated on the Queen group, developed by 700' shaft with drifts run every 100'. **Equipment:** includes 20-stamp mill, handling 50 tons daily and reported making an extraction of 60% of the gold values.

Property under option to Tonopah Belmont M. Co., in 1916.

Mine credited with total production since 1908 of \$700,000 in gold.

QUEEN OF BRONZE MINE.

OREGON

Roy H. Clark, mgr., Takilma, Josephine Co., Oregon. Mine purchased for \$150,000 by Twohy Bros. and associates March, 1916.

Property: is in the Illinois Valley and near the Waldo Sm. & Ref. Co. holdings, 30 miles from Waters Creek on the railway. The new California & Oregon Coast Ry. will connect it will Grant Pass and Crescent City, Calif., 1916.

Mine has been a producer for 10 years, shipping ore with 9% to 20% copper and \$5 gold per ton, but with much ore of lower grade in the mine. See Waldo Mng. & Smelting Co.

A tramway installed 1916 carries ore from the working tunnel to loading bins, where 30 outfits are hauling it to railway.

QUEEN OF THE WEST MINES CO.

OREGON

R. G. Amidon, supt., Cornucopia, Oregon. **Property:** a gold mine, equipped with 50-ton stamp mill and cyanide plant, remodeled 1916.

QUEEN REGENT MERGER MINES CO.

NEVADA

Office: 337 Monadnock Bldg., San Francisco, Calif. **Officers:** J. D. Brown, pres.; H. B. Wade, sec.; J. E. Kerr, gen. mgr.

Inc. 1911, in Calif. Cap., \$2,000,000; shares \$2 par; 628,000 shares issued.

Property: 5 unpatented claims, bought June, 1915, for \$60,000, in Rand mining district, Mineral Co., Nev., 18 miles S. and W. of Rand. This tract is said to have 4,000' of the main contact fissure, which traverses the Rand district for 7 miles.

Development: by 235' main working shaft and 2 prospect shafts, each 100' deep. Crosscut on 1st and 2nd levels reported to have opened vein, 30-40' wide, between andesite footwall and rhyolite hanging wall, showing \$6-\$14 ore. Management estimated Feb., 1916, 5,000 tons of \$10-\$12 mill ore on the dumps and \$200,000 mill ore developed in the mine. Equipped with hoisting machinery good for depth of 1,000'.

Company purchased the Wheeler mine, a gold-copper property at Spenceville, Nevada Co., Calif., 15 miles from a railroad, in March, 1914, and is developing same by tunnels. Ore is principally chalcopryrite, said to average about 7% copper, and \$4 in gold and silver. Property reported to have 3,000' of the main contact vein. A 12-ton Partridge smelter was to have been started up March 1, 1916. It is expected to yield 1.5 tons of matte per day.

QUEEN VICTORIA MINE

BRITISH COLUMBIA

Owned by British Columbia Copper Co. Described Vol. VIII., Copper Handbook. Work suspended March, 1915. Costs were \$3 per ton and ore

averaged only 1.2% copper; 0.36 oz. silver; trace gold; 36.8% silica, 14% iron, so that no profit could be made. Shipments totaled 7,920 tons.

QUICK SEVEN MINING CO.

MISSOURI

Alba, Mo. Inc. in Mo. Cap., \$105,000. Operates a lease on 78 acres of mineral bearing land owned by J. Richardson, in Sec. 6, T. 29, R. 32, Jasper Co., Mo. Is reported to be the largest producer of zinc concentrate in the Alba district.

Development: by 3 shafts to depth of 150'. Equipped with 200-ton concentrator, pumps, drills, compressor and steam power. About 45 men employed.

QUICKSILVER INVESTMENT CO., INC. (THE) CALIFORNIA

Office: 45 Broadway, New York. **Officers:** Geo. H. Sexton, pres.; Robt. Gibson, v. p.; Harry A. Nichols, 2nd v. p.; Chas. A. Frank, sec.-treas.; A. Heyward McAlpin, asst. sec.-treas.; above with Ira Barrows and Wm. Herbert, directors.

Inc. 1915, in Virginia. Cap., \$1,061,900, in \$61,900—7% cumulative, 1st preferred, issued to noteholders of old company; \$421,300—7%, 2nd preferred, and \$578,800 common shares; shares \$100 par; \$461,900 outstanding. All stock is held in a 5-year voting trust; voting trustees: Chas. A. Frank, chairman, Robt. Gibson and Ira Barrows, N. Y. City.

Company has a 25-year lease from 1915 on the Almaden quicksilver mine of the Quicksilver Mining Co., through its subsidiary the New Almaden Co., Inc., and will pay 20% of its net profits to owners. Reported operating at a loss; indebtedness to noteholders, March 1, 1915, was \$61,900. More than \$60,000,000 has been produced by Almaden mine.

QUICKSILVER MINING CO.

CALIFORNIA

Offices: 45 Broadway, New York. C. T. Tracy, sec.-treas., New Almaden, Calif. **Officers:** M. E. Harby, pres.; Alfred H. Swayne, v. p.; above with L. L. Benedict, Jr., L. Crawford, H. Wallerstein, H. O. Talmage, W. B. Franklin, S. Y. Baylies, W. H. Landers, H. A. Nichols and W. Herbert, directors.

Inc. 1867 in New York. Cap., 10,000,000 shares; \$1 par, in 5,700,000 common and 4,300,000 preferred, 7% noncumulative. Annual meeting, 3d Wednesday in June, in N. Y. City. Stock listed on the New York Stock Exchange. Farmers Loan & Trust Co., New York, transfer agent; Equitable Trust Co., New York, registrar. In 1914, company defaulted on payment of notes, and was refinanced March, 1915.

Dividends: few and far between; none has been paid on the common since 1882 when 40c was paid. Payments on preferred: June, 1891, 4%; May, 1899, ½%; July, 1900, ½%; May, 1901, ½%; May, 1902, ½%; May, 1903, ½%.

Property: several thousand acres, including the New Almaden quicksilver mines at New Almaden, near San Jose, Calif. Mine is the oldest producer of quicksilver in the United States. Company has given a 25-year lease from Feb., 1915, on its mines to the New Almaden Co., a subsidiary of the newly organized Quicksilver Investment Co. and will receive 20% of net profits. Stockholders were offered voting trust certificates in new company on basis of one share of second preferred for 10 shares of old preferred in consideration of payment of \$3 for each share of old stock. New common was exchangeable for old common stock at same ratio plus \$1.50 per share of old common. Many of the troubles of the old company are said to be due to lack of efficient management in the last few years.

QUINBY MINING CO.

CALIFORNIA

Idle. **Address:** Quinby, via Burnt ranch, Calif. **Property:** 6 claims, on Quinby Creek, in Trinity Reserve, showing 4' vein of copper ore, developed by 2 tunnels, 100' and 400' long and 300' drifts. Oxidized surface ore was milled.

QUINCY MINING CO.

MICHIGAN

Office: 32 Broadway, New York. Mine and works office: Hancock, Houghton Co., Mich. **Officers:** Wm. Rogers Todd, pres.; W. Parsons

Todd, v. p.; Jas. L. Bishop, Chas. J. Devereaux, Isaac H. Meserve, Wm. B. Belcher, John M. Longyear and Otto Kirchner, directors; W. A. O. Paul, sec.-treas.; F. J. McLain, asst. sec.-treas.; Chas. L. Lawton, gen. mgr.; Jas. W. Shields, mill supt.; Alex. Laist, smelter supt.

Inc. March 30, 1848, under special charter from the state of Michigan. Cap., \$3,750,000; shares \$25 par; issued, \$2,750,000. Original cap., \$500,000; reincorporated March 6, 1878, for 30 years more with cap. \$1,000,000, increased, 1889, to \$1,250,000, again increased, 1896, to \$2,500,000, and once more increased, 1906, to \$3,750,000. Reincorporated 1908 for a third term of 30 years. Old Colony Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, first Wednesday in June.

Comparative Statement: Assets and Liabilities exclusive of real estate, mine plant and supplies in use.

	Cash, Cu & Invest's	Acc'ts Rec.	Total	Acc'ts		Add. Supplies		Total
				Pay.	At Mine	At Smelt.	Total	
1915	\$1,018,381	\$626,283	\$1,644,664	\$282,861	\$271,035	\$32,118	\$1,664,956	
1914	736,617	152,795	889,412	255,620	229,912	33,827	897,531	
1913	406,633	53,110	459,733	110,179	352,998	44,386	746,938	
		Metal	Total	Net			Balance	
		Sales	Income	Expenses	Income	Divid's	Dec. 31	
1915	\$3,983,958	\$3,999,745	\$2,126,071	\$1,873,674	\$880,000	\$1,664,956(a)		
1914	2,054,622	2,063,650	1,858,057	205,593	55,000	897,532		
1913	1,921,198	1,940,128	1,863,968	76,160	412,500	746,938(b)		

(a) After deducting \$226,250 paid Hancock Cons. Mining Co. for mineral land purchased.

(b) Balance, Jan. 1, 1913, \$1,233,278; also, deduct \$150,000 paid note given St. Mary's Canal Mineral Land Co.

Dividends: Quincy paid its first dividend in 1862, and profits have been disbursed to shareholders in every succeeding year except 1866 and 1867, giving the company a continuous dividend record of 45 years, from 1868 to date, rendering it the oldest dividend-paying American copper mine, and second only to the Tharsis Sulphur & Copper Co., Ltd., which has a record of continuous dividends since 1867, or 1 year longer than the Quincy's record. Recent dividends, by years, have been as follows: 1900-1, 36%; 1902, 28%; 1903, 22%; 1904, 20%; 1905, 24%; 1906, 50%; 1907, 54%; 1908, 18%; 1909, 16%; 1910, 20%; 1911, 16%; 1912, 21%; 1913, 15%; 1914, 2%; 1915, 32%; 1916, 28% to July 1. Total dividends to July 1, 1916, \$22,547,500.

A table of statistics, production, costs, etc., 1864-1905, is given Vol. X., Copper Handbook.

Property: is very extensive, the management having adopted the policy, many years ago, of expansion of territory as opportunities offered. Acquisitions include a purchase of the Arcadian Copper Co., 1907, at a price of \$750,000; the old Franklin mine, 1908, at a cost of \$170,000, and the acquisition, 1910, of Sec. 14 and the N. E. ¼ of Sec. 22, of 800 acres, from St. Mary's Mineral Land Co. bought for \$600,000; 80 acres under and to the S. of shaft No. 2 were bought from Hancock Mng. Co., July, 1915, for \$226,250.

The holdings of the Quincy now include lands formerly held by the Pewabic, Franklin, Mesnard, Pontiac, Arcadian and St. Mary's, in order named, from south to north.

Geology and development: property carries the Pewabic bed and a number of parallel copper-bearing amygdaloids, from the Hancock mine, on the northern shore of Portage lake, to the boundary of the Franklin Junior mine, or about half way from Hancock to Calumet. Through the acquisition of new territory, shafts Nos. 2, 6 and 8 can be sunk to practically unlimited depth.

The mine was opened 1848, on the Quincy amygdaloid, a bed lying some distance west of the Pewabic, but the Quincy bed was abandoned 1856, when the Pewabic amygdaloid was opened. There is a footwall branch, known as the Pewabic East lode, underlying and parallel with the

main bed, which occasionally yields good returns. The so-called West lode, about 300' west of the Pewabic bed, has been opened by shafts Nos. 4 and 7 through crosscuts on the 30th, 39th, 40th, 44th and 49th levels, and considerable stamp rock has been stoped therefrom. About 150' west of the West lode is another amygdaloidal bed averaging about 40' in width and carrying more or less copper, which probably may prove workable at some future time. About 1,000' west of the Pewabic bed is the Hancock amygdaloid, which is narrow but fairly mineralized, and which yielded an average of 21 lbs. fine copper per ton, after reasonable selection, when worked in the old Hancock mine, this figure being materially above the present average return from the Pewabic bed.

The Pewabic amygdaloidal bed, on which all shafts are sunk, has a strike of about N. 30° E., with an average dip of 52 to 54° at surface, flattening in the lowest workings at depth of more than a mile to approximately 37° 30', the shafts following the dip of the bed on catenary curves. The Pewabic averages about 20' in width in the upper workings, but is materially narrower at the bottom. The lower workings show decreased copper values with much less heavy copper than above, but the ore is more uniform in value. Part of the decrease in copper returns is due to mining rock that formerly would have been left as worthless and practically the entire Pewabic bed is now mined. There are copper courses, or shoots, that rake to the north with depth.

The Pewabic bed has good walls and the mine requires comparatively little timbering. Dry-walls are built of waste rock, in wide stopes, saving the expense of hoisting waste and also the cost of timber. Shafts are sunk mainly in the footwall. The Pewabic rock now runs 15 to 17 lbs. fine copper per ton, with some silver values. Previous to about 1890, about 40% of the copper was secured in masses. In 1912 the proportion of mass copper was about 15%. The southernmost drifts of the Quincy are about 3,000' below mean water datum of Portage lake, while the northernmost workings at No. 8 shaft are fully 2 miles from the southern breasts.

New work totaled 27,340' in 1915, and average about 6 miles yearly, the mine having over 100 miles of workings. Fire doors have been installed and every precaution is taken against fire. Miners are carried to and from work in man cars holding 30 men each, and hoisting cables are inspected frequently, with every care taken to prevent accidents.

The electric underground traction plant was installed by the General Electric Co., tram lines averaging about 1,800' each in length with gradients of 1.5% towards the shafts. The equipment includes 20 electric locomotives, each hauling 4 or 5 three-ton rock cars at a speed of 6 to 8 miles per hour, 1 man caring for each train. Tram cars are unloaded into 500-ton storage bins, built on the hanging-wall side of the shafts. This system of storage obviates the loss of time by either the tram lines or skips, and adds about 25% to the hoisting capacity of the mine, the property being equipped with hoisting and rockhouse capacity for a production of over 4,000 tons daily. About 160 rock drills are used in sinking, drifting and stoping, and extensive use is made of the diamond drill for exploratory and preliminary development work.

The Quincy has been much troubled by air blasts, violent disturbances brought about by the settling of superincumbent rock in the scores of miles of worked-out openings, causing violent compression of the air elsewhere throughout the mine. The most serious disturbances from air blasts, which are practically artificial earthquakes, felt for only a few miles distance upon surface, were experienced in Feb., 1906, and March, 1914, and there seems reason to fear that these troubles will prove intermittently continuous for the balance of the mine's life. The air blasts, while unpleasant, have caused more alarm than damage.

Owing to the absorption of adjoining mines, the Quincy shafts are numbered irregularly and are described hereinafter in order of occurrence, from south to north, rather than in order by number.

No. 7 shaft: the southernmost, planned and sunk by John L. Harris,

leaves surface at an angle of 53° and is bottomed at an angle of 37° 30'. The shaft was sunk 4,000', in 18 months, through very refractory rock, this speed being rendered possible by sinking and raising in 5 sections simultaneously. The shaft is bottomed at the 71st level, at a depth of about 5,500',

No. 7 shaft has a steel shaft rock house, with 750-ton bins, a steam hammer and two 24x36" crushers.

No. 7 shaft has an 8,000-h. p. Allis Chalmers Corliss hoist, with 52x84" cylinders and winding drums 28' in diameter by 11' 9" face, carrying 8,000' of 1½" steel cable, the main shaft weighing 120,000 lbs. This hoist can raise 6-ton skips from a depth of 1½ miles at a speed of 3,000' per minute, hoisting being limited to this rate by an automatic cutoff which also prevents overwinding. Starting a load of 6 tons from a depth of more than a mile, the hoist, if untouched, will check without damage after raising the skip only a few feet higher than the appointed place in the shaft house. There is a 1,300-gal. bailer in addition to skips.

No. 4 shaft is closed down.

No. 2 shaft: 585' next north of No. 4, is below the 75th level. Equipment includes a 1,300-gal. bailer for raising water and 30 to 40 power drills are operated normally.

No. 2 shaft has a shaft rock house, built 1908, by the American Bridge Co. Stamp rock from the shaft is dumped onto grizzlies, with wide bars, smaller material falling into circular bins, whence it passes by gravity to the crushers and thence into the main rock house bin. The smaller mass copper passes through the grizzly bars, is picked out by workmen and dropped into a chute carrying it to a steam hammer, there also being a chute for waste rock. The grizzlies allow large pieces of rock to fall into a bin of reinforced concrete in front of the steam hammer, where broken and sent to the main rock house bin through a chute, while mass copper is dropped into a steel tube leading to a circular steel bin, which loads into railroad cars through chutes with pneumatic gates.

No. 2 shaft has a special crushing plant for waste rock, between the collar of the shaft and the rock house. Poor rock is dumped into a circular bin and drawn by gravity to a crusher, going thence to circular storage bins, from which it is drawn off into wagons or railroad cars for use in railroad ballasting road building and concrete work. There are similar crushing plants at the other main shafts, except No. 7.

The surface equipment at No. 2 shaft is very heavy, being practically a duplicate of that at No. 7, including a powerful hoist and two 60-drill cross-compound 2-stage Corliss air compressors.

No. 6 shaft: 1,928' north of No. 2 and only 200' south of the Franklin line, is below the 73rd level. Equipment includes an Allis-Chalmers duplex hoist, with a 22' 6" straight-face drum, raising 8-ton skips; a 1,300-gal. bailer, a centrifugal feed-water heater being attached to one cylinder of the hoist, and a 100-drill 2-stage compound air compressor. The boiler house has four 250-h. p. Wickes water-tube vertical boilers, nine 100-h. p. locomotive firebox boilers, and a powerful fire pump.

The Franklin mine lies next north of No. 6. The Quincy bought the old Franklin mine, 160 acres, for \$170,000, taking possession Dec., 1908, and closing the mine immediately. It is doubtful if the old shafts ever will be used by the Quincy.

No. 8 shaft: the Mesnard, 4,168' north of No. 6, is at the 64th level. Levels in this shaft were opened at 135' intervals and former numbering made the 24th level of No. 8 correspond with the 42d level of No. 6. This lode was poor in the upper levels, but the lower workings, while by no means up to the Quincy average of some years ago in either quantity or quality of ore developed, show a bed wider and better mineralized than above, and the ground is of very satisfactory and profitable average, the improvement that began on the 10th level being very marked below the 20th level. The present average of the lode at the Mesnard shaft is nearly or quite up to the present average of the older workings, the 2,000' level showing a marked improvement above the general average for the Mes-

nard workings. This shaft is connected with the workings to the south on all levels, which at this depth are at 200' intervals, from the 41st, which was the first to pass under the old Franklin mine, to the 63rd inclusive. Production, begun 1907 from this shaft, was 1,600 tons daily. The power house at No. 8 has a Nordberg 32x72" duplex-cylinder engine, with double-conical drum, of 12' 6" minimum and 18' 6" maximum diam., good for 6,000' depth, and a 65-drill Nordberg 2-stage cross-compound air compressor. The boiler room has ten 250-h. p. Parker and Burt boilers. There is a large changing house of reinforced concrete at this shaft, and many well-built houses for employees.

No. 9 shaft: 2,600' north of No. 8 is the old 100' Pontiac shaft, given a concrete collar and cut down to 3-compartment size. The shaft is 2,900' deep, and at 2,600' cuts a drift from No. 8, giving ventilation; it is not in operation.

To the north of the Pontiac shaft there is a long stretch of ground, bought of the Arcadian Copper Co. and St. Mary's Mineral Land Co., carrying the extension of the Pewabic bed and available for later development.

The surface plant of the Quincy is very complete. Miscellaneous buildings at the mine include a large warehouse, general office, several hundred dwellings at the mine location and a considerable number of houses at the mills.

The Quincy has extensive holdings of land, in and adjoining the city of Hancock, and portions have been platted, from time to time, and sold at good prices.

Water for boilers and potable use at the mine location is taken from Portage lake, the pumps forcing water for a mile against a static head of 640'.

The company's private rail line, known as the Quincy & Torch Lake, built 1890, is 6 miles long, touching at all shafts and shops at the mine and at the boiler house, wharves and coal sheds at the mill. This line is connected with the Mineral Range, Hancock & Calumet and Copper Range railways. Equipment includes several locomotives, freight cars and nearly 150 hopper cars for rock, the latter having automatic couplers and air brakes.

Stamp mills: at Mason, on Torch lake, 6 miles from the mine, have 8 stamps, with combined capacity of about 5,500 tons daily, the stamps giving an average duty of about 700 tons. Two 36"x8' Hardinge ball mills were added in 1916. The results secured at the Quincy mills reflect great credit upon Superintendent Shields.

No. 1 mill, of wood, has 5 Allis-Chalmers 2-way stamps, taking steam at 100 lbs. pressure. There is an Allis-Chalmers Huntington mill for regrinding raggings, and the dressing machinery includes 92 Hodge jigs, and 32 Wilfley tables.

No. 2 mill, 630' north of No. 1, has 3 Allis-Chalmers heads, each set on foundations of heavy timbers and concrete, surmounted by a bottom plate of 22 tons, a middle plate of 18 tons and a top plate of 18 tons, all of solid iron castings, above which are the mortar boxes of the stamps. The stamps have 1" revolving screens for the mortar boxes, with hydraulic discharges, as have the launders leading from the mortars, these yielding about 60% of the copper secured. Finishing jigs and slime tables have been replaced by 24 Wilfley tables, 8 for each stamp, assisted by 3 Standard concentrators. Each stamp has 12 rough jigs, 6 Wilfleys for finishing and 2 Wilfleys and 1 Standard table for slimes. There is a settler from which slimes are taken to the Wilfley tables. Regrinding is done by a Trent Chilean mill, with 3 jigs and 3 Wilfleys as auxiliaries. By the adoption of hydraulic discharges and other improvements the capacity of the stamp-heads has been increased about 25%, while changes in the wash have given an increased capacity of 30%, with labor costs reduced 25% and loss in tailings cut down 40 to 50%. About 35% of the present product of the mill is No. 3 grade mineral, carrying very fine copper.

The mill power house at No. 2 mill, has four 250-h. p. Wickes vertical water-tube boilers. There is an electric light plant.

The mill and pump house has a 20,000,000-gal. centrifugal pump, and a 20,000,000-gal. Allis-Chalmers vertical triple-expansion pump, and the old pump house has 3 pumps with combined capacity of 21,000,000 gal. daily. Water is taken from a 7x7' 6" tunnel, driven 100' under the bed of the lake. A 6x6' 6" tunnel 440' long, connecting mills, boiler houses and pump houses, carries both water and steam pipes.

The tailings at the mills are very extensive, including millions of tons of stamp sand, and various experiments on reconcentration have been conducted by different interests at intervals since 1902. The companies that have attacked this proposition have bankrupted themselves with monotonous regularity, notwithstanding which, the successful results being secured at the regrinding mills of the Calumet & Hecla offer promise that the Quincy sands also may be retreated profitably at some future time.

Smelter: blown in Dec. 1, 1898, is at Ripley, on the shore of Portage lake, opposite Houghton, just east of Hancock and only a half mile from the mine.

One building has four 40-ton reverberatory furnaces, and a second building has 60-ton and 120-ton reverberatories, the latter having an automatic casting machine. On arriving at the reverberatory building the trucks carrying mineral are lifted by electric cranes and contents dumped into the furnaces, which are top-charged. An overhead trolley in the main building permits handling large bars and cakes, and a trolley dipping system is used for casting. Slags are trammed, in 3,000-lb. pots, to a 30' hydraulic elevator which raises the ladles and dumps their contents over the end of a trestle. The cupola building has 1 blast furnace only, for reverberatory slags. A briquetting plant has 2 boiler-iron retorts for briquetting low-grade mineral before smelting. Miscellaneous buildings at the smelter include an engine house, casting house, cooper shop, office, laboratory, machine shop, 50x100' warehouse, and a coal shed.

Production has remained nearly constant for several years but was seriously lessened by the labor strike of 1913. Silver production averages about 100,000 oz. yearly.

Recent Production:

	Tons	Lbs. Mineral Produced	Ref. Copper Lbs.	Lbs. Cu. per Ton	Cost (a) per Lb.	Sell. Price
1915	1,269,000	34,251,765	22,054,813	17.38	9.42c	18.01c
1914		22,612,460	15,356,380		11.51c	13.29c
1913	804,645	18,161,575	12,184,128	15.11	13.65c	15.59c
1912	1,309,258	30,040,360	20,634,800	15.76	11.09c	16.24c
1911	1,382,524	32,550,440	22,252,943	16.1	10.17c	12.72c

(a) Includes mining expense, smelting, transportation, etc., and taxes paid in Michigan.

Management is entitled to credit for following unswervingly a policy of expansion that is necessary to the successful operation of any large industrial enterprise. Finlay in 1911 estimated a life of 7 years and a further production of but 200,000,000 lbs. of copper. Additional acreage purchased since that year makes the probable production 1,000,000,000 lbs. of copper and a life of 50 years. The company has the longest record of continuous annual dividend payments of any American copper mine and bids fair to continue disbursing large profits for at least another generation or two.

QUINTERA MINING CO., LTD.

MEXICO

London secretary and Office: J. G. Mills, 8 Crosby Square, London, E. C., Eng. Paris office: 11 rue Boudreau, Paris, IXe, France. Mine at Aduana, Alamos, Sonora, Mex. Jacques F. Kulp, chairman; A. Dubois, S. Einhorn and Ernest May, directors.

Inc. May 4, 1888, in Great Britain. Cap., £52,000, increased Nov. 18, 1901, from £40,000; shares £1 par, fully paid; all issued.

Annual meeting in June. Shares listed on the Paris coulisse. Accounts for calendar year 1911, submitted July 8, 1912, showed £966 loss; total deficit, Jan. 1, 1913, £17,559; reserve fund, £26,623. Operations suspended since 1911, owing to Mexican revolutions.

Dividends: 25% in 1900; 22.5% in 1901; 17.5% in 1902; 17.5% in 1903; 7.5% in 1905; 11.25% in 1906, and 5%, or 2s. 3d. in 1907; none since.

Property: 26 claims, 134 hectares, in the Alamos district, Sonora, and in the Fuerte district, state of Sinaloa, Mex., with ranches of about 7,400 acres. The mining property consists of 4 groups, the Quintra and Libertad, Azulaques and Constanacia, Minas Nuevas, Cotera and Porvenir, and the Rosario group. Only the Quintra has been worked by the present owners.

Some 40 or 50 years ago a Frenchman owned this and the Rosario, a lead-silver property on Rosario mountain, where the states of Sonora, Sinaloa and Chihuahua touch. He had worked the Rosario extensively, the ore being a lead carbonate containing much silver, and finally went to Paris, mortgaged both properties to the Egyptian-Paris Bank for \$250,000 and skipped out to South America. He has never been heard from since. After the bank acquired the properties, for many years they sent engineers out each year to examine and report. Finally, about 30 years ago, after several had reported favorably upon the Quintra, work was commenced.

The vein is strong on the surface, 18 to 20' wide, and has granite on the east and dark andesite on the west. It showed low silver values on the surface and 2 to 3% lead. With depth the value of the ore improved and under efficient management, the mine paid \$50,000 to \$100,000 yearly in dividends, notwithstanding that the general mill management was expensive.

The ore is 20 to 30' wide in the deeper levels and assayed 40 to 50 oz. in silver, the lead being replaced by 8 to 9% copper ore as depth increased. This copper ore was sorted out and smelted on the ground using mesquite charcoal at a cost of one-half cent per pound. The mine is on a hill 700' above the mill, and an aerial tram was put in to bring the ore to the mill. A shaft 500' deep was sunk at the north end of the property, from which a drift was driven 1,300' south and a winze sunk, ultimately to a depth of 1,000' below the surface. All ore was hoisted twice and trammed 1,300', when an adit from the mill 2,000 to 2,500' long would have tapped the winze 200' below the long drift, and the ore could have been trammed in cars direct to the mill. Even when the new shaft was sunk from the surface, this was done near the old one, instead of raising from the winze on the 500' level. At 1,500', the vein split. One branch was followed to the east in the granite; it contains no ore of value. A few hundred feet north of the shaft the main vein enters the granite on both sides and becomes barren. At the south end of the property the ore-shoot appears to be dipping into the Promontorio. Property considered valuable, but in a remote section that is without even wagon roads, and mine is impossible to operate until peace is restored to the country.

In 1916, the secretary of the company writes that in consequence of the unsettled state of affairs in Mexico, the property is shut down indefinitely.

QUO VADIS GOLD MINING CO.

NEVADA

Las Vegas, Nev. Officers: Peter Buol, pres.; C. C. Ronnow, v. p.; Ed. W. Clark, sec.-treas.; above with F. A. Clark and J. B. Anderson, directors. Inc. Dec., 1915, in Nevada.

Property: the Quo Vadis mine at Las Vegas, Clark Co., Nev., said to show rich stringers of free milling gold ore in latite and andesite formation. Developed by 300' tunnel and a shallow shaft, which will eventually be sunk to 500'.

RADIUM COMPANY OF AMERICA.

COLORADO

Property: at Tidwell, 15 miles from Green river in Paradox Valley

district, Colo., comprises a number of claims covering carnotite bearing sandstones cut by quartz stringers. Carload shipments carry 2.24% uranium oxide and 3.87% vanadic acid. Described in U. S. Geol. Survey Bull. 530-K p. 163.

RADIUM MINES CO.**ARIZONA**

W. H. Mercer, mgr., Globe, Ariz. Property: 60 claims, 4 miles north of the Old Dominion mine, Globe, said to show vanadium ore in a vein or mineralized fault zone in diabase. The ore shows galena associated with iron oxide and manganese; vanadanite occurs as crystalline incrustations around other minerals, but has not yet been found in commercial quantities.

RAINBOW LODE DEVELOPMENT CO.**MONTANA**

Office: 1400 Alworth Bldg., Duluth, Minn. Mine office: 14 West Granite St, Butte, Mont. Officers: Edward C. Congdon, pres.; Chester A. Congdon, v.-p.; Frederic R. Kennedy, sec.-treas.; preceding with Thomas F. Cole, Joseph B. Cotton, directors. John D. Pope, gen. mgr.

Inc. Nov. 9, 1912, in Delaware. Cap., \$1,500,000, increased June 1, 1915, from \$800,000; shares \$10 par; issued \$800,000. Bonds: \$400,000, 5-year convertible 6% due June 1, 1920, convertible into stock at par. Annual meeting, first Tuesday in June.

Property: 10 claims, including the Third Sphinx, Michigander, Moral, Valley Queen, Carn Brea, Sarah, Wedge, Hidden Treasure and Wanda claims, with fractional interest in the Lone Star Claim. The group lies east of the Butte & Superior property and is supposed to carry an extension of the Rainbow lode.

Development: company is sinking a shaft on the Third Sphinx claim which was 1,500' deep in Nov., 1915. Lateral development has been done only on the 600' and 1,000' levels, and consists of crosscuts north from the shaft. The crosscut on the 600' level, showed 375' of leached lode matter. On the 1,000' level a vein that averaged 3% zinc for 8' has been cut.

Company has also acquired control of the Butte & London property under an agreement to deepen the 1,130' shaft of that company 500', cross-cutting on the 1,630' level the entire width of the property to develop the veins at that depth. In return for this it receives 51% of the Greendale Exploration Co.'s stock.

A crosscut, already 1,600' long, is being driven from the 2,000' level of the North Butte mine through the Overman claim. In about 2,000' more it will reach Rainbow Dev. ground and drain the lodes therein, and will thoroughly explore the Rainbow ledge in this tract.

Equipment: at Rainbow shaft includes a 300-h. p. double drum hoist good for 2,500', 2 electric hoists, air compressors, combined capacity of 1,650 cu. ft. per min., one 400 gals. and one 200 gals. pump, blacksmith shop, carpenter shop, change house and office.

Option expired. (Cannot locate this Co. in the field.)

RAINBOW MINE**OREGON**

Operated by U. S. Sm., Ref. & Mng. Co., 55 Congress St., Boston, Mass. Mine at Rye Valley, Baker Co., Ore. Howard S. Lee, mgr.; Frank W. Parker, supt.; Walter W. Duke, Jr., mill supt.

Property: a group covering the Rainbow vein, a brecciated zone 5'-50' wide made of rock fragments cemented by quartz.

Development: 500' shaft, with 1,500' of drifting on vein on 200' level. Operates 15-stamp mill, 100 tons a day with tube mill, Dorr classifier and thickener, Pachuca tanks, Kelly press and Merrill filter. See Min. Res., Oregon, Dec., 1914; Vol. 1, No. 8, p. 220.

RAINBOW MINING CO.**IDAHO**

Control under option to S. Edward Brown of Kellogg until July 25, 1916. Cap., \$1,000,000; shares \$1 par; 800,000 in treasury.

Property: on Little North fork of the Coeur d'Alene river shows quartz vein 10'-25' wide with silver, lead and zinc ore. Development will be by tunnels to cut lode at a depth of 450'.

RAINBOW MINING & MILLING CO., LTD.**IDAHO**

Wallace, Shoshone Co., Idaho. **Officers:** Hon. Herman J. Rossi, pres.; Abe Wyman, v.-p.; Geo. Austin, sec.-treas.-gen. mgr.; preceding with Therrett Towles, Sig Hofslund, and A. E. Bronson, directors.

Inc. June, 1907, in Idaho. **Cap.**, \$300,000, increased 1913 to \$500,000; shares 25 cts. par, assessable; issued \$250,000. Annual meeting, June 1st.

Property: 19 claims, 7 patented, 360 acres, in 2 groups. The original group of 15 claims, 3 miles west of Wallace, in the Evolution district, near the Grey Copper mine, has St. Regis and Burke quartzite similar to the Coeur d'Alene region, cut by a 1 to 12' fissure vein running N. 15° E. and traceable 1,800'. This vein carries grey copper ore with iron and quartz gangue, with an average of about 2 to 3% copper and 8 to 10 oz. silver per ton. Developed by 3 tunnels 110', 80', and 1,400' long respectively.

The second group, of 4 claims, bought 1910, is about 3 miles from the Handspike mine, and 15 miles from a railway, at the mouth of Bootjack creek, a tributary of the North fork of the Coeur d'Alene river, in Secs. 23 and 24, T. 31 N., R. 1 W., in an unorganized district. This property shows a vein of 12' estimated average width, traceable 6,000', carrying lead and copper ore, associated with iron carbonates, in a quartz gangue. Development to depth of 800' by several tunnels from 40-1,400' long, a total of 2,700' of underground workings.

Improvements include 5 buildings and an air compressor on No. 2 group. Property is three-fourths mile from O. W. R. & N. R. R. Company is developing steadily.

RAINBOW MOUNTAIN MINING CO.**ARIZONA**

Mine at Chloride, Ariz. **Officers:** C. E. Walker, pres.; G. E. McCarn, v.p.; B. F. Williams, sec.; H. L. McCarn, treas. and gen. mgr.

Inc. 1907, in Arizona. **Cap.**, \$1,200,000; shares \$1 par.

Property: 11 claims, unpatented, on Rainbow Mt., Wallapai mining district, Mohave Co. Claims said to show a vertical vein containing gold-silver-lead-ore opened by a 440' shaft in 1915. Much water was encountered at this depth. **Development:** work totals 4,000' including 780' of tunnels. Company claims to have blocked out 1,500 tons of ore, averaging \$20 in gold, 10 oz. silver and 6% lead. **Equipment:** includes an 80-h. p. hoist and a 2-mile aerial tram. Shipments have been made at different times to Needles smelter.

RALSTON MINING CO.**NEVADA**

Tonopah, Nev. **Officers:** Chas. E. Perry, pres.; Wm. Foreman, v.p.; T. A. MacDuff, sec.-treas.; J. H. Evans, R. J. Highland, directors.

Inc. July, 1916, in Nevada. **Cap.**, \$1,000,000; shares \$1 par.

Property: the K. C., or Gori McBride group, east of the Halifax and adjoining the East End mine. The property was paid for with 601,000 shares at 3c.

RAMBLER-CARIBOO MINES, LTD.**BRITISH COLUMBIA**

Address: Three Forks, B. C. **Officers:** A. F. McClaine, pres.; Alfred Coolidge, v.-p.-sec.-treas., with Dr. B. W. McPhee, Dr. John Benson, C. L. MacKenzie, Dr. Johnston Armstrong, and Rev. P. F. Hylebos, directors. A. E. Cable, asst. sec.; J. A. McPhee, asst. treas. **Cap.**, \$1,750,000; shares \$1 par; all issued. Listed on Spokane Exchange.

Balance sheet of April 30, 1916, showed total receipts of \$155,964, which included: balance forward \$5,325; ore in transit and at smelter, \$136,233. Disbursements for year ending April 30 were \$140,514, including \$13,384 for development, \$27,294 for mining and \$17,339 for milling expenses. Net earnings for the year 1915 amounted to \$123,500. On April 30, 1916, the company reported a cash on hand of \$16,508 together with 1,000 tons of zinc concentrates averaging 37% zinc and 25 oz. silver per ton, and 8 carloads of lead ore and concentrates at the smelter or in transit.

Dividends: of 1c per share were paid on Oct. 15, Dec. 15, 1915, April 15, 1916; 2c per share June 5, 1916. The company is reported as having paid 22c per share in as many consecutive installments prior to suspension of

dividends in 1903. Total dividends, including June 5, said to be \$472,500; while another report gives total to Oct., 1915, as \$250,000 to \$300,000; "exact records not available."

Property: 5 crown granted claims, at the head of McGuigan Creek, near Three Forks, Slocan mining district, has been operated for many years as a silver-lead-zinc mine and has been extensively developed at depth. On the 14th level a 5,000' crosscut was run, but development there has been disappointing, the orebody evidently not extending that far. Reported in April, 1916, that new orebodies had recently been found on the 7th, 8th, 9th, 10th and 12th levels, the ore carrying a higher percentage of zinc than in the upper levels, with silver content about the same, also "we have been producing about 150 tons each of lead and zinc concentrates and 30 tons of crude lead ore monthly for some time. The crude ore runs from 148 to 165 oz. silver and 50 to 58% lead, while the lead concentrates average from 70 to 100 oz. silver and 32 to 40% lead, and the zinc concentrates run 35 to 37% zinc, and about 25 oz. silver." Development work from May 1, 1915 to April 30, 1916, amounted to 1,360'. Ore reserves estimated as sufficient for 2 years operations.

Company has recently closed a contract with the Kusa Spelter Co. of Dewar, Okla., for its zinc concentrates. Employs 40 to 50 men.

The concentrator was operated 20 hours daily during 1915 and treated 21,000 tons of ore, producing 1,800 tons of concentrates that carried 1,292,644 lbs. lead and 142,066 oz. silver and 630 tons concentrate, yielding 14,689 oz. silver and 472,871 lbs. zinc.

Management is reported as "honest, efficient and extremely conservative" but gives out but little information.

RAMBLER COPPER & PLATINUM CO.

WYOMING

Office: Room 710, 145 La Salle St., Chicago, Ill. **Mine address:** New Albany, Albany Co., Wyo. Frank M. Wootton, pres.; Edw. White, v.-p.; Dorchester Mapes, sec.

Inc. Jan. 21, 1908, in Wyoming, as a merger of the Rambler Mining & Smelting Co., and New Lincoln Copper Co. **Cap.**, \$2,500,000, shares \$1 par; issued, \$2,029,463.

Property leased for 15 years, in 1912, to J. Thielman of Merrill, Wis., who transferred the lease to a new corporation called the Platinum Mining & Milling Co. (which see).

RAMSEY-RUTHERFORD GOLD MINING CO.

ALASKA

Valdez, Alaska. **Inc.** in Sept., 1913. **Property:** 10 miles N. E. of Valdez at an elevation of 3,500'; trail to the mine goes over Valdez glacier, making transportation difficult. **Ore:** free milling gold quartz in fissure veins in graywacke.

Development: at the end of 1914 consisted of a 162' shaft with 500' of workings. **Equipment:** includes several gasoline engines, air compressor, and a 5-stamp mill, which cannot be operated during the winter. In 1915 company employed 20 men and was reported to have considerable ore blocked out. See U. S. G. S. Bull. 622, pp. 159-161.

RAMSHORN MINE.

IDAHO

At Bay Horse, Custer Co., Idaho. Presumably belonging to Ramshorn Mining Co. Is the largest and most extensively dry-silver ore mine in Idaho. Shows well-defined fissure veins in black altered slate of igneous material. Vein varies from a few inches to several feet in width and carries quartz and spathic iron with ore shoots containing streaks and spots of tetrahedrite carrying high copper and silver values.

Examined 1913 by Frank Leland and said to be under-option to him.

RANDOLPH-GEMMILL DEVELOPMENT CO.

ARIZONA

Addresses: Crown King, Ariz., and Prescott, Ariz. **Officers:** M. P. Randolph, pres.; F. S. Viele, v. p.; David B. Gemmill, engr.

Property: the remodeled Crown King mill, in which 70-80 tons per day of the old tails from the mill are retreated. These tails are complex, carrying 0.3 oz. gold, 4½ oz. silver, 11% zinc, 0.8% copper, 10% iron,

53% insoluble; they are tailed, and treated by oil flotation making 4 to 1 concentrate. The bulk concentrate is retreated making 9 tons zinc and 16 tons iron concentrate from each 100 tons tails. Zinc product carries 45% zinc, 10% iron, 4½% copper, 13 oz. silver and 0.35 oz. gold; the iron product carries 0.8 oz. gold, 12 oz. silver, 3% copper, 15% zinc, 18% iron and 25% silica. These products yield a net profit of \$2.50 to \$3 per ton of tails treated after paying \$1.50 per ton royalty. The company plans a custom mill at Crown King.

R. A. P. SYNDICATE**ONTARIO**

E. M. Richardson and W. B. Albright of the Sherwin-Williams Paint Co., 52 William St., New York, and John Papassimakes, of Boston Creek, owners.

Property: 21 claims on Boston Creek, 51 miles by rail north of Cobalt. The district is a new one, discovered 1915, and has 2 other operating companies, the Miller Independence and Crown Reserve (McCrea claim).

Development: 180' of drifting on the 100' level shows 52' ore, including 20' high-grade. A 167' shaft cut 12' streak of high-grade.

RAPP MINING DEVELOPMENT & PROSPECTING CO. ONTARIO

Address: Boston Creek, via Krugersdorf on the Ont. Northern Ry.

Property: the original "find" at Boston Creek shows a gold-bearing quartz vein on which shaft has been sunk. **Equipment:** includes hoist, compressor, etc.

RARE METALS CO.**COLORADO**

Nelson Franklin, mgr., Rollinsville, via Nederland, Colo. Is a subsidiary of the Vindicator Consolidated Gold Mining Co. of Cripple Creek. Owns and operates a 75-ton custom tungsten mill at Rollinsville on the D. & S. L. R. R., 4 miles from Nederland, Gilpin Co., Colo.

RARITAN COPPER WORKS.**NEW JERSEY**

Owned by International Smelting & Refining Co., at Perth Amboy, N. J. A. C. Clark, supt.

RATTLESNAKE JACK MINING & MILLING CO. SOUTH DAKOTA

Galena, Lawrence Co., S. D. Owned by C. B. Harris of Galena and Wm. Sansone of New York.

Property: several claims, including the Rattlesnake Jack mine near Galena, said to show gold ore assaying \$15 to \$20 per ton. **Development:** 200' shaft and tunnels. A 10-stamp mill and cyanide plant, completed in Aug., 1915, ran for several months, when a shutdown was made to build a tailing dam; resumed operations in Jan., 1916, only to close down in April, due to a disagreement between the owners. The mine is being worked pending settlement of differences.

Reported that 1,800 tons of ore treated in February, 1916, yielded \$9,800 in gold, with a profit of \$5,200. Daily tonnage treated averaged 60 tons when the mill was running.

RAVEN & BEACON HILL GOLD MINING CO.**COLORADO**

Office: 39 Exchange Bank Bldg., Colorado Springs. **Officers:** W. W. Price, pres.; John T. Hawkins, v. p.; W. B. Price, sec.

Cap., \$170,000; shares 10c; in treasury Jan. 1, 1916, 328,000 shares stock and \$5,244 in cash. Listed on Colorado Springs Exchange.

Property: 17 acres of the Arequa townsite and 7 acres of the Cameron townsite, at Cripple Creek; crosscut by the Roosevelt Tunnel. Developed by 554' shaft. The mine has been blocked out for leasing; the Elkton Cons. M. & M. Co. operates Blocks 1 and 2 through the Elkton main shaft and at last accounts was shipping steadily ore of good average milling grade.

Gross production to date, \$85,691; none in 1915.

RAVEN COPPER CO.**MONTANA**

Property sold, Aug., 1915, to the Anaconda Copper Co., for \$65,000, and company is in process of liquidation. Fully described in Vol. XI., Copper Handbook.

RAWLEY MINING CO.**COLORADO**

Office: 25 Madison Ave., New York. Chas. E. Beckwith, mine supt., Bonanza, Saguache Co., Colo. **Officers:** A. Fillmore Hyde, pres.; Eugene

G. Foster, v. p.; E. V. Cox, sec.-treas.; preceding with John L. Cox, W. Hodges, Elmer Z. Burns and H. O. Hall, directors; Simons & Burns, cons. engr.

Inc. 1901 in Colorado. **Cap.**, \$2,500,000; shares \$1 par, non-assessable; 1,903,679 shares outstanding. Annual meeting third Monday in January.

Property: 64 claims, 400 acres, shows fissure veins in andesite, running N.-S., nearly vertical and of 5 to 6' width; they carry argentiferous galena, bornite and chalcopryrite, in a heavy sulphide smelting ore on the 12th level. The mine has 13,843' of workings, estimated to show 97,000 tons concentrating and 225,250 tons smelting ore. The 6,235' tunnel cuts vein on 1,200' level.

Equipment: includes an 8-drill Rand air compressor, steam power with 50-h. p. at the mine and 100-h. p. at the mill, fuel being wood. There are 24 buildings and a 100-ton mill. Property still in the development stage. Idle 1915-16.

RAY-ARIZONA COPPER CO.

ARIZONA

P. T. McGrath, pres. and mgr., Kelvin, Ariz. **Property:** 42 claims, on the south side of the Gila river, opposite Kelvin; shows schists cut by igneous rocks, with impregnations and veins carrying copper ore. **Development:** by shaft and churn drilling. F. L. Underwood is reported to have financed the company under an option on 51% of the stock for \$250,000.

Equipped with Leschen tramway. Lessees shipped a car of copper ore early in 1916 to Hayden smelter.

RAY CENTRAL COPPER MINING CO.

ARIZONA

Company conveyed by direct deed all assets to Ray Consolidated Copper Co. in June, 1912, but has not yet been legally dissolved.

RAY CONSOLIDATED COPPER CO.

ARIZONA

Office: 25 Broad St., New York. **Mine office:** Louis S. Cates, gen. mgr., Ray, Pinal Co., Ariz. **Mill office:** Hayden, Gila Co., Ariz. **Officers:** Sherwood Aldrich, pres.; D. C. Jackling, v. p. and managing director; Chas. Hayden, second v. p.; preceding, with Chas. M. MacNeill, Seeley W. Mudd and W. Hinckle Smith, executive committee; Eugene P. Shove, sec.-treas.; preceding officers, Spencer Penrose and A. Chester Beatty, directors. W. S. Boyd, supt. of mines; D. D. Moffatt, supt. of mills; Ed. Hiatt, mg. engr.

Inc. May 11, 1907, in Maine. **Cap.**, \$16,000,000; shares \$10 par; \$15,712,790 issued, Dec. 31, 1915. Original capital \$6,000,000, increased to \$8,000,000 in 1908, increased 1909 to \$10,000,000, increased May, 1910, to \$14,000,000. The increase to \$16,000,000, March, 1912, was to provide shares for the absorption of the Ray Central Copper Mining Co., giving 1 share of Ray Cons. for 8 of Ray Central. Company absorbed the Gila Copper Co., through exchange of stock, giving 1 share for 3. Company owns entire capital stock of the Ray & Gila Valley Railroad Co., cap. \$1,095,000. Bankers' Trust Co., New York, and Boston Safe Deposit & Trust Co., Boston, registrars; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents. Fiscal year, formerly ending June 30, has been changed to end with the calendar year. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, formerly held 4th Tuesday in September, has been changed to 3rd Friday in April.

RAY CONSOLIDATED COPPER COMPANY

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK

87 Milk Street, BOSTON

Comparative General Balance Sheet; Ray Cons. Copper Co. and Ray & Gila Valley R. R. Co.

Assets:						
	Property	Const. & Equip.	Devel.	Metals in Transit	Current Assets	Total
1915	\$8,917,573	\$7,373,768	\$4,076,250	\$3,823,834	\$1,253,492	\$25,444,917
1914	8,917,407	6,961,660	4,024,120	1,753,695	912,892	22,569,774

Liabilities:						
	Capital Stock	Bonds	Current	Reserves, Ins., Bond Redemp.	Surplus	Total
1915	\$15,712,790	\$160,500	\$709,132	\$974,078	\$7,888,417	\$25,444,917
1914	14,549,290	2,708,000	316,911	905,217	4,090,356	22,569,774

The bonds were called for redemption Jan. 1, 1916, outstanding March 16, \$30,000. 1915 surplus includes \$1,451,835 from securities sold; earned surplus was \$6,436,581; 1914 surplus from sale of securities, \$308,424; earned surplus, \$3,781,932.

Comparative Income Account, Ray Cons. Copper Co.						
	Operating Revenue	Operating Expenses	Net Optg. Profit	Total Income	Total Deduct's	Balance Dec. 31
1915	\$10,498,962	\$6,125,590	\$4,373,371	\$4,760,684	\$4,760,684	\$6,434,704
1914	7,597,724	5,281,484	2,316,240	2,655,163	2,655,163	3,776,368

Net earnings for 1st 6 months, 1916, approximately \$5,273,000.

Earnings and Dividends on stock per share:						
	1916	1915	1914	1913	1912	1911
Earned		\$2.73	\$1.29	\$1.49	\$1.33	\$0.25
Paid	*\$1.00	1.25	0.75	1.125	nil	nil

Present rate, \$2 per share per annum, payable quarterly, March 31, etc., at Guaranty Trust Co., New York.

A sinking fund of 10 cts. per ton of dry ore treated was in effect from 1914 to 1916, increased to 20 cts. a ton after 1916. It seems improbable it will ever be needed.

Property: 126 patented claims, 2,143 acres of mining claims, at Ray, 130 acres at Ray Junction for railroad purposes; and a tract of 4,324 acres in Gila and Pinal counties, at Hayden and 21 miles from the mines, for milling and power plant and tailing disposal; 536.5 acres of this are leased to the A. S. & R. Co. for its smelter.

About 580 acres of the Ray property has been proven to be mineralized, and about 183 acres have been developed, with a certainty that more or less of the additional mineral ground will be found to carry workable values.

Geology: the property shows a flat orebody 150 to 400' thick, 1,000 to 3,000' wide and about 9,000' long, through the property. This zone consists essentially of a highly metamorphosed iron-stained granite, whose borders and tongues are also mineralized and cut by diabase dikes. A fault east of the orebody brings the orebody against quartzite and limestone, while unaltered schist is found to the west. The silicified and whitened rock is leached to a considerable depth, the oxidized zone being succeeded by impregnations and seams of chalcocite and pyrite. The ore deposit is almost identical with that of Miami, and genetically similar to those at Bingham, Ely and Morenci. Oxidized copper ores are found near surface, though in much of the ground the top of the belt is leached to depths varying from 30 to 400' and averaging 225', this leached zone being succeeded by ore carrying copper sulphides, greatly enriched by the secondary redeposition of chalcocite, latter constituting the main ore value. At the bottom of the orebody the transition from the ore to rock mineralized with primary sulphides takes place in a few feet. This primary mineralization averages about one-half of 1% copper, whereas an average sample of ore on the 50' level gave 2.4% copper, 3.4% iron, 2.6% sulphur and 90.3% insoluble matter.

*First six months.

The many drill holes bored have shown an average capping of 240' depth, succeeded by an average of 118' thickness of ore, on the Ray proper, with 315' of capping and 171' thickness of ore on the Gila ground. The Ray mine has been developed by both underground workings and extensive churn-drill borings. Six churn drills have been employed, averaging about 50' each daily, boring 340 holes to an average depth of nearly 400' each, with a total of 140,000' of drilling, holes being bored checkerboard fashion, in 200' squares.

Development: by shafts Nos. 1 and 2 about 4,000' apart, and No. 3, the Ray Central shaft, near No. 1. There are many less important workings. The ore supply now comes almost equally from the No. 1 and the No. 2 mines. The No. 3 mine furnishes a smaller tonnage of high-grade ore. No. 1 shaft is 400' deep and has 4 levels at 171' and each succeeding 100' in depth. The shafts are connected by a drift, on the second level, which is run for more than 1 mile, practically through commercial ore. By the side of each shaft is an incline shaft, with a series of stairs used by the men and a hauling way used for the handling of material, the main shafts being used solely for ore extraction. The greatest depth from which ore is to be hoisted will be about 300' for years to come, and the greater part of the tonnage will be taken from the 170' level and above for some years. The mine is operated on the Cates shrinkage-stopping system, the stopes being carried up 15' wide with 10' pillars. When the stopping is completed and ready for drawing the pillars crush and come down with the broken ore. This method gives a 92% recovery of the ore blocked out. The ore is trammed to 600-ton underground loading bins on each level of each shaft, and drawn therefrom into 12-ton skips through gates operated pneumatically. Ore is hauled underground in trains of 5-ton cars, drawn by 10-ton electric locomotives through the 4,000' 8x14' double-track main haulage tunnel, with which all shafts and working levels are connected. Three cars are dumped at a time into each ore pocket, by a revolving tippie.

The Ray mine, of which the Ray Central or Globe-Isabella mine is now an integral part, has been developed for a maximum width of 3,500' and length of 8,000'. Total underground workings Jan. 1, 1916, amounted to approximately 100 miles, of which mining operations have destroyed about 45 miles. In 1915 new work totaled 45,292', compared with 75,261' in 1914.

Ore reserves: calculated to Dec. 31, 1914, amounted to 74,765,789 tons, averaging 2.214% copper and underlying an area of 205.2 acres. This is exclusive of 7,061,821 tons, averaging 1.74% copper mined from inception to the end of 1914. The higher grade orebody developed by No. 3 shaft, contained Jan. 1, 1914 approximately 540,000 tons of ore averaging slightly over 5% copper. Ore reserves, Jan. 1, 1916, 71,911,475 tons averaging 2.235% copper. This tonnage ensures a life of about 82 years on basis of present production.

The mine is operated electrically throughout, taking current over a transmission line from Hayden to Ray. There is a crushing plant at the mine, reducing ores to about 1" size before shipping to the mill.

The company owns and operates its own railway, known as the Ray & Gila Valley, from Ray to Kelvin, the trains continuing over the tracks of the Arizona railway (S. P. R. R.) to Hayden Junction and thence over a branch line, belonging to the Ray & Gila Valley to the Hayden concentrator. The line between Ray and Kelvin is standard gauge and is operated as a common carrier. It has 80-lb. rails, Mogul locomotives and 60 ton steel ore cars. The company has a very favorable freight contract with the Phoenix & Eastern for the transportation of ores partially over that line.

The old concentrator at Kelvin, 6 miles from the mine, inherited from the English owners, was enlarged in 1907, to 300 tons daily capacity and extensive experiments were made until Aug., 1909, these resulting in the concentration of ores 17 into 1, with a 70% recovery of assay values.

Concentrator: occupies a 4,000-acre site at Hayden, about 16 miles from the mine. In its essential features it is a duplicate of the Garfield mill of the Utah Copper Co.

The mill, of 8,000 tons daily capacity, has eight 1,000-ton sections, and is so designed that it may be enlarged, on the unit plan. The crushing department has 16 sets of 42x16" rolls, and 24 six-foot Garfield Chilean mills. Sizing is done by 48 impact screens, and Janney classifiers, and concentration is effected by Garfield roughing tables, Harz single compartment jigs, Wilfley tables, and Isbell vanners. Water, derived from the Gila river and the adjacent hills, is sent to a 4,000,000-gal. reservoir at the mill site through a 30" pipe, by pumps having a capacity of 7,500 gals. per minute.

The mill started in March, 1911, treating an average of 850 tons of ore daily. The concentrates are well adapted to smelting, as regards sulphur and iron contents, only a small amount of limestone being required for fluxing. Concentrates are treated in the Hayden smelter, owned by the American Smelting & Refining Co.

The power plant at the mill site, of 10,000-h. p. capacity, supplies electric current for the operation of the entire property. The plant has water-tube boilers, burning oil and coal, and running four 2,500-h. p. Allis-Chalmers triple-expansion engines, direct-connected to four 1,750-k. w. electric generators.

	Production:			Cost per Ton		% Cu.		Lbs. Cu. in Rec. per T. Ore	Net Prod. Lbs. Cu.	Cost per Lb.	Sell. Cts.
	Tons Treated	Mine Cts.	Mill Cts.	Total	% Cu.	% Rec.	Cncts.				
1916	745,940	69.23	57.59		1.631						
1915	2,848,969	62.68	50.86	\$2.115	1.673	64.11	19.29	21.45	60,338,936	9.497	17.352
1914	2,427,700	62.42	49.88	2.174	1.760	67.88	19.25	23.89	57,004,281	8.839	13.267
1913	2,365,296	73.23	51.93	2.284	1.719	66.09	18.55	22.72	52,341,029	9.784	15.201
1912	1,565,875	77.55	46.88	2.334	1.677	68.28	18.94	22.9	35,861,496	9.828	15.762
1911	681,519	81.60	59.45	2.65	1.83	63.01	22.44	22.0	14,935,047	10.765	13.08

Mine cost includes coarse crushing and loading on cars at mine, from 3.1 to 3.7 cts. per ton. Total cost calculated from income statement, includes all operating charges. 1914-16 production of copper is from smelter returns from concentrates and high-grade ore shipments. Cost per pound does not include miscel. income, equal to about 0.1 ct. per lb. 1916 figures are for 1st quarter only. Output for first 6 months in 1916, approximately 35,582,000 lbs. Low recovery in 1915 due to construction work in mill improvements at a time when the price of copper made it more profitable to overload such sections as were not undergoing repairs. Ratio of concentration was 17.99 to 1 in 1914.

In 1915 No. 3 shaft supplied 1,737 tons of sorted ore, shipped direct to the smelter. In 1915 production of silver was 45,083 oz., sold at 49.445 cts. per oz. and 319 oz. gold at \$20 per oz. Reported in June, 1916, that daily production ore was averaging 9,500 tons.

The concentrator is now handling its full capacity of 8,000 tons a day, which it is expected will be crowded to 10,000 tons per day. This additional capacity and the better grade of ore that will be mined when the edges of the orebody now being mined are cleaned up, and the main portion of the orebody is worked, will still further increase the annual production of copper. With the mine and works running at full capacity on the average grade of ore, the management expects an annual production of at least 80,000,000 lbs. fine copper yearly. The management expects to lay down finished copper, on the seaboard, at a cost under 9 cts. per lb.; original estimates by the company's engineers were that a net profit of at least \$1.75 per ton of ore could be secured. The tonnage already developed places the Ray Consolidated among the great copper mines of the world, with a certainty that the present enormous ore tonnage will be increased, and a possibility that it may be doubled. The management is practically the same as that of the Utah Copper Co., the pioneer among the so-called porphyry mines of the world, and is thoroughly experienced, strong and capable.

RAY HERCULES COPPER CO.

ARIZONA

Office: 25 Broad St., New York. Mine at Ray, Ariz. Directors: Frank C. Armstrong, pres.; J. G. Hopkins, E. P. Earle, Geo. A. Huhn, W. F.

Bartholomew, F. C. Armstrong, August Heckscher, Jos. B. McCall. C. E. Addams, gen. mgr.; A. A. Wren, drill supt. and sampler.

Inc. 1915, in Maine. **Cap.**, 1,500,000 shares, \$5 par. Company owns 90% of the issued Arizona Hercules Copper Co. stock. When entire stock of holding company is issued, company will have \$1,000,000 cash. No bonded debt, no preferred stock. As the 500,000 shares sold at \$3.75 yielded \$1,875,000 and \$1,000,000 was put in the treasury, the difference must represent part of the purchase price.

Property: 207 acres, in the heart of the Ray district, at Ray, Ariz., surrounded by the holdings of the Ray Consolidated Co. Tract shows Pinal schist, in part capped by dacite, conglomerate and wash and invaded by diabase. Ore developed is an extension and part of the Ray Consolidated orebody. It is crossed by a fault with 350' drop to the east which fact long retarded development.

In September, 1915, Henry Krumb made an examination after drilling 27 drill holes; 17 drill holes showed ore averaging 73.6' thick over 13½ acres with a 257' capping. The total ore developed by these holes was 3,428,774 tons assaying 2.36% copper. The area S. E. and E. has since developed more ore and 4 drills are now working, putting down holes at 200' intervals. A total of the first 30 holes aggregating 89,000' cost \$2.90 a ft., including general expense. 52c, labor and supplies, \$1.55, sampling and technical data, 57c, grading roads and moving drill, 27c. Drills are run in three 8-hour shifts with 1 drill runner at \$6 per day, helper at 40c per hour and sampler at 50c per hour. Drills average 30' per day and consume 1½ tons of coal and 1,500 gals. of water.

Company is sinking a 700' shaft at N. W. corner of property and will mine orebody by methods formerly used by Supt. Addams at de Beers diamond mine in Africa. Company has authorized a 1,000-ton mill and figures a recovery of 33.44 lbs. copper per ton at 8½c total cost. If this is done company can earn \$540,000 at 13c copper.

Company is backed by big financial houses, has expert technical advisors, and is very favorably regarded. The stock has been kept down in price by the greed of various brokerage houses, but is understood to now be held largely by strong investment interests.

RAY JEFFERSON MINING CO.

IDAHO

Address: Daniel L. McGrath, mgr., Wallace, Idaho. **Officers:** E. R. Day, pres.; H. L. Day, v.-p.; with Geo. K. Garrett, directors.

In May, 1916, control passed to the Day interests, owners of the Hercules, Tamarack-Custer mines, and of the Northport S. and R. Co. Company sold treasury stock to finance construction of 250-ton mill and installation of electric haulage system, 1916. The company had \$100,000 in treasury May 1 and expected mill to start July 15.

Property: 38 claims, 600 acres in a compact group, adjoining the Consolidated Interstate-Callahan holdings and including the Hill group is reported to show the Interstate-Callahan, Amazon and Manhattan veins, one with an orebody 400' long. The Carlisle is a cross vein running northerly and intersecting the Interstate. The latter is supposed to be the Hercules vein.

Development: by the Blue Grouse and Carlisle tunnels. The Mountain Goat tunnel opens a shoot 300' long, showing 3' of shipping ore and 9' of mill ore on the Callahan vein. The Carlisle tunnel has 400' of drifting on the vein of this name, carrying 5' to 10' of mill ore for the entire distance. About 50 men employed. A 400-ton mill is under construction and a 30-drill compressor installed.

RAYMOND-ILLINOIS MINING CO.

UTAH

Office: 509 McCornick Bldg., Salt Lake City, Utah. **Main office:** Eureka, Juab Co., Utah. **Officers:** Frank J. Hagenbarth, pres. and gen. mgr.; J. M. Wheeler, v.-p.; J. C. Lynch, sec.-treas.; preceding and Thos. Kearns, directors.

Inc. 1905, in Utah. **Cap.**, \$150,000; shares \$1 par; assessable. Assess-

ments of one-half-cent a share fell due Oct. 11 and Nov. 28, 1913, and Jan. 15, 1914.

Property: 15 patented claims, in the Tintic district, shows fissures and replacements in limestone. Developed by about 1 mile of tunnels and a 1,500' vertical shaft, which as yet have shown but little ore. The bottom workings are wet. Diamond drilling was done, 1909-10, from the bottom of the shaft. Idle since 1914.

READY BULLION COPPER CO.

ALASKA

Office: 517 State St., Boston, Mass. Mine near Juneau, Alaska, developed by 2,200' incline shaft. Is reported starting new shaft to be sunk 2,400'.

REAL DEL MONTE Y PACHUCA.

MEXICO

Subsidiary of the U. S. Smelting Ref. & Mining Co., 55 Congress St., Boston, Mass. Mines at Pachuca and Real del Monte, Hidalgo, Mex.

Inc. 1854, in Mexico, with 2,554 capital shares; all but 20 owned by the U. S. Sm. Ref. & Mng. Co.

The first discovery of ore was made shortly after the Conquest of Mexico by the Spaniards, and several of the principal properties were in large production prior to 1780, and at the time of the visit of Baron Van Humboldt in 1790 constituted the most important silver operations in the Western Hemisphere.

Property: 180 mining claims, 1,736 hectares or 4,270 acres, and approximately 26,000 acres agricultural land, at Real del Monte, 7 miles from Pachuca.

Geology: of the district is extremely simple, as all veins are fissures in a uniform, deep-seated andesite boss which constitutes the entire rock mass for an area of over 100 square miles. While there are superficial capping rocks of other nature, they have no relation to the veins. Vein filling is quartz with a little calcite. The total mineral content of the veins is never more than four or five per cent. and aside from the silver and gold minerals is almost wholly composed of iron pyrite with insignificant sprinklings of lead and zinc sulphides.

Development: by over 150 shafts, and the tunnels, drifts, etc., now open and accessible, aggregate over 100 miles in length. Past workings have embraced over 50 operating mines on the company's property, but the principal operations at present are confined to eight, worked through 16 shafts extending to surface and numerous interior shafts devoted to handling of men and materials. The deepest workings extend to a depth of 625 meters (2,050') below the surface and the average depth from which ore is handled approximates 1,300'.

Ore Reserves: owing to the heavy expense of pumping, the reserves of ore actually blocked have been held for several years past at about 1½ years of full production rate. During the past year entirely new developments have importantly added to this ratio. The eight operating mines referred to embrace a relatively small proportion of the known mineral bearing territory and operations are assured for many years to come.

Ores are transported from the shafts by electric surface haulage or aerial tramways to two cyanide plants, one of 800 tons daily capacity in the Real del Monte district, the other 1,200 tons daily capacity for the Pachuca district. Approximately, 90% of the silver values and 96% of the gold are extracted by the cyanide process and by concentration. About 20% of the total recovered values are in the form of concentrates which are shipped to custom smelters; the balance in the form of doré bullion which is exported.

Production: during 1915 amounted to 390,000 tons of ore averaging 13.9 oz. of silver and \$1.48 gold per ton. The average cost for the first nine months of 1915 was \$4.16.

In spite of Revolutionary activities and the fact that during several periods the properties have been completely cut off by rail and telegraph from the outside world for months at a time, operations have never been

stopped and the entire organization, Mexican and foreign, has been held together. There have been no labor troubles of importance at any time and the only causes for cessation or reduction of operations have been due to difficulties in getting supplies on account of transportation causes. The plants are at present operating at a little over 80% of rated capacity.

RECORD LODGE MINING CO.**ARIZONA**

J. J. McCarthy, supt., Oatman, Ariz. **Officers:** Chas. A. Gehrman, pres.; Lee A. Meyers, v. p.; J. J. McCarthy, sec.; J. A. Small, treas.; L. L. Wallace, directors. **Inc. Jan., 1916, in Arizona. Cap., \$250,000; shares 25c par.**

Property: claims located on Hardy vein. **Equipment:** hoist, compressor, etc.

RECORD MINES CO.**ARIZONA**

Idle. Address: Mudersbach Mine, Bouse, Yuma Co., Ariz. Owns Mudersbach mine with 23 claims, 8 miles south of Bouse, on the main road to Quartzite, in the foothills of the Palomas mountains. The property covers the strike of a contact metamorphic zone showing gossans of specular hematite, underlaid by oxidized ores to shallow depth, succeeded by copper sulphides, an average sampling said to have given 4.5% copper. **Ore:** occurs as bornite, chalcopyrite, pyrite and hematite in a garnet-epidote gangue; it is an irregular bunched replacement, a few inches to a few feet thick, of limestone resting on schist, and altered by quartz monzonite.

The mine, which is one of the oldest locations in the district, was taken over, 1910, from the Excelsior Gold & Copper Mining Co., for a price reported to have been \$250,000. The main orebody has been opened at several points by a number of pits and shafts, of 10' to 50' depth, showing ore, and a shaft, No. 1, 190' deep.

Equipment: includes two 15-h. p. gasoline hoists, a gas engine and air compressor. The mine was developing, with a small force, at last accounts. Option given Clara Consolidated Co., 1913, has been relinquished.

RED BIRD MINING & SMELTING CO.**IDAHO**

Inc. 1913 to take over assets of Idaho Smelting and Mining Co. J. B. Jones, sec.-mgr.

Property: consists of extensive holdings near Clayton, Custer Co., 60 miles N.-W. of the Oregon Short Line terminal at Mackay, including the Ella group at Clayton, Red Bird group on Squaw Creek, Silver Rule group on Slate Creek, Skylark group at Bayhorse, and a 100-ton smelter at Clayton. The Red Bird mine is the principal property, containing lead-silver-copper-gold ore. Ore occurs in well-defined veins opened to maximum depth of 900' by shafts and crosscuts. The smelter was closed down, Nov., 1915, after an unsuccessful run of one month, during which it turned out 2,700 bars of bullion, containing good silver values. Development work has apparently also, been discontinued.

RED CLIFF MINING CO.**BRITISH COLUMBIA**

Idle. Bankrupt. Mine at Stewart, Skeena district, B. C. A. Erskine Smith, pres.; A. D. Tennant, v. p.; F. Wilcox, sec.; A. C. Ray, H. L. Lowndes, F. T. Chadwick and William Savage, directors. Inc., June, 1909. Cap., \$1,500,000; shares \$1 par; issued, 1,291,200.

Lands: on the Portland canal, said to be owned outright, show a main orebody claimed to be about 100' wide, carrying ore averaging 3 to 18% copper, 1 to 4 oz. silver and \$16 to \$24 gold per ton. Mine is developed by a 400' shaft with 1,240' of drifting and crosscutting on the 400' level and 800' on the 300' level. Shipments to the smelter of 1,249 tons in 1912 averaged but \$14.50 gross value with freight and treatment costs of \$8.76, leaving but a narrow margin for profit after mining costs are deducted.

The company had a promising prospect on which \$308,654 has been expended and all but 60,000 shares sold at par or better. Office expenses for 1912 were \$12,252; assuming similar sums for 2 previous years and adding that to mine development, leaves a balance of \$885,889 unaccounted for. Did it go into the pockets of the promoters, or the vendors? The

shares were boosted on optimistic statements up to \$2.05, or a valuation of \$3,000,000, a ridiculous figure for an undeveloped prospect. The people that invested in the company have lost their money, and one investor, brooding over his loss, has gone to the insane asylum.

Mine is shut down, treasury empty, property mortgaged for \$70,000, and a report by J. L. Parker states that there are 20,000 tons of ore available with a net profit of \$1 per ton, which means that property is not worth the mortgage.

RED LEDGE COPPER MINE

IDAHO

Address: care R. N. Bell, Boise, Idaho. Mine is 10 miles north of Landore, Adams Co., Idaho, in Deep Creek canyon, 2 miles from Snake river.

Claims cover a very large outcrop of red and yellow stained quartz porphyry, about 1 mile long and 2,000' wide, bordered by granular igneous rock on one side and greenstone on the other, which is permeated with a fine-grained cupriferous pyrite as well as stained with green carbonate of copper. Geologic examination indicates that the orebody is an anticline, or saddle fold of bedded porphyry schist, 100' thick.

Development: by 400' crosscut tunnel, reaching the ore zone at 200'. The orebody is 80' wide, with a 30' section of leached material averaging \$7 per ton in gold and silver, and a 50' section carrying 4.6% copper and \$5 per ton in gold and silver. The ore mineral is said to be a primary sulphide. The property appears to be a copper deposit which would warrant development if not so inaccessible, being 17 miles from railway terminal at Homestead, Ore. Construction cost to connect mine with railway would be around \$850,000.

RED LION CONSOLIDATED MINES CO.

NEVADA

Goldfield, Nev. A. P. Mackey, pres. Inc. in Wyoming. Cap., \$2,000,000; shares \$1 par. In treasury April, 1916, 700,000 shares. Listed on San Francisco Exchange. Control held by Yellow Tiger Mining Co.

Property: 6 claims, 97½ acres, patented, at Goldfield, adjoining the Milltown Extension and Yellow Tiger Mining Co.'s lands. Plans development by running a crosscut from the shaft of the Yellow Tiger Mining Co. across the property of Milltown Extension and then into Red Lion territory; this crosscut to be on the 600 or 700' level; the nearest point to reach Red Lion territory from the Yellow Tiger workings is 1,400'. As additional footage is required for any prospecting done in Red Lion ground the scheme does not commend itself as being attractive and the property must be classed as a decided prospect. At last accounts the Yellow Tiger shaft had not been unwatered.

RED METALS CO.

NEVADA

Last address: 16 Washoe Bank Bldg., Reno, Nev. A. W. Holmes, pres.; Geo. T. Milner, sec. and gen. mgr.; Jas. Howell, treas.

Inc. May 12, 1910, in Nevada. Cap., \$1,000,000; shares \$1 par; nonassessable; in \$50,000 preferred and \$950,000 common stock; issued, \$1,500 preferred and \$786,200 common stock. Annual meeting, first Monday in June.

Property: 16 claims, unpatented, 300 acres, on Peavine Mountain, Washoe Co., Nev. Claims carry lenticular deposits, between diabase and diorite, that are 1 to 12' wide, show copper carbonate and bornite ore, said to average 9% copper, 15 oz. silver and \$4.80 gold per ton. **Development:** by tunnel, 1,200' long. The mine was opened 1866, for silver, closed 1877, owing to the low price of that metal, and again reopened, 1908. See Copper Handbook, vol. XI.

Geology of this district is given in U. S. Geol. Survey Bull. 594, p. 194.

RED MONARCH CONSOLIDATED MINING CO.

IDAHO

Offices: 417 Hutton Bldg., Spokane, Wash., and Wallace, Idaho. **Officers:** Conrad Wolfe, pres., gen. mgr.; W. G. Collins, v. p.; Gale Smith, sec.-treas., with G. I. Toevs, Orris Dorman, F. R. Wolfe and Ralph Smith, directors.

Inc. 1915, in Washington. **Cap.**, \$2,000,000; shares \$1 par; assessable. Annual meeting, first Tuesday in April.

Property: 43 claims, about 800 acres, in Beaver Creek district, 9 miles north of Wallace, adjoins Cons. Interstate-Callahan on the west; claims are on S. W. slope of Sunset Mt. and on opposite side of the mountain from the Interstate. Said to show 5 well defined fissure veins of silver, lead, zinc ore in Prichard slate and Burke quartzite. Veins are parallel, strike N. 70° W., dip 80° to the S. W.

Development: up to the time acquired by the present company, Nov. 1915, consisted of 2,000' of prospect tunnels and open cuts. Ore had been found in one tunnel, 650' long, at a depth of 500'. Company is now driving two tunnels from Missoula Gulch, one north to attain a depth of 1,000' within a length of 1,000', and one south to attain a depth of 2,000' within a length of 3,000'.

Equipment: includes an Ingersoll-Rand compressor, capacity 2,000 cu. ft., operated by a 250-h. p. G. E. motor.

Management states that plans for a mill are being drawn, the intention being to have it completed by the Fall of 1916; oil flotation will be used. Property is considered promising.

RED MOUNTAIN COPPER MINING CO.

ARIZONA

Owens the Four Metals mine at Mowry, Santa Cruz Co., Ariz. Was worked unsuccessfully by Oscar A. Turner, 1914-15, and is now supposedly moribund.

RED MOUNTAIN DEVELOPMENT CO.

ARIZONA

Office: P. O. Box 3007, Lowell, Ariz. **Mine office:** Dragoon, Cochise Co., Ariz. **Officers:** Frank Briggs, pres., treas. and gen. mgr.; Wm. Hawley, v. p.; E. J. Briggs, sec.

Inc. Oct. 5, 1908, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; non-assessable. Annual meeting, second Tuesday in September.

Property: 17 claims, 340 acres, crossed by the Southern Pacific railway, shows schist, porphyry and limestone, with a vein claimed to be 130' wide and traceable 2 miles, carrying copper and lead ores, including copper oxides and chalcopryrite. **Development:** consists of a 100' shaft. Idle owing to lack of funds.

RED MOUNTAIN MINING CO.

WASHINGTON

R. J. Bonnamarte, supt., Bellingham, Wash. Control purchased June, 1916, by George Wingfield and associates of Goldfield, Nev.

Property: in Mt. Baker district, Wash., shows a fissure vein containing an oreshoot developed for 175' and averaging 4' in width, of \$20 ore. **Development:** carried on intermittently since 1889, is by tunnels, the third or 700' level, showing high-grade ore. **Equipment:** includes a hydro-electric plant and a 10-stamp mill.

RED ROVER COPPER CO.

ARIZONA

Phoenix, Maricopa Co., Ariz. Dr. R. W. Craig, pres.; J. Apfield, v. p.; R. M. de Gex, treas. and gen. mgr.

Inc. July, 1909, in Arizona. **Cap.**, \$1,000,000; shares \$1 par.

Lands: 12 claims, known as the Red Rover Group, 12 miles north of Camp Creek and 50 miles N. E. of Phoenix, the nearest rail point. **Development:** by 10,000' of underground workings, including a 200' tunnel and a 370' incline shaft, showing a 10 to 16' orebody between limestone and porphyry, carrying a 3' paystreak estimated to average 10% copper, 6 to 60 oz. silver.

The Red Rover mine, discovered 1882, has shipped from shallow workings about \$200,000 worth of high-grade ore, running about 15 to 25% copper, with values mainly in silver chlorides, 1 carload of 20 tons netting \$41,000, with no allowance made for copper contents. **Production:** for 1913-14 was 440 tons of ore.

RED WARRIOR MINING CO.

UTAH

Office: Providence Bldg., Duluth, Minn. **Main office:** Milford, Beaver Co., Utah. **Officers:** Leonidas Merritt, pres.; Jas. T. Hale, v. p.; W. H.

Borgen, sec.; E. R. Ribenack, treas.; preceding with W. A. Kaake, John E. Merritt, Angus Buchanan and W. F. Acker, directors; Wilbur J. Merritt, supt.

Inc. Jan 25, 1908, in Minnesota. **Cap.**, \$250,000; increased Jan., 1911, from \$150,000, shares \$1 par; nonassessable; issued, 210,000. Shares are listed on the Duluth Stock Exchange and New York curb. Annual meeting, second Tuesday in January.

Property: a silver-lead mine comprising 8 claims, 1 patented, 95 acres, in the Star district, 8 miles from the S. P. L. A. & St. L. R. R. The claims show orebodies occurring along the bedding planes of limestone, the one under development said to have an average thickness of 6', width of 50' and proven depth of 600', and carries ore estimated by the management to average 21% lead, 1% zinc, 18 oz. silver and 25 cts. gold per ton. In the deeper levels the mine has shown ore assaying 12% copper, 1% lead and 3 oz. silver per ton.

Development: by an 812' vertical shaft with levels at 500' and 675' and a 200' winze sunk on the vein from the 500' level. There are also numerous old shallow shafts and tunnels, the mine having about 3,000' of old and 4,000' of new workings. These workings were estimated to show 20,000 tons of ore, with about 10,000 tons blocked out for stoping by the former management. The mine was operated from 1870 until 1889 and was reopened 1907, by this company. The shaft is to be deepened to 1,000'.

Equipment: includes a hoist good for 1,500' and a 3-drill compressor. It is understood that the mine has the same N.-S. ore channels mined in the Moscow mine, whose workings of equal depth are about 1,500' distant. Property a promising venture, but not yet a mine.

REDEMPTION COPPER MINING & MILLING CO. ARIZONA

Lost its property, 1914. Now controlled by John H. Ware, Trustee, Kingman, Ariz. **Property:** the Clyde mine, near Chloride, Mohave Co., Ariz., opened by shafts of 104' and 114', and tunnels of 125' and 195', a total of about 1,000' of workings. Said to show a vein of 2' average width, with a paystreak carrying about 3% copper, 25 oz. silver, \$2 gold per ton, and oxidized ores near surface. **Equipment:** includes gasoline power and a 25-ton concentrator.

REDLICH TUNGSTEN CO. NEVADA

Col. O. P. Posey, pres. Owns a group of tungsten mines, 16 miles south of Mina, Mineral Co., Nev., on which work was resumed May, 1916.

REDWOOD COPPER MINING CO. WASHINGTON

Dead. Mine at Chewelah, Stevens Co., Wash. **Development:** includes a 400' tunnel with several hundred feet of raises and winzes expected to expose copper at greater depth. Operations ceased in April, 1912, and property was lost under foreclosure of mortgage. Present owners are Chas. Stevens and others of Robinson Straus & Co., St. Paul, Minn.

REDWOOD COPPER QUEEN MINING CO. CALIFORNIA

Idle. Is a San Francisco corporation. E. R. Leach, pres.; Thos. Melersher, sec.-treas.

Property: 840 acres, patented, is 25 miles from Cloverdale, nearest rail point, Mendocino Co., Calif. Developed by tunnels and winzes. Vein, much broken by faults prominent on surface, has a 2 to 4' gossan capping, traceable for a mile. Country rocks are brecciated porphyry and sandstone. Ores include cuprite, melaconite, malachite, azurite, chalcocopyrite and tetrahedrite.

Mineralized zone is 300' long, 10-40' wide and 125' deep, carrying kidneys and lenses of sulphide ore with as much as 8-9% copper and small gold-silver values. High sulphur content and absence of arsenic make ore desirable for manufacture of sulphuric acid.

REED'S PEAK MINING CO. UTAH

Address: Box 902, Park City, Utah. **Officers:** W. D. Lewis, pres.; Henry Welsh, v. p.; W. J. Bardsley, sec.-treas., with Robt. Kimball, D. Scott, Frank Andrew and Thos. S. Mitchell, directors. Alex. McDonald, supt.

Inc. Feb. 14, 1907, in Utah. **Cap.**, \$30,000; shares 10c par; outstanding Dec., 1915, 210,000 shares; assessable. Listed on Salt Lake Exchange.

Property: 21 unpatented claims, 420 acres, 12 miles from a railroad, located on South Fork in Big Cottonwood mining district, Salt Lake Co. Claims said to show fissure veins in limestone carrying lead-silver ore. **Development:** by tunnels, upper 450' long, lower 825' long. Objective of lower tunnel is the intersection of the Birthday No. 1 fissure with a N.-S. fissure at a depth of 800' from surface; this intersection is expected to be reached within a short distance; Birthday fissures Nos. 1 and 2, said to have been productive of shipping ore on upper levels.

Equipment: includes a compressor, machine drills and electric power.

A few tons of ore have been shipped from development work; property is a prospect.

REGAL MINES CO.

ALASKA

Subsidiary of the Great Northern Development Co., which see.

Office: 77 Franklin St., Boston, Mass. **Mine Office:** Kennecott, Alaska.

Officers: Walter M. Briggs, pres.; H. I. Gaskill, sec.-treas.; James Phillips, Jr., C. Hartman Kuhn, Chas. S. Farnum, Mulford Martin, E. F. Gray, W. M. Briggs, J. M. Satterfield, directors. E. F. Gray, gen. mgr.

Inc. 1912 in Maine. **Cap.**, \$250,000; shares \$5 par; fully paid and non-assessable; issued \$28,011. Annual meeting, November 2.

Property: 17 claims, unpatented, 340 acres, near Kennecott, Copper River district. Developed by 115' shaft sunk on a contact between limestone and greenstone and showing copper glance ore. Assessment work only was done in 1914 and 1915.

REID-NEWFOUNDLAND CO.

NEWFOUNDLAND

St. Johns, N. F. Owns a copper property at New Bay, N. F., now idle.

Property was under development in 1907, but has never been a producer.

REINDEER QUEEN MINING CO.

IDAHO

Office: Wallace, Idaho. **Mine address:** Mullan, Idaho. **Officers:** A. B. Crawford, pres. and mgr., Mullan; J. C. Glahe, v. p.; J. H. Wixon, treas.; W. B. Heidfeldt, sec.; preceding with A. R. McRae, P. P. Weber and S. D. Le Mieux, directors.

Inc. Sept. 19, 1913, in Idaho. **Cap.**, \$200,000; shares 10 cts. par, assessable. Company is a consolidation of the Copper Queen and the Reindeer Queen companies, whose holdings are contiguous and cover extensive copper exposures. The new company assumed all obligations of the old corporation and exchanged stock, share for share. The consolidation makes possible the speedy development of the orebody already cut by the Reindeer tunnel, which has been extended as a drift along the vein into the ground heretofore owned by the Copper Queen.

Property: 15 claims in the Mullan copper belt, including the Stevens Peak (or Copper Queen) group and the Reindeer group of 6 claims, all at the head of Willow Creek. The outcropping shows a big copper-stained fissure vein, 5 to 20' wide.

Development: by a crosscut tunnel which has cut the vein at a depth of 800', showing bornite and chalcopyrite ore opened by a drift on the vein. Plans addition of electric power plant, 1916. Examined by Rush J. White, 1915.

RELIANCE MINING & MILLING CO.

MONTANA

Officers: D. M. Adams, pres., Box 386, Butte, Mont.; Frank Eichelberger, v. p.; P. H. Kenny, sec.; preceding with J. C. Lane and J. W. Higgins, directors.

Inc. April 17, 1913, in Mont. **Cap.**, \$150,000; shares 10c par; non-assessable; 1,325,000 issued. Control reported in hands of John C. Norvell, in 1916.

Property: 3 claims, in the Moose Creek section, Silver Bow Co., 18 miles south of Butte, show a vein of copper-silver-lead-zinc ore in carboniferous limestone, opened by a 180' shaft. Has produced 22 tons to date; net returns, \$2,611. Plans to deepen shaft and crosscut on 175' level, 1916.

RENO-YERINGTON COPPER CO.**NEVADA**

Officers: E. L. Brown, pres.-mgr., 944 West 6th St., Reno, Nev.; Victor Cokelair, v. p.; M. C. Brown, sec.; Farmers & Merchants Natl. Bank, treas.; preceding with Walter Harris, O. H. Sonne, Will McDonough, directors.

Inc. Jan. 25, 1907. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; 750,000 shares outstanding.

Property: 5 unpatented claims, about 100 acres, north of the Blue-stone mine, at Yerington, Lyon Co., Nev., said to show sulphide ore in granite with easterly dip, averaging 3% copper.

Development: by 700' tunnel and 100' incline shaft sunk on the contact. **Equipment:** includes hoist and buildings.

Property was bonded, 1913, to Geo. Wingfield, but the bond was relinquished and property reverted to original company.

REORGANIZED BLUE BULL MINING CO.**NEVADA**

Office: P. O. Box 565, Goldfield, Nev. **Officers:** Geo. Wingfield, pres.; F. A. Favier, v. p. and asst. sec.; A. H. Howe, sec.-treas.; preceding with J. S. Henderson and K. M. Simpson, directors.

Inc. 1912 in Nevada. **Cap.**, \$1,500,000; shares \$1 par; outstanding, 1,309,000 shares; assessments totaling 4c called to end of 1915. J. S. Cook & Co., Goldfield, Nev., registrar. Annual meeting, third Monday in December. Company was organized to acquire title to the property of the Blue Bull Mining Co., sold at sheriff's sale June 14, 1912. Latter company's stock was exchanged share for share for new stock on payment of 1c per share.

Property: 8 claims, 148 acres, in the Goldfield district, Esmeralda Co., Nev. **Development:** by a 730' shaft with workings on the 500 and 700' levels opening up the Victor and Blue Bull veins. Crosscuts have been run into the C. O. D. Consolidated Mining Co. ground under a leasing agreement. Commercial ore was found on the 500' level, but not on the 700'.

Property is a prospect.

REORGANIZED BOOTH MINING COMPANY OF GOLDFIELD**NEVADA**

Goldfield Nevada. **Officers:** Geo. Wingfield, v. p.; A. H. Howe, sec.-treas. with F. C. Favier, W. E. Zoebel and B. J. Henley, directors. A. I. D'Arcy, mgr.

Inc. 1912, in Nev., as a reorganization of the Booth Mng. Co. Stock was exchanged, share for share, on payment of 1c. **Cap.**, \$1,000,000; shares \$1 par; assessable: \$999,957 outstanding. Annual meeting, third Monday in December. Listed on San Francisco and Salt Lake City exchanges; traded in on New York Curb. Stock transferred at company's office. John S. Cook & Co., Goldfield, registrar. Control is held by Geo. Wingfield. Five assessments, aggregating 7c, have been levied: the fifth, 2c per share, was in January, 1915.

Financial statement from Dec. 23, 1914, to Dec. 1, 1915, shows receipts of \$245,447, which includes: Assessment No. 5, \$19,973; realized from mine rights, \$15,000; dividends on stocks owned, \$19,275; sale of capital assets, \$187,316; balance Dec. 23, 1914, \$3,681; miscellaneous, \$202. Disbursements totaled \$47,988, leaving a cash balance Dec. 1, 1915, of \$197,458. Cash balance on hand April 27, 1916, after payment of dividend No. 3 was \$222,320.

Dividends: No. 1, 5c per share, paid March 6, 1916; No. 2, 15c, on April 6; No. 3, 10c, on April 26; No. 4, 5c, on June 6, making a total of \$349,984.95.

The company's treasury is built upon the apex suit filed Feb., 1915, against Jumbo Extension, which see; as a result of this suit it was proven that the Reorganized Booth Mining Co. was the owner of all the ores in the same vein throughout the entire sweep of the extralateral lines, which included the Laguna claims of the Goldfield Cons. Mines Co., a considerable part of the property of the Reorganized Kewanas Mining Co., a part of the property of the Spearhead Gold Mining Co., a small part of one

of the claims of the Lone Star Cons. Mining Co., a considerable part of the property of the Goldfield Merger Mines Co., and other miscellaneous claims and fractions.

As a result of this litigation an agreement was entered into with the Goldfield Cons. whereby subsequent litigation between them was obviated; the production from the Goldfield Cons. ground had been at a time so remote that recovery for the bulk of the proceeds was found to have been barred by the statute of limitations. From Jumbo Extension the Reorganized Booth Co. received \$15,000 cash and 300,000 shares stock; from the Reorganized Kewanas the company received 250,000 shares stock; from the Goldfield Merger 750,000 shares stock. With regard to the Lone Star Cons., the extended north end line of the Booth claim only touched one corner of the Lone Star, which happened to contain the working shaft of that company; a settlement was effected for a nominal consideration only. No settlement, as yet, has been effected with the Spearhead Gold Mng. Co.

By Dec. 1, 1915, the company had disposed of 135,400 shares of Jumbo Ext. stock in the market, for which it received \$187,316; up to the present time it is said to have disposed of at least 224,000 shares.

Property: formerly owned by the old Booth Mining Co., consists of one claim adjoining the Red Top and Laguna mines of the Goldfield Cons. In Sept., 1915, all development work was suspended and it was reported the management would endeavor to purchase another property.

The company is said to have the distinction of being the only non-producing mine that receives an income without incurring the slightest expense for operating.

REORGANIZED CRACKER JACK MINING CO. NEVADA

Goldfield, Nev. Geo. C. Kremer, pres.; H. G. McMahon, sec. and supt. Inc. Dec. 18, 1915, in Nev. as a reorganization of the Cracker Jack Mining Co. Cap., \$150,000; shares 10c par; assessable; 1,440,000 outstanding. Listed on San Francisco Exchange. On Dec. 21, 1915, a call of 1c per share was made, each stockholder in the old company being required to pay the assessment before receiving share for share of the new company.

Property: 40 acres, patented, at Goldfield, adjoining Sandstorm-Kendall on the east; said to have had \$50,000 expended on it for development. In Jan., 1916, the company purchased the adjoining 3 claims, 60 acres, formerly owned by the Adams Gold Mining Co., which had been sold for taxes. Adams group has a vertical shaft 320' deep with levels at 115' and 300' depth. Reported in April that company had purchased an electric hoist, compressors and drills and would begin work at the Adams shaft. Property is a prospect.

REORGANIZED KEWANAS GOLD MINING CO. NEVADA

Address: A. H. Howe, sec.-treas., Goldfield, Nev.; Geo. Wingfield, pres.; A. I. D'Arcy, mgr.

Inc. July, 1913, in Nevada. Cap., \$1,500,000; shares \$1 par; all outstanding; assessable. Assessment No. 2, 1c per share, delinquent, Aug., 1916. Listed in Salt Lake City; traded on New York Curb.

Company is a reorganization of the Goldfield Kewanas Mining Co., which became bankrupt in 1913. As a result of the apex suit filed in 1915 by Reorganized Booth Mining Co., which see, the latter company received 250,000 shares Kewanas stock.

Statement issued June 25, 1916, showed: receipts—assessment No. 1, \$14,508; misc., \$209. Disbursements: \$7,257, which includes mine development, \$6,195; bank overdraft, March 15, 1916, \$9,281; leaving overdraft, June 25, 1916, \$1,822.

Property: 2 claims and a fraction, about 40 acres, east of the Laguna group of the Goldfield Cons. at Goldfield.

Development: by means of the winze on the Kewanas ground below an east crosscut into it from the 700' level of the Laguna shaft of the Goldfield Cons. Work up to July, 1916, consisted of exploration of the vein exposed on the 840' level; 550' N. of the winze the vein split, one branch

strikes N. W., the other N. E., with shale between. Both branches have been explored about 700' N. of the winze and work said to have disclosed a large vein, giving "good assay returns in gold, silver and copper." Assay results not reported. Up to July, no "large bodies of commercial ore have been exposed, but with the size of vein and values that have been obtained from portions of the vein, and the amount of unexplored ground still available along the strike of the vein on Kewanas claims, it would seem that the possibilities of encountering bodies of good ore are very favorable." Property is a prospect.

REPUBLIC CONSOLIDATED MINES CORPORATION

WASHINGTON

Republic, Ferry Co., Wash. **Officers:** A. B. Willard, pres.; A. J. Langhan, sec.; J. P. Burson, treas.; Geo. S. Bailey, gen. mgr. Is a reconstruction of Republic Mines Corporation.

Inc. in 1914 to take over the Lone Pine, Surprise and Pearl claims in the Eureka mining district in Ferry County; these claims were worked in 1910-1913 by the Republic Mines Corp., which is said to have produced over \$2,000,000 in gold and silver during the last 2 years it operated and before it went into bankruptcy in 1913. The Republic Cons. optioned the property in 1914 to a new company, the Western Union Mines Co., which operated for a short time and passed tranquilly away in 1915; this company was soon succeeded by another new company, the West Virginia Mining Co., which purchased some new machinery, operated a few months, and, like its predecessor, suffered a painless death, in Oct., 1915. The property reverted to the Republic Cons. Mines Co., which has since been operating it.

In July, 1916, the property was reported as shipping 200 tons daily to Trail, B. C. Is planning sinking a 2-compartment shaft to a depth of 1,000'. The property is said to have merit and could be operated profitably under competent management. For geology, see U. S. G. S. Bull. 550, pp. 150-162. Employs 40 men.

In July, 1916, Geo. S. Bailey, trustee in bankruptcy of the Republic Mines Corp., gave a deed to the 3 claims named above, receiving \$82,000 in final payment. At the same time, the Republic Cons. Corp. gave a mortgage on the claims to Jerome J. Day of Wallace, Idaho, to secure a loan of \$93,000, payable July 17, 1917. This mortgage gives the Day Bros. control of mining operations.

REPUBLIC MINES CO.

NEW MEXICO

Office: 526 Exchange Bldg., Denver, Colo. **Mine Office:** Lucero, Mora Co., N. M. **Officers:** Felix J. Woodward, pres.; Walter Littlefield, v. p.; Marcus Finch, sec.-treas. and gen. mgr.

Inc. Dec. 8, 1903, in Colorado. **Cap.**, \$500,000; increased, 1909, to \$1,000,000; shares \$1 par. Reported that Guanajuato Cons. Mining & Dev. Co. owns \$1,000,000 of the \$2,000,000 capital stock of Republic Mines Co.

Property: comprises about 7,500 acres, patented, half freehold and half under bond and lease. Claims are 30 miles from a railroad, stretching for 8 miles along Coyote creek, from Mora river to the adjacent mountains, showing a series of 3 parallel cupriferous beds of slate and arenaceous shale, alternating with limestone, having an approximately N.-S. strike. The lands are said to include coal, limestone and iron ore deposits.

Geology: there are 3 main beds, of 3 to 8' claimed average thickness, with 3 minor beds, said to show considerable chalcocite, claimed to give average assays of 8 to 17% copper, with an estimated average tenor of 6%. The company's "expert," Prof. Tyler, is said to have estimated the values of its orebodies, to depth of 350', at \$45,000,000. Though the surface showings are said to be attractive, the geological character of the deposit does not warrant a belief that the property will ever support such a statement.

Development: by shallow pits, with a 50' shaft and several tunnels, longest 650', with about 4,000' of workings.

Marcus Finch, sec.-treas., writes in Feb., 1916: "We refuse to give

you any facts in relation to our property, believing you to be incapable of publishing a fair, unbiased statement of facts." Our readers know that the Handbook publishes absolutely unbiased and fair reports and may draw their own conclusions from Mr. Finch's attitude.

Property idle.

REPUBLIC SMELTING CORPORATION CALIFORNIA

Idle. Office: Parker, Ariz. Mine in Riverside mountains, southern California. F. C. Fenner, pres.; R. G. Munn, sec. Cap., \$7,500,000; shares \$10 par.

Property: various claims, mill sites and placer land in the East Riverside mountains, 8 miles from Calzona, Bendigo district, said to show veins in limestone, cut by dikes and carrying copper-gold ores. The company had options on the Calzona, Jack Knife, Silver Dollar, Ox Bow, Gold Dollar and Jack Knife Extension mines, but failed to make the payments due. None of these properties have extensive development, but the surface indications are good and the shafts down to 100' and 150' give favorable results.

Secretary wrote Sept., 1913, that company is "out of business," but independent reports indicate that corporation is intact and owns a group of claims along the same contact zone as the Corem, Steece and Calzona properties. The former vice-president of the company, using the name of John Chestnut, sold 40,000 shares of stock in a preceding corporation and is said to have kept the money and fled the country. This action effectually stopped all plans for financing the company, although it had been reported on by several able engineers and metallurgists.

REQUA-SAVAGE GOLD MINING CO. COLORADO

Subsidiary of the United Gold Mines Co. Address: 112 Tejon St., Colorado Springs, Colo. Officers: J. S. Geyer, pres.; J. Yeomans, v. p.; A. Schumacher, sec.-treas.

Reincorporated Nov., 1915, as original incorporation had expired by limitation. Cap., 1,250,000 shares; 1c par; 413,000 shares in treasury Jan., 1916; also note, secured for \$1,713. Stock listed on Colorado Springs Exchange. Total dividends, \$8,070.

Property: Roman, Savage and Trojan claims, on Beacon Hill, and 1 acre on Gold Hill, Cripple Creek district, Colo., under lease, 1916. Developed by several shafts, deepest 700' and a 100' tunnel. Production to date, \$161,378.

RESCUE-EULA MINING CO. NEVADA

Offices: 265 Russ Bldg., San Francisco, California, and Tonopah, Nev. Officers: Chas. D. Laing, pres.; Herman Zadig, v. p.; with J. W. Dorsey, Joe Joseph and Wm. Edwards, directors. Chas. D. Olney, sec.; J. W. Chandler, gen. mgr.; J. Thomas, supt.

Inc. in Nev. Cap., \$1,500,000; outstanding, \$1,300,000; shares \$1 par; assessable. Stock transferred at company's office. Registration Surety Co., San Francisco, registrar. Listed on San Francisco and Salt Lake City exchanges and traded in on New York Curb. Assessment No. 8 was levied in Jan., 1915; total assessments to that time, \$120,000.

Property: the Rescue, Eula, Last Thought and Maggie May claims, 80 acres, at Tonopah, said to show silver-bearing ore in veins. Developed by an 1,100' shaft. Early in 1916 a body of milling ore was opened on the 950' level, which in July had been drifted on for 170'; 4 raises, highest 130', are said to be in ore. The 800 level is said to be the limit of the orebody above the 950' level; it has not been opened up below this level.

Shipments have been made since the finding of the orebody; production in April, 1916, said to have been 800 tons, yielding \$16,000, with net profits of \$12,000.

REVERE COPPER CO. MASSACHUSETTS

See Taunton-New Bedford Copper Co.

REVIAS CREEK MINING & POWER CO. MONTANA

Letter returned marked "defunct," 1916. Mine near Dixon, Mont.; fully described in Vol. XI, Copper Handbook.

REWARD-ARIZONA MINE**ARIZONA**

Is a copper property near Tucson and close to the Lake Shore mine that is being diamond drilled, 1916, by 350' hole at 45°.

Property has a 400' shaft in which much water was encountered, and pumps will be installed before crosscutting to reach the orebody.

REWARD GOLD MINES SYNDICATE**CALIFORNIA**

Address: G. Miller, supt., Manzanar, Inyo Co., Calif. A. Burnett and J. A. Summers, local representatives.

Property: the Eclipse gold mine, equipped with stamp mill, 1853, and with a reported output of \$3,000,000, and the Reward, Brown Monster, or Hirsch mine, originally a silver-lead mine, until free milling gold ore was discovered. Vein is a bedded one 4' thick between dark siliceous limestones.

Development: at Reward mine by 750' working tunnel, known as 7th level. The mine and the geology thereof are fully described by A. Knopf, Min. Res. of Inyo and White Mts., Calif., Bull. 540 U. S. Geol. Survey, p. 116, 1914.

Mine was formerly controlled by J. Levering Jones of Philadelphia, who sold it to Alex McCone of Los Angeles and Wm. Lambert.

REX CONSOLIDATED MINING CO.**IDAHO**

Offices: 120 Broadway, New York, and Wallace, Idaho. **Officers:** M. J. Sweeny, pres. and gen. mgr.; Robt. Sweeny, v. p. and treas.; B. F. Taylor, sec.; above with J. O. Stewart, L. E. Whicher, R. M. Atwater and E. P. Howard, directors; N. C. Sheridan, supt.

Inc. July, 1915, in Del. **Cap.**, \$1,500,000; shares \$1 par; outstanding, \$1,206,000. U. S. Corp. Co., 36 Nassau St., New York, transfer office and registrar. Annual meeting, second Monday in January. Listed on Spokane and Butte exchanges, Boston Curb, and traded in on New York Curb.

Annual report for year 1915 shows assets of \$1,510,177, which includes property, \$1,039,985; stock discount, \$112,500; development and equipment, \$28,652. Current liabilities reported as \$10,177.

Property: 2 groups of claims in Nine Mile section, Coeur d'Alene, including the Sixteen-to-One mine, 7 claims, 100 acres, at Nine Mile Creek, near the Cons. Interstate-Callahan and Success mines held under bond and lease. Was extensively developed years ago by the Finch-Campbell interests of Spokane, but increase of zinc values at depth made operations unprofitable. About 4 years ago the mine was reopened by another company and much money spent in equipment for deep exploration. Present option calls for \$150,000 if paid within one year, or, \$200,000 within 5 years. In Dec., 1915, this company took an option on the property of the Black Bear Cons., which see; after paying \$10,000, the option was relinquished.

The claims are in the slate belt, long considered valueless as an ore formation, until W. H. Weed attacked this view and demonstrated its falsity by work at the Interstate Callahan. The claims contain 2 strong veins, the Rex and Okanogon, 480' S. of and parallel to it. The former has been extensively opened, with 65,000 tons blocked out and four times this indicated, of a value of \$7.50 per ton. A strike made Aug. 16 on the Okanogon vein shows 3' of ore, opened by 25' of drifting, still in ore. A foot of this ore assays 35% lead and 6.3 oz. silver.

Development: tunnels with a 730' winze from the lowest tunnel, making a total depth of 1,330' in the mine, with 6,000' of underground workings. Crosscuts have been run on 80', 120' and 150' levels; most of the work has been done above the lower tunnel level. Present management unwatered the mine and commenced development in Dec., 1915. There is said to be a considerable tonnage of zinc-lead ore remaining in the old workings, but no ore reserves are reported.

Equipment: includes an electric hoist, 15-drill compressor of 1,100 cu. ft. capacity, driven by a 250 h. p. motor, pumps, and a \$150,000 mill of 250-ton daily capacity with slimes filtering and oil flotation equipment.

The mill will begin treating Rex ore in September, the lease to the Cons. Tamarack-Custer Mng. Co. having been canceled.

Company is deepening the winze 300' and crosscutting the 3 ore-bodies found in the upper workings. Although the ore contains silver, lead and zinc, the metal content was sufficient to operate profitably under former conditions. A mile tramway from mine to mill has been built. With the mill treating 150 tons per day for 300 days, the management assumes earnings of \$1,125 a day, or \$337,000 per year, equivalent to 27c a share on the 1,250,000 shares of issued stock. This estimate is apparently based upon present abnormally high metal prices.

REXALL SILVER & COPPER MINING CO. UTAH

Idle. Office: 1023 Kearns Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. Officers: M. R. Evans, pres.; John Gallacher, v. p.; B. D. Hammill, sec.-treas., preceding with F. A. Price, directors.

Inc. 1906 in Utah. Cap., \$125,000; shares 25c par; 446,317 issued; assessable 1c per year, with 6 assessments levied. Annual meeting, first Monday in June. Listed on Salt Lake Exchange.

Property: 7 claims, patented, about 60 acres, adjoining the Cardiff mine, on the south fork of Big Cottonwood canyon, 17 miles from a railway. Development: by several pits and shafts and a 900' tunnel. Mine has about 1,300' of underground work; an 80' shaft reported to show well defined quartz vein, but company must sink to reach the soluble white limestone in which the Cottonwood ores occur. Idle and negotiating in the hopes of raising funds for deeper development. Reported in July, 1916, that company would merge with the adjoining Columbus Extension.

REY DEL ORO MINING CO. MEXICO

Dead. Property owned by International Investment Syndicate, L. A. Investment Bldg., Los Angeles, Calif.

REYNOLDS-ALASKA DEVELOPMENT CO. ALASKA

Office: 45 W. 34th St., New York. Mine office: Latouche, Latouche Island, Alaska. Officers: Marvin F. Butler, pres.; H. M. Coffin, v. p.; J. Frank Birdsall, sec.-treas.; preceding with A. E. Austin, Hon. J. G. Brady, L. S. Conabeer, John Yule, O. C. McGilvara, Geo. K. Hinds and G. B. Wirgman, directors.

Inc. 1903 in Washington. Cap., \$3,000,000; shares \$1 par; in \$1,000,000 cumulative 6% preferred stock and \$2,000,000 common stock. Authorized March 3, 1908, a \$500,000 twenty-year 6% gold bond issue; issued, \$125,000. Annual meeting, first Tuesday in April.

Property: 102 claims, about 2,000 acres, in Valdez district, Prince William Sound, Alaska. Company was in receiver's hands until June, 1910, when discharged by court order. Former management fully described in Vol. X, Copper Handbook.

The Boulder Bay group of 31 claims, 620 acres, is on the mainland at eastern side of Prince William Sound. Claims show a contact deposit between greenstone and slate, carrying chalcopyrite said to assay up to 11% copper and \$3 gold per ton, but averaging 2 to 4% copper. Developed by 2 tunnels. Equipment includes a 60-h. p. boiler and a 5-drill Rand air compressor. The Copper Mountain group of 9 claims is on Landlock bay, near Boulder bay.

The Iron Mountain group of 62 claims includes the Duchess and Blue Fox properties, on Horseshoe bay, Latouche Island. The Blue Fox mine has a 4' vein of ore, formerly claimed to average 7% copper, slightly developed by a shaft now filled with water.

The Duchess mine, last worked in 1911, when 400' of drifting was done on the lower tunnel, is developed by 2 tunnels, the upper a 375' drift tunnel, and the lower having 500' of drifts on the orebody, which has an average width of 25'. This group shows massive sulphide ore, estimated by the management to average about 3% copper. Assessment work only has been done since 1911. Company plans resuming work in the Duchess tunnels and patenting claims on Latouche Island in 1916.

Equipment: includes a 200-h. p. hydro-electric installation, with a flume

and steel pipe leading from Big Falls creek to a Pelton wheel, direct-connected to two 40-kw. generators; a 50-h. p. hoist and 2 Rand air compressors, of 5 drills aggregate capacity, with 6 air drills and 10 Ingersoll-Temple electric drills.

RHODE ISLAND COPPER CO.

MICHIGAN

Subsidiary of the Franklin Mining Co.

Office: 60 Congress St., Boston, Mass. Mine Office: Demmon, Houghton Co., Mich. Officers: R. M. Edwards, pres.; Henry Tolman, treas.; Albert L. Wyman, sec.; preceding with S. J. Jennings, H. M. Howard, Carlos W. Van Law and C. A. Hight, directors.

Inc. Dec. 9, 1898, in Michigan. Cap., \$2,500,000; shares \$25 par; paid in, \$10.50. Assessment No. 2, of \$1, was payable Jan. 14, 1907, and assessment No. 3, of 50c, was payable June 15, 1910. The Franklin Mining Co. owns 99,030 shares or 99% acquired by exchange of 3 shares Rhode Island for one of Franklin. Annual meeting, second Wednesday in April. No bonded debt. American Transfer Co., Boston, transfer agent.

Annual report for 1914 shows rents and cash on hand, \$320; borrowed from Franklin Mining Co., \$8,980; insurance, total receipts, \$10,322. Expenses amounted to \$127 at mine, \$1,436 taxes, balance being interest and incidentals.

Property: 800 acres, immediately north of the Franklin Junior mine. The ground has been explored by extensive diamond-drill work showing cores from the Mesnard epidote, Allouez conglomerate, Pewabic amygdaloid, Kearsarge amygdaloid, and other copper-bearing beds. All the formations lying between the Kearsarge amygdaloid and the Calumet conglomerate were drilled by a series of holes, the Calumet bed showing traces of copper. The first cores from the Kearsarge bed showed copper in somewhat encouraging quantities from a bed of about 19' width.

No. 1 shaft, 500' deep, is sunk on the Pewabic amygdaloid. This lode is 8 to 10' thick, of which 2 to 3' near the hanging wall is well mineralized but spotty in the 4 levels opened.

No. 2 shaft, 1,227' feet deep, has 10 levels, with a 125' winze below the 10th. The workings are north of the shaft, except on the 8th, 9th and 10th levels, the latter 2,400' long. The 8th level south develops a fair stretch of copper ground toward the Franklin Junior, and a 1,400' drift on the 8th level north showed 25 to 75' stretches of payable ground. The Rhode Island property is being developed by the Franklin Mining Co., at a depth of about 2,000', where the Pewabic bed averages 8 to 10' width.

The Albany & Boston, or Allouez conglomerate, has been opened by crosscuts on the 500' and 1,000' levels, but the showing secured was discouraging. A crosscut of about 250' length on the 10th level, about 1,100' south of No. 2 shaft, has disclosed an amygdaloidal bed of some promise. The east crosscut on the 8th level, at depth of 1,000' cut 2 apparently valueless beds, one being the Mesnard epidote. The East lode, about 5' wide, carries a little copper, but nothing of promise. The West lode, 96' from the Pewabic, is 7 to 9' wide, carrying occasional bunched copper. The 4 amygdaloidal beds lying between the West lode and the Allouez conglomerate have been tested by N.-S. drifts, 3 proving barren.

Equipment: includes a frame shaft house at No. 2, with an engine house having a Nordberg hoist capable of raising 2-ton skips from a quarter mile depth, and a 12-drill Rand air compressor. Buildings include a machine shop and smithy, warehouse and 15 dwellings.

The Rhode Island is idle and the plan of developing at greater depth through the north drifts of the Franklin is a good one, since the Pewabic bed to the south of the Rhode Island has shown great improvement below a depth of 2,000' in both the Mesnard shaft of the Quincy and the main shaft of the Franklin.

RICHARDS COPPER CO.

ARIZONA

Office: 206 Magee Bldg., Pittsburgh, Pa. Officers: Wm. J. Crittenden, pres.; Peter Boyd, v. p.; A. A. Lappe, sec.; D. N. Richards, treas., with

Jas. W. McClure, all of Pittsburgh, and Harry B. Staver, Chicago, directors.

Property and equipment of the Black Hills Copper Co., Ltd., was acquired at sheriff's sale by the Richards Copper Co., which owns all property in fee simple and has no debts. No definite plans of development have been decided upon to date.

Property: 9 claims, 6 patented, 280 acres, in the Verde district, between the United Verde and Equator mines. **Development:** by shafts of 212' and 675' and tunnels of 60' and 90', with 2,500' of openings. Main shaft, at 382', cut a stringer of ore assaying up to 13% copper and 3 oz. silver. Has a 280-h. p. steam plant, with 125-h. p. tubular high-pressure boiler, duplex pump, hoist and power drills. Did some work, 1905-07; since idle, owing to lack of funds. Property is well located, and late developments in district make claims valuable. Favorably considered if put in charge of competent engineer.

RICHFIELD COPPER CO.

MEXICO

Office: 812 Mears Bldg., Scranton, Pa. **Officers:** Dr. J. K. Bentley, pres.; Dalbys L. Fickes, sec.; Otto Robinson, treas.; preceding with Harry Witter, R. H. Gay, Geo. Stark, John Hershberger, Philip Robinson, J. A. Schadt, R. E. Mikesell, W. O. Smith, J. H. Wood and Jacob Huffer, directors.

Inc. 1902 in Arizona, as successor of Richfield Mining Co. **Cap.**, \$5,000,000; shares \$1 par; issued, 4,000,000. Bonds, \$250,000, authorized, at 6%; issued, \$230,000. Scranton Trust Co., registrar. Annual meeting, second Saturday in October.

Property: 1,300 acres of mineral property, with timber and ranch lands, total holdings 26,512 acres in the Ures district. The Dos Naciones group, 12 miles east of Tuape and 35 miles from a railway, is said to have 7 contact deposits between granite and limestone, of 10 to 60' estimated average width. **Development:** includes about 10,000' of underground work, showing oxidized ores and chalcopryite, reported by present management to average 4 to 15% copper, 7 to 40 oz. silver and \$2 to \$5 gold per ton. A body of good ore was reported at a depth of 350'.

Equipment: includes two 25-h. p. hoists and a 5-drill air compressor, several mine buildings and an 80-ton water-jacket smelter.

Shipments to the American Smelting & Refining Co. and Phelps, Dodge & Co. ran 9 to 10% copper, 10 to 32 oz. silver and \$2 to \$5 gold per ton. Management has been prevented from operating during the last years owing to revolutionary disturbances in Mexico, but plans resuming work when able.

RICHMOND & ANACONDA CONSOLIDATED MINING CO. UTAH

See Uncle Sam Consolidated Mining Co.

RICHMOND-EUREKA MINING CO.

NEVADA

Address: P. O. Box 385, Boston, Mass. **Officers:** W. G. Sharp, pres.; C. G. Rice, v. p.; F. W. Batchelder, sec.-treas.; above with Albert Fries, A. J. Seligman, C. A. Wimpfheimer, Frederick Lyon, John Laurie, directors.

Inc. Sept. 28, 1905, in Maine. **Cap.**, \$3,600,000; shares \$10 par. Annual meeting, 4th Wednesday in Sept.

Property: at Eureka, Nev., has been practically idle since 1910, when shipments of low-grade ore were stopped, owing to increased freight rates, which condition still obtains. Though the railway was reopened for traffic during 1912, the new company put the freight rates at figures largely in excess of even the old rates, which were prohibitive.

In 1915 efforts were made to find higher grade ores, but as yet no considerable tonnage of such ore has been developed.

RICHMOND MINING, MILLING & REDUCTION CO. MONTANA

Office: care Martin Waldson, pres., Scandinavian-American Bank, Spokane, Wash. Chas. J. Heidenreich, v. p.-gen. mgr., Saltese, Missoula Co., Mont.; W. S. Norman, sec.; Thos. McGowan, treas., with Dr. E. Richter, directors. **Cap.**, \$1,000,000.

Property: the Richmond mine, 6 claims, near Adair, 3 miles S. E. of

Saltese, on C. M. & St. P. R. R. Mine adjoins the Monitor mine, and is developed by 3 shafts, one 375' deep, the others 125' deep and connected. Orebodies reported to have width of 5-10' and to show for 160' in shaft. **Equipment:** includes a gasoline hoist and compressor, installed 1913. Vein, parallel to the Monitor, shows a persistent streak of copper glance in the shaft.

The property was a small producer for some years and was reopened, Sept., 1913, after many years of idleness. Shipped 5 cars of ore late 1915 said to have assayed 7-10% copper, \$4-\$7 gold, 2-3 oz. silver per ton. Shipments have been made of 30% copper ore for several months. Employs 6 men. Plans installing a \$15,000 aerial tram, 800' long from mine to railway bins.

RICO ARGENTINE MINING CO. COLORADO

Office: Mackintosh Block, Salt Lake City. **Mine address:** J. C. Jensen, mgr., Rico, Dolores Co., Colo. **Officers:** Charles Read, pres.; A. E. Rykert, v. p.; J. H. Woodmansee, sec.-treas.; S. A. King, L. O. Hoffmann, C. D. Ray, Fred. W. Price, directors.

Inc. 1911. **Cap.,** \$100,000; shares 10c par; 766,334 issued; assessable; assessment No. 4 of 1c per share levied August, 1916. Company is its own transfer agent and registrar. Listed on Salt Lake Exchange.

Property: the Black Hawk and Argentine groups, 21 claims, 145 acres, mostly patented, adjoining the Rico-Wellington Mining Co. property. Claims show alternating strata of limestone and sandstone, dipping at angle of about 30° and cut by almost vertical fissures of great extent and persistence. Where these fissures cross the soluble limestone they contain flat replacement deposits of sulphide ores carrying copper, zinc and lead with gold and silver values. The ore shoots or bedded deposits are from 3-30' thick. These fissures and the limestone are identical both in character and occurrence with those which are producing in the Rico-Argentine property.

A new tunnel, 200' lower than former workings, is reported to have cut 3' of ore opened by a 60' drift, June, 1916, also a shoot of copper ore bearing an 8" streak of \$40 ore.

A new campaign of development was begun in 1915 and the property promises to become an important producer in the near future.

RICO CONSOLIDATED MINES CO. COLORADO

Owned by Jesse Knight interests of Provo, Utah. C. A. Jensen, gen. mgr., Rico, Dolores Co., Colo. Listed on Salt Lake City Exchange.

Property: adjoining the Rico Argentine on the N. E., is said to show a vein of copper-silver-lead ore 35' wide in the upper workings. Company is driving a tunnel to gain 140' depth; in April, 1916, this tunnel was in over 300', with only a short distance to drive. Company has been making shipments, but they are not reported.

RICO MINING CO. COLORADO

Office: 9 Wall St., New York. **Mine office:** Rico, Dolores Co., Colo. **Officers:** Henry Godet, pres.; Wm. R. Sainsbury, sec.; Geo. E. Hicks, supt.

Inc. Oct. 25, 1911, in Colorado. **Cap.,** \$3,500,000; outstanding, \$260,000 preferred, \$1,750,000 common stock and \$480,000 first mortgage bonds; shares \$10 par. Company owns properties of the Pro Patria Mining & Milling Co. and the United Rico Mines Co., both dead.

Property: 156 claims, 1,110 acres with 20 acres mill site and 320 acres coal land, in the Pioneer district of Colorado. Ore occurs in fissure veins as replacements of lime. Claims are reported to show veins averaging from a few inches to 15' in width, a mile long and proven to a depth of 700'. Ores in one mine carry 4% copper, 10% lead, 10% zinc and 10 oz. silver, the copper ore occurring as chalcopyrite associated with pyrite, sphalerite and galena in fluoritic gangue.

Development: by tunnels, 1,000 to 3,000' long. Equipped with 125 hydro-electric power at mine and 100-h. p. at mill. There are two 75-h. p. hoists, 2 compound air compressors, 10 air drills and 1 air electric drill; two 9x15 Blake crushers, 18 Wilfley tables, etc.

Production: to date estimated at 1,200,000 lbs. copper. Operating in a

small way through leasing. Expects to start operations in Autumn of 1916.
RICO WELLINGTON MINING CO. COLORADO

Address: Jesse Knight, pres., Provo, Utah; Chas. Read, v. p.; W. Lester Mangum, sec.-treas.; Knight Starr Jordan, asst. sec.-treas.; C. J. Jensen, gen. mgr., with J. Wm. Knight and C. R. Bates, directors. H. R. Trenholm, supt.; E. B. Hayes, mill supt.

Inc. in Utah, Aug., 1911. Cap., \$1,000,000; shares \$1 par; 51% of stock owned by Knight Investment Co.

Treasurer's report for year ended Dec. 31, 1915, shows assets \$258,666, which includes mining property, \$241,600; cash and accounts receivable, \$5,019; liabilities, \$18,403, which includes \$13,054 owing the Knight Investment Co. Receipts totaled \$106,602 from ore settlements and expenditures \$69,020, leaving a net gain for the year's operations of \$37,582 and a total gain to date of \$140,262.

Since the property was taken over by its present owners it has earned \$300,000, has invested \$50,000 in a mill and expended \$100,000 in development work. The debt of \$150,000 advanced for this equipment and work was reduced to \$3,000 in June, 1916.

Property: the Wellington mine, at Rico, which contains ore-shoots formed by replacement and contact metamorphism in the limestone beds of the middle member of the Hermosa formation. In 1914 a flat deposit of zinc-lead ore was cut, 400' long on the dip, 50' wide along the strike and 7 to 8' thick. It lies parallel to the Black Hawk fault. To the north the orebody is cut off by a cross fault parallel to the Nellie Bly fault, the orebody north of the fault being 170' below. Across the Black Hawk fault a copper deposit, replacing limestone and broken by several faults, has been opened, the ore carrying good copper and silver values.

Development: consists of about 15,000' of underground work, reported to expose large amounts of lead-zinc and copper ore. Development for 1915 amounted to 5,985'.

Equipment: includes a 2,500' tram to the Rio Grande railroad, handling 50 tons per hour at a cost of 23 cts. per ton. The 100-ton mill, formerly belonging to the Pro Patria Co. and leased for 5 years, has been remodeled at a cost of nearly \$30,000. A tube mill, 5 Deister tables, 6 Callow tanks, 2 Callow screens and electrical equipment have been installed.

Production: for 1915 was 11,903 tons copper ore, netting \$105,722; 18 tons lead ore, netting \$212, and 628 tons of iron sulphide ore, netting \$2,515.

Property is a good one and, being managed by Jesse Knight, the company is assured of skillful, economical and up-to-date operation.

RIDGE & VALLEY MINING CO. UTAH

Address: 723 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. **Officers:** Wm. R. Wallace, pres.; Jackson C. McChrystal, v. p.-mgr.; H. S. Auerbach, treas.; J. E. Berkley, sec.; J. H. McChrystal, supt., above with Sarah H. McChrystal, directors.

Cap., \$1,000,000; originally \$250,000, increased 1915 to \$500,000 and in 1916 to present amount.

Property: 39 claims, 443 acres, adjoining the Gemini property, and operated through the Gemini shaft for many years. Ores carry lead-silver-copper-gold values. **Development:** by 1,700' shaft, and extensive workings. Lessees extracting ore reported to assay 49% lead, 16 oz. silver. Recent work consists of drifting on vein, reported to be 70' wide, and continuous for several hundred feet.

RIGHT OF WAY MINES, LTD. ONTARIO

Office: 17½ Elgin St., Ottawa, Ont. **Officers:** E. Seybold, pres.; A. W. Fraser, v. p.; E. A. Larmouth, sec.-treas.; with C. J. Booth, directors. D. H. Angus, mine mgr.

Inc. Sept. 11, 1909, in Ont. Cap., \$2,000,000; shares \$1 par; outstanding \$1,685,500. Transfer office: 46 Elgin St., Ottawa, Ont. Annual meeting in February.

Annual report for 1915 shows gross receipts \$56,836; operating expenses, \$44,583; leaving a net profit of \$12,253; with interest, \$409, and \$527 brought

forward; balance on hand Dec. 31, 1915, \$13,189. A dividend of $\frac{1}{2}$ of 1%, calling for \$10,000, was paid March 15, 1916. Balance on hand, including concentrates, estimated April 15, as approximately, \$40,000.

Stock selling around 5c per share, 1916, sold in the boom days as high as \$10.50. The company has paid 65% on the old capital of 500,000 shares and the new capital of 2,000,000 shares.

Property: $3\frac{1}{2}$ acres, adjoining La Rose mine in Cobalt and mining rights under $3\frac{1}{2}$ miles of the right of way of the T. & N. O. Railway. The production of silver for a few years was important, but during the last two years little rich ore has been mined or discovered. During the past few months some high-grade ore has been shipped from the 75' and 120' levels. Mine is opened up to the 365' level. Twenty men are employed.

RILLA MINING CO.

COLORADO

Address: Samuel Klous, gen. mgr., 50 Congress St., Boston, and Breckenridge, Colo. **Officers:** Wm. A. Irving, pres.; Edson W. Noyes, v. p.; Frank S. Sinnick, sec.-treas.; above with Samuel Klous and Geo. S. Sinnick, directors.

Inc. Feb. 18, 1915, in Colo. **Cap.**, 1,000,000 shares, \$1 par; 500,000 in trust, 177,000 shares listed on Boston Curb, Jan., 1916. Annual meeting, third Wednesday in January. Company is practically a reorganization of the O'Reilly Gold Mining Co., capital being reduced from \$2,500,000.

Property: the Bay State group, 13 claims, 65 acres, on the north slope of North Star Mt., 8 miles from Breckenridge, Colo., is said to show copper, silver and gold ore in fissure veins in diorite and porphyry. The Witch Hazel vein is 8' wide. Porphyry dike cut 1916 is said to carry \$4 values for 18' in width and 1000' in length.

Development: tunnels, 1,300', 200', 100' and 60' in length. In the 1,300' tunnel a 200' crosscut is said to have cut a 6' vein of copper ore. Management claims that \$125,000 has been spent on development work. No ore reserves given. **Equipment:** 330 cu. ft. air compressor, electric power. Future plans provide for 100-ton mill and 2 additional compressors.

Is one of a new crop of Curb promotions of Boston. It is a tunnel proposition and is favorably regarded as a speculative venture.

RIO DOLORES MINING CO.

COLORADO

Rico, Dolores Co., Colo. Controlled by J. W. Burns. **Property:** adjoins Rico Wellington mine, north of Rico, and is said to show a 3' vein, carrying ore assaying up to 8% copper. Reported ready for operations, 1916. Needs funds for development.

RIO GRANDE & DOLORES SILVER MINING CO., LTD. MEXICO

Office: 37 Old Jewry, London, E. C., Eng. **Mine office:** Mineral de Guadalupe, La Union, Guerrero, Mex. **Lieut.-Col.** A. B. Haig, C. M. G., and Brooke Mockett, directors; A. Kitching, sec.

Inc. Dec. 11, 1877, in Great Britain. **Cap.**, £17,000; increased, Aug., 1881, from £10,000; shares £10 par, in £10,000 ordinary shares and £7,000 cumulative preference shares, fully issued and fully paid. After the payment of a 10% dividend on preference shares, remaining profits are divided equally. **Debentures**, £10,000, at 10%.

Property: La Nava mine, at Guadalupe, carrying copper ore, with values mainly in silver, developed by shaft and tunnel. **Equipment:** includes steam and water power, with a 20-ton mill and leaching plant. Property employs about 100 men, normally, but for several years active operation has been prevented by the Mexican revolution.

RIO PLATA MINING CO.

MEXICO

Office: 654 W. 51st St., New York. **Officers:** H. W. Miller, pres.; Archibald Nesbitt, v. p.; Jas. H. Lee, sec.-treas., with Geo. F. Parker, Jos. J. Bonneau, L. Bonneau, John C. Hanson, W. E. Green, Jos. Coult, R. N. Brundage, L. O. Hedden, David W. Shanks, directors.

Inc. April 7, 1906, in Ariz. **Cap.**, \$2,000,000; shares \$5 par; outstanding \$1,872,590. Stock transferred at company's office. New York Trust Co., New York, registrar. Annual meeting in Jan. at Phoenix, Ariz. Protocolization of the company completed Oct. 15, 1910.

In 1911 company acquired control of the Trinity Cons. Hydraulic Mining Co. in California.

Comparative General Balance Sheet (Year Ending Nov. 30)

Assets:						
	Prop-erty	Cal. Mine Investm'ts	Treas. Stock	Cash	Other Current	Total
1915	\$1,298,779	\$632,436	\$127,410	\$4,214	\$98,357	\$2,161,196
1914	1,298,522	631,964	127,410	11,967	87,216	2,157,079
Liabilities:						
	Capital Stock	Current	Suspense Account	Surplus Account	Total	
1915	\$2,000,000	\$2,575	\$8,665	\$149,956	\$2,161,196	
1914	2,000,000	4,697	.....	152,382	2,157,079	

Income Account (Year Ending Nov. 30)

	Silver Sales	Inventory (+ or -)	Total Income	Expenses			Year's Surplus
				Oper.	Admin.	Divids.	
1915 \$ 545	\$	\$ 1,428	\$ 2,250	\$ 1,604	\$	\$(d) 2,426	
1914 .....	.....	14,493	6,033	12,277	.....	(d) 30,887
1913	-115,395	10,550	27,389	17,966	18,726	(d) 53,531	
1912 95,330	+ 74,062	178,628	60,930	35,646	37,392	44,661	
1911 422,443	- 12,989	410,997	150,534	43,515	149,554	67,393	
1910 387,364	+ 34,764	425,557	140,324	40,169	140,073	104,990	

(d) Deficit.

Dividends: initial dividend, 1½%, paid Dec., 1909; quarterly dividends, 2%, from March, 1910, to Dec., 1911, inclusive; none in 1912; Feb. 1, 1913, 1%; none since.

Property: the lands and reduction works formerly owned by the Cia Minera de Rio de Plata, S. A., of Mexico, includes 187 acres mining land, 2,700 acres ranch and timber lands and water rights, located 6 miles S. of Guazapares, Chihuahua, and 350 miles from El Paso. Holdings include the Santo Nino, David, Santa Teresa, Santa Barbara, Cleopatra, La Ultima and Enrique silver mines. The ore occurs in the Santa Barbara fissure vein, dipping 17°, with average width of 4 to 6'.

Development: by tunnels, with about 3,000' of workings. Claimed to have \$2,000,000 in ore blocked out. **Equipment:** includes hydro-electric plant and an auxiliary steam plant, 25-stamp mill, 60-ton concentrator and an 80-ton cyanide plant.

Operations have been greatly interfered with on account of the revolution.

RIO TINTO COPPER CO.

MEXICO

Office: Perry Payne Bldg., Cleveland, Ohio. **Mine and works office:** Terrazas, Chihuahua, Mex. James Corrigan, gen. mgr.; H. A. Eye, supt.; Capt. M. D. Murray, mine supt.; H. L. Schneider, smelter supt.; J. M. Baker, smelter foreman; F. W. Topken, master mechanic. Inc. in Ohio, holding property through a subsidiary Mexican company, and is operated as a close corporation under the control of Corrigan, McKinney & Co. The Rio Tinto Mexicano mine and works were bought 1908, for a price said to have been \$187,500, and this company also took over the property formerly held by the San Rafael Copper Mining Co.

Property: about 25 miles north of Chihuahua City, comprises a main tract of 153 hectares, and a smaller tract of 6 hectares, including nearly all the developed mineral property of the Terrazas camp, except a few lead mines. The larger tract includes the Rio Tinto mine, and properties formerly worked by the Rio Tinto Mexicano Mining Co., Boston & Mexican Mining Co., Dragoon Mining Co. and San Rafael Copper Mining Co. The principal properties are the Rio Tinto Mexicano, San Rafael, Promontorio, Verde and Colombia mines, all connected underground. The company also owns the Savanarola group, at Savanarola, about 50 miles south of Chihuahua and 35 miles west of Ortiz, carrying silver-copper and lead ores.

The Rio Tinto Mexicano mine was opened 1860, closed 1902, and reopened 1905, and has been owned and operated by a number of different mining companies until purchased by the present company from Messrs. Enrique and Juan A. Creel. **Geology:** the mine shows contact deposits between limestone and altered andesite, there being 5 known orebodies in a metamorphic zone traced 1,500 metres, the orebody, with a minimum of 2', maximum of 100', and average of about 20' width, being erratic but of very large extent. Ore also occurs between the bedding planes of limestone, near a large quartz ledge, and the orebodies, while erratic in size and occurrence, are connected and practically continuous. The limestone has an average dip of 45° N.-W., and the property has also some silver-lead ore. Ore near surface is mainly oxidized, but sulphides occur below. The oxidized ores range 2 to 5% in copper tenor, with traces of lead and zinc, with an average of about 3% copper, 2 to 4 oz. silver and 30 to 75 cts. gold per ton. The gangue is mainly limestone, somewhat garnetiferous. Extensive diamond-drill borings show good orebodies.

Development: by a number of shafts to a depth of 440'; has about 3 miles of workings. The ground is firm, breaking well and requiring no timbering, pillars having been removed to give chambers up to 100' square.

The San Rafael mine has 2 shafts, the deeper being a 440' two-compartment shaft, known as the Verde. The Promontorio mine has 2 new shafts, nearly 1,000' apart, the main Promontorio shaft being 350' deep, with a surface gravity tram to ore bins. The Promontorio also has 2 old shafts. The Colombia mine has a 275' shaft, with about one-half mile of workings. Miscellaneous shafts include the Bronce of 120', Pedernal of 180', San Martin of 100' and Vinagre of 100'.

Equipment: includes steam and gas power. The San Rafael main shaft has two 100-h. p. boilers and a 100-h. p. hoist, with 4-drill and 14-drill air compressors. There are 5 gasoline hoists of 6 to 22 h. p. at various other shafts.

Ore is carried from mines to smelter by a mile long narrow-gauge railway, equipped with a 6-ton Porter locomotive and 5-ton iron ore cars.

Smelter: at Terrazas, 1 mile from the mine, connected by a one-half mile spur with the main line of the Mexican Central railroad, has two 300-ton 42x192" blast furnaces. The converter department has 1 stand and 3 shells, with a 40-ton electric traveling crane and a relining plant. The power plant has a 250-h. p. compound engine, direct-connected to a No. 8 Connersville blower, and a 100-kw. generator supplies current for the other machinery.

Production: 1906-1910 inclusive amounted to 9,150,000 lbs. copper; 27,000 metric tons smelted averaged 2.5% copper, mining cost being \$3.50 per ton, and smelting cost \$3.50 per ton, or a cost for finished copper of 12.5 cts. per lb. The ore, though low grade, exists in large quantities, and the mine bids fair to become a producer, capable of making 1,000,000 lbs. fine copper monthly.

The mine and smelter operated more or less continuously throughout 1912 and 1913, despite the revolutions which stopped almost all mining operations in this part of Mexico, but the intolerable conditions since then have kept it closed.

RIVERSIDE MINING CO.

IDAHO

T. R. Mason, pres., Kellogg, Idaho. Owned in Kellogg and Spokane. Claims in National Forest Reserve, at headwaters of the North Fork of Coeur d'Alene river.

Property: shows a 7' vein with 18" of high-grade silver-lead ore. **Development:** 460' crosscut tunnel with 100' back.

ROB ROY MINING CO.

UTAH

Mine near Beaver City, Utah, at mouth of Indian Creek Canyon. T. P. Farnsworth, Salt Lake City, owner. Developed to depth of 300'. Reported about to resume operations, 1916. Mine has produced very rich gold ore, but was closed down several years ago when the vein was cut off by faulting. Tunnel will be driven south in hopes of finding orebody.

ROBERT EMMET COPPER CO.**MONTANA**

Idle. Mine at Amazon, Jefferson Co., Mont. Wm. Q. Ranft, pres.; at last reports; John J. Schmitt, sec.-treas. **Cap.**: \$3,000,000; shares \$5 par.

Lands: 6 claims, patented, 90 acres, carrying veins in granite, not far from the andesite contact. The main vein has a generally N.-E. strike, developed by a 500' shaft, showing a shoot of ore on the 350' level. A 1,200' tunnel having about 1,000' of laterals shows a 10' vein carrying copper, silver and lead ore.

Equipment: includes 10-drill air compressor, electric plant, with transformers, for 60,000-volt current, taken from the Montana Power Co., the Robert Emmet Co. furnishing power to the Comet mine.

ROBERT LEE MINE.**NEW MEXICO**

Address: Pyramid Camp, via Lordsburg, Grant Co., N. M. Owned by Dan. Breil and Harry Small, of Lordsburg, N. M. Mine was operated in 1885 and was later purchased by Dr. Bartlett, inventor of the Bartlett concentrating table, who erected a mill and milled \$97,000 worth of ore. The claims show a well-defined quartz-calcite vein running N. E.-S. W. and dipping S. E., lying in a zone of altered and chloritized diorite porphyry.

Development: includes the old shaft, 250' deep, which has been reopened and shows in the lower level a streak of ore 2' thick, carrying 30% copper and 500 oz. silver. Sinking winze, 1915.

ROBERTA MINING & MILLING CO.**IDAHO**

Mine near Gem, Shoshone Co., Idaho. **Officers**: Jos. Lutey, Jr., pres.; E. V. Moran, sec.; W. C. Orton, treas.; Thos. Roberts, mgr.; preceding with Curtis Lewis and Alex. Penaluna, directors.

Property: 12 claims, patented, well timbered, on Nine Mile creek, carry 4 known veins.

Development: by tunnels, lower 300' long, to be driven 2,000' to give a back of 800' and to cut 4 veins, one of which shows lead and copper carbonates at surface, giving assays up to 6% copper, 10% lead, 16 oz. silver and \$3 gold per ton. Company's holdings are in the lead belt of the Coeur d'Alene. Working 1916.

ROCHER DE BOULE COPPER CO.**BRITISH COLUMBIA**

Office: 419 D. F. Walker Bldg., Salt Lake City, Utah. Mine at Hazelton, B. C. **Officers**, John F. Cowan, sec.-treas. and gen. mgr.; M. S. Brown, pres.; A. Fred Wey, v. p., and S. A. Douglass, directors. D. J. Williams, mgr.; J. A. Cowan, supt. **Inc.** Oct 15, 1911, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; non-assessable; fully issued, fully paid. Listed on Butte Exchange. Annual meeting, Oct. 20.

Property: 6½ claims, crown grant, 325 acres with 50 acres mill site and 100 acres other lands, in Hazelton district, 9 miles from the Grand Trunk Pacific railroad. Ore occurs in fissure veins in granite, veins having an E.-W. strike with dip of 60°. Five ore-shoots being developed have average width of 5½', are 3,000' long and proven to depth of 150', according to management.

Development: by shaft and 800' tunnel estimated to have blocked out 25,000 tons of ore averaging 15% copper, 5 oz. silver and \$1.50 gold per ton. Copper occurs principally as chalcopryite and bornite.

Mine was under lease to Montana Continental Dev. Co. from 1913 to Feb., 1916. Lessees shipped about 17,000 tons of ore, 1915, averaging 7% copper and \$2.50 gold-silver, according to reports.

Equipped: with 240-h. p. hydro-electric plant, aerial and surface tramways, compressor and saw-mill by lessees who worked mine on royalty basis. Is a good mine with rich ore.

ROCHESTER BUCK & CHARLEY MINES CO.**NEVADA**

Lower Rochester, or Manhattan, Nev. **Officers**: C. H. Moyer, pres.; Frank L. Reber, v. p., sec. and treas.; with John Fant, C. E. Bugg and Wm. Lane, directors. F. L. Reber, mgr.

Inc. in Nevada. **Cap.**, \$1,000,000; outstanding, \$750,000; shares \$1 par. Annual meeting first Wednesday in April.

Property: 8 claims, 150 acres, in Rochester mining district, shows contact deposits 6-16' wide between rhyolite and limestone, said to carry gold, silver and some lead ore. Was discovered in 1913.

Development: 220' tunnel, with 600' of underground workings. Property worked by lessees in 1915. Production about \$41,000. Management is planning to put in an electric hoist.

ROCHESTER ELDA FINO MINING CO.

NEVADA

Offices: 702 Mutual Bank Bldg., San Francisco, Calif., and Rochester, Nev. **Officers:** Jos. F. Nenzel, pres.; Clay Peters, v. p.; with O. G. Stevens, directors. H. W. Hartmann, sec.

Inc. Feb. 8, 1915. **Cap.,** \$1,500,000; shares \$1 par. Annual meeting, last Wednesday in April. Management states operating expenses in 1915 were \$9,500.

Property: 2 claims, 30 acres, adjoining Rochester Mines Co on the east, said to show contact deposit 4' to 5' in width between rhyolite and felsite, carrying gold-silver ore.

Development: 3 shafts, deepest 190', with 300' of underground workings. Claims 500 tons ore blocked out.

Equipment: includes a hoist. Property is a prospect undergoing development.

ROCHESTER MERGER MINES CO.

NEVADA

Lovelock, Nev. **Officers:** W. C. Pitt, pres.; H. G. Humphrey, v. p.; C. H. McIntosh, sec.-treas.; with J. E. McCreary, and B. R. Binns, directors.

Cap., \$2,000,000; issued \$1,377,100; shares \$1 par. Listed on San Francisco Exchange.

Property: 22 claims, 350 acres, in 4 groups; original Rochester, Rochester Belmont, Widow Florence and Crown Point Extension, 2 groups in the Rochester mining district, Humboldt county. **Ore:** gold, silver. The original Rochester and Rochester Belmont groups are contiguous and adjoin Rochester Mines Co. on the west.

Development: by two tunnels, the Friedman tunnel crosscutting Rochester Merger ground for 1,560' before entering Rochester Mines Co. property and the Pitt tunnel (900' long), 1,200' north of the Friedman, supposed to cut the Broughton vein at a vertical depth of 500' and horizontal distance of 1,200'. The Pitt tunnel is reported by the management to have cut 2 veins, one of which has been drifted on for 265', in ore for 130', width 50' and average assay \$15 per ton. The Friedman tunnel, 1,500' long, May 1st, will serve both the Rochester Merger Mines Co. and the Rochester Mines Co. It is said to have cut 10 veins, 12' to 15' in width and drifting is being done on a few of these veins. **Equipment:** includes a 12-drill compressor, recently added.

Property is a mining venture, in the prospect class.

ROCHESTER MINES CO.

NEVADA

Lovelock, and Rochester, Nev. **Officers:** L. A. Friedman, pres. and gen. mgr.; H. J. Murrish, sec.-treas.; with W. C. Pitt, J. P. O'Brien, Sam Platt, Richard Hartley, directors.

Inc. Dec. 17, 1912, in Nev. **Cap.,** 2,250,000 shares; \$1 par; outstanding May 15, 1916, 2,148,791 shares. Secretary, Lovelock, Nev., and Security Transfer & Registrar Co., New York, transfer agts. Stock listed on San Francisco and Salt Lake City Exchanges and on New York Curb.

Mortgage: 8%, trust deed to C. Uniacke and A. John for \$70,000, dated Nov. 9, 1914, to cover 14 notes for \$5,000 each.

General Balance Sheet (May 15):

Assets:					
	Prop.-Dev.	Equip.	Current	Miscel.	Total
1916	\$2,028,157	\$133,586	\$40,722	\$1,133	\$2,203,598
Liabilities:					
	Cap. Stock	Surplus	Current	Total	
1916	\$2,148,791	\$24,451	\$30,356	\$2,203,598	

The income report for May 1, 1915, to May 15, 1916, shows bullion

sales, \$433,605, which with royalties and custom ore treatment totaled \$533,186. Mining and milling costs totaled \$433,732, leaving \$99,454 excess of income over mine and mill expenses.

Expenses, which amounted to \$46,807, included the following items: salaries, \$8,510; office expenses, \$6,391; printing and advertising, \$20,594; auto expense, \$3,542; traveling expense, \$2,467; legal expense, \$2,069.

Property: 14 claims, 3 patented, on Nenzel Hill, in the Rochester mining district, Humboldt Co., includes Weaver Mining Co. property bought 1915. Ore on Nenzel Hill was first discovered a decade ago, but little work was done at that time. In 1912 large bodies of \$50 to \$60 silver-gold ore were found and shipments started in a small way; in the Winter of 1913-1914 these shipments attracted attention and the town of Rochester came into existence.

Geology: ore deposits of Nenzel Hill occur as replacement veins along fissures and shear zones in sheeted rhyolite; veins vary from a few feet to 40' in width and range from 100' to 3,700' in length; strike N. to N. 30° E., dip 60° W. The west vein is the main ore carrier, showing an orebody 750' long, the shoot being 20' wide and averaging \$21 per ton, at a depth of 300'. The east vein shows 6-7' of \$25 ore, and on the 250' level showed 2' of \$160 ore. For geology see U. S. G. S. Bull. 580, p. 342.

Development: 20,660' of work, mostly by tunnels. In Feb., 1916, work consisted of 950' of shafts, 2,800' of tunnels, 600' of winzes, and several thousand feet of raises and drifts, with estimated ore reserves of 118,000 tons. The Friedman tunnel, crossing Rochester Merger ground on the west for 1,560' will be used jointly with that company by the Rochester Mines Co. On May 1, this tunnel was within a short distance of the property line; it will cut the veins at a depth of 1,200' several hundred feet below the present workings.

In March, 1915, company completed an up-to-date 10-stamp and cyanide mill in Rochester Canyon, almost 3 miles from the mines, with which it is connected by the Nevada Short Line narrow-gauge road. Mill was designed to treat 100 tons ore daily, but has been treating 120 to 150 tons; stamps, weigh 1,550 lbs. each, drop 100 times per min., extraction reported as about 92.87%; continuous counter-current decantation is employed. This plant is to be enlarged to treat 200 tons per day, 1916.

Production: 1913 and 1914 reported as 52,282 tons, yielding \$1,015,345, chiefly in silver; average value for entire production, \$19.52 per ton. In 1915, the mill operated 205 days, treated 23,090 tons ore, lessee and company account, yielding 3,131 oz. gold, and 545,959 oz. silver; ore averaged about \$15 per ton.

Costs, per ton, 1916 (5 mos.): mining, \$3.221; milling, \$2.288; indirect, \$0.827. Power: electric, obtained from the Nevada Valleys Power Co. Reserves are large, being reported as sufficient for several years' operation, with 10,000 tons broken in stopes.

ROCHESTER RAVEN MINES CO.

NEVADA

Lower Rochester, Humboldt Co., Nev. **Officers:** J. J. Morely, pres.; Frank L. Reber, v. p.; T. J. D. Galter, sec.-treas. and res. agt.; preceding with E. S. Howard, Frank Towelly and C. F. Harley, directors. **Cap.**, 1,000,000 shares, 25c par.

Property: 3 claims, in Lower Rochester district, operated by lessees who are reported as shipping ore with values of \$34 per ton in gold and silver. Said to have shipped \$10,000 gross worth of ore in first few months of 1916. Geologic conditions are similar to those of district in general. See U. S. G. S. Bull. 580, p. 325.

Plans include driving tunnel to prove orebodies to depth of 600'.

ROCHESTER TREASURE MINING CO.

NEVADA

Address: J. E. McGovern, sec.-treas., Rochester, Nev.; J. C. Colligen, pres.; J. W. Kromer, v. p.; John Golden and Harry J. Murrish, directors.

Inc. April 14, 1913, in Nevada. **Cap.**, \$1,500,000; \$1 par; 500,000 issued.

Property: the Old Relief mine, 5 claims, 95 acres in Relief canyon in Rochester district, shows a silver-bearing quartz vein 15-20' wide, cutting

limestone and running S. E., dipping 55° west and varying from 1 to 15' in width, with a pay shoot 2' thick.

Development: by 350' tunnel on vein and 280' tunnel with 200' back. Is a prospect.

ROCHESTER UNITED MINES CO.

NEVADA

Rochester, Humboldt Co., Nev. **Officers:** G. S. Johnson, pres. Reno, Nev.; C. F. Spilman, v. p.; A. J. Wright, sec.-treas.; with O. H. Bru and E. W. Orr, directors. C. C. Higgins, mgr. **Cap.**, 1,500,000 shares, issued 600,000.

Property: two groups, 13 claims, 200 acres, at Rochester; one group of 11 claims, 175 acres, adjoins property of Rochester Merger Mines Co. and Rochester Mines Co. on the south. Literature sent out by the promoters states "that it is so located as to command the extensions of the veins of both the Rochester Mines and Rochester Merger Mines Companies' properties." A study of the map shows it is very improbable that the veins opened up on property of Rochester Mines Co. cross any claims owned by Rochester United Mines Co., and the extent and value of the veins under development on Rochester Merger ground remains to be proven. Up to May, 1916, little, if any, development work had been done.

ROCK ROSE MINING & MILLING CO.

MONTANA

Officers: J. M. Nilan, pres., Helena, Mont.; H. C. Krug, v. p.-treas., Butler, Pa.; Andrew Weisner, sec., Helena, Mont.; R. A. Weisner, asst. sec. Inc. in Mont.

Property; 6 claims, 3 patented, adjoining Fort Harrison on east, near Helena, Mont., and 3 claims under option. Dandy claim has 117' shaft with 400' drift and crosscut exposes 2 veins, one of silver-lead, the other of gold ore. Galena vein is 6" to 4½' wide, averaging 2½'. **Ore:** silver lead carrying \$14.07 to \$57.79 per ton. A total of 196 tons of ore shipped in July, 1906, June, 1907, July, 1908, yielded \$4,234 smelter returns.

Development: by 100' shaft with a 125' drift, exposing ore for 75', in part lead and in part copper ore that carries 4½ to 10% copper. The gold vein is 2-3' wide and reported to average \$25 per ton, though none has been shipped. The vein is traceable by 6-7 pits for 378' across the claim.

Equipment: 80-h. p. boiler, compressor, etc., complete. Buildings include engine house, ore sorting house, boarding and bunk houses. The freight rate is but \$1 per ton for team, R. R. and loading. Water is handled by 1-2 hours pumping each day.

Property adjoins and is east of Helena Mine & Christmas Gift. Although lessees only shipped 190 tons hand picked ore in 2 years, the mine is shallow and worthy of development. Said to have had an offer for sale of property March, 1916, and if stockholders approve, deal will be completed at once.

District is an old one, but ore-shoots heretofore developed have faded out in depth.

ROCKY MOUNTAIN GOLDFIELD MINING CO.

COLORADO

Denver, Colo., and St. Elmo, Colo. **Property:** the Hayden, San Diego, Little Johnny and Nellie claims, at Baron Mountain, Chalk Creek district, Colo., said to carry several veins whose outcrop is owned for 4,500'. The mine is near several producers, including the Mary Murphy, credited with a \$25,000,000 production.

Development: 600' tunnel and 80' shaft on Hayden vein, and shallow shafts on others. The Nellie has made shipments of \$40 ore. A new 150-ton concentrating mill at St. Elmo will treat the ores.

ROCKY MOUNTAIN MINES CO.

NEW MEXICO

Office: care G. L. Brooks, pres., Albuquerque, N. M. Mine at Cerrillos, Santa Fe Co., N. M. H. O. Brooks, sec.; and E. L. Grose, directors.

Inc. Apr. 4, 1913, in N. M., to work property formerly owned by the Sunset Mining & Smelting Co. **Cap.**, \$1,000,000; shares \$1 par; non-assessable; 470,000 issued.

Property: 9 claims, 100 acres, in the Cerrillos district, held under lease

and bond. Claims show orebodies in zone of crushed monzonite and andesite, averaging 2-5' in width. Vein said to be continuous for 700'.

Development: by former companies, includes 3 shafts, 60 to 175' deep, and 3 drift tunnels, 120', 361' and 442' long, said to show ore carrying 0.30% copper, 8% lead, 14% zinc, 7 oz. silver and \$0.03 gold per ton. The Tom Payne claim is the only one now worked.

Equipment: includes a 12-h. p. hoist, several buildings and concentrator with 1 Dodge crusher, one Hardy and 5 Wilfley tables, 2 slime tables. Smelter, 6 miles from the mine, has not been operated by present company, but management planning to improve mill and work continuously, 1916.

ROCKY POINT CONS. MINES CO.

CALIFORNIA

Bishop, Inyo Co., Calif. **Officers:** Gaylord Wilshire, pres., 422 Hollingsworth Bldg., Los Angeles; Mrs. Mary Wilshire, v. p.; H. R. Kearns, sec.-treas. E. W. Walter, supt.

Inc. in Ariz. Cap., 1,000,000 shares; \$5 par; in treasury, 500,000.

Property: referred to under various names, Bishop Creek Gold Mine, Bishop Creek Milling Co., and Wilshire Bishop Creek Gold mine, consists of 99 claims, 12 patented, located on headwaters of Bishop Creek, 16 miles from Bishop. Claims are said to show a silicified shear zone 800' wide in granite: strike N. 50° W., dip 60° S. The vein is in the center of this zone, running N. 76° W., with no definite walls. It contains dense, banded quartz carrying very fine gold with some arsenopyrite and pyrrhotite. The mine, idle for several years, was unwatered in April, 1915, and operations resumed.

Development: 300' shaft with 2 levels, 1,000' of workings in all, claimed to disclose an orebody 20' wide and opened up for over 100' with face still in ore. Ore reserves estimated at 13,138 tons.

Equipment: includes a 70-h. p. electric hoist; Sullivan 12-drill compressor, pumps, Bleichert tramway and a 50-ton 10-stamp and cyanide mill. Recovery is 85% on \$11.40 ore, \$5.76 as concentrate, \$4 as cyanide recovery and a loss on tails of \$1.70.

Production: for 1915 reported as 6196 tons of \$11.34 ore. The ore carries 86.3% insol., 4.67% iron, 1.80% alumina, 2.60% lime, 1.70% sulphur, and 1% arsenic. Recovery was 85%. Closed down in Oct. for the winter.

In a suit recently brought by a stockholder to get access to the company books, and secure the names and addresses of 6,000 stockholders, it is claimed that Wilshire holds control of the stock; that there has been no stockholders' meeting since 1913 in London, when no quorum was present; that no financial statement has been furnished or has been accessible to the stockholders since Nov., 1913, and that an assessment of 5c was levied in order to pay indebtedness less than the amount secured by assessment. Wilshire is reported to have answered that the books were available for examination, and that the actual purpose of the investigation is to secure a list of stockholders for the purpose of inducing them to pay to the investigators a fee of 2 cts. per share for adjusting the affairs of the company and winding up the corporation.

It is reported that Wilshire proposes to reorganize as the Cons. Wilshire Mining Co., raising funds for enlargement of the mill by an assessment of 6 cts. per share.

Both the company and its president frequently appear in print, and the stockholders appear to have a long wait before their officers get down to actual mining and an attempt to pay dividends.

ROMERO MINING CO.

NEW MEXICO

Margarita Romero, owner, Las Vegas, N. M. **Property:** the Santa Nino claim at El Porvenir, San Miguel Co., N. M., has a deposit of copper-gold ore, developed by tunnel and shaft work. **Equipment:** includes steam power and a 10-ton King mill and rolls for concentration work. Shipped molybdenite ore, worth \$1.50 per lb., 1914.

ROSALIE COPPER CO.**ARIZONA**

Address: Haddock & Shackelford, 424 Dwight Bldg., Kansas City, Mo. Mine near Mayer, Yavapai Co., Ariz. G. C. Meese, Los Angeles, Calif., pres.-gen. mgr.

Inc. in Arizona. Cap., \$3,000,000; shares \$1 par.

Property: 9 claims, patented, 180 acres, in the Copper Creek district, 25 miles S. E. of Mayer and 18 miles from Cordes siding, the nearest rail point. The mine has numerous pits and shafts, and a 1,000' tunnel, developing a 2 to 7' vein carrying native copper, in the oxidized zone, followed by bornite, chalcopryrite and occasional chalcocite ores, said to assay 4.15 to 7.3% copper, with small gold and silver values. **Equipment:** includes a 50-h. p. gasoline engine and air compressor. Suspended operations in 1907, but preparing to resume, 1915. Not favorably regarded.

ROSE CONSOLIDATED MINING CO.**MONTANA**

Oscar Nordquist, mgr., Wallace, Idaho, with Sidney L. Shonts and Harold Childs of Wallace, acquired control of company in May, 1916.

Property: a gold-tungsten mine near Libby, equipped with mill, was reopened, Aug., 1916.

ROSEMONT COPPER CO.**ARIZONA**

Office: 11 Broadway, New York. Mine at Rosemont, Pima Co., Ariz. Is controlled by Adolph Lewisohn and Lewisohn Bros. The mine has numerous orebodies in limestone, occurring under geological conditions superficially similar to those at Bisbee. Company also owns claims at Helvetia, and others adjoining the Tiptop mine, near Helvetia, but the bulk of its holdings are on the east side of the Santa Rita mountains, west of the Rosemont postoffice. Company has a small smelter, long idle. Property regarded as promising.

ROSS MINING & MILLING CO.**COLORADO**

Idle many years and probably dead. **Office:** Ross Bldg., Waynesburg, Pa. Mines at Silverton, San Juan Co., Colo. The company has had much financial trouble, like its predecessors and collateral relatives in the chain of promotions. Fully described, Vol. XI, Copper Handbook.

ROSSLAND KOOTENAY MINING CO., LTD. BRITISH COLUMBIA

Idle since 1904. **Office:** Salisbury House, London, E. C., Eng. **Mine office:** Rossland, Trail district, B. C. C. Williamson Milne, chairman; Dr. G. Schack-Sommer and Lionel W. Harris, directors; Bedford McNeill, cons. engr.; F. A. Labouchere, sec.

Inc. May 17, 1902, in Great Britain, as a reconstruction of Rossland-Great Western Mines, Ltd., and Kootenay Mining Co., Ltd. **Cap., £150,000; shares £1 par; issued, £148,607.**

Property: 171 acres, at Rossland, carrying auriferous and argentiferous copper ores, of low grade, and 113 acres placer at West Kootenay. The company also owns 2,615 shares of the Santa Eulalia Development Co., Ltd., owning the Nueva Chihuahua property at Santa Eulalia, Chih., Mex. Revolutionary conditions have prevented any work for several years in Mexico.

ROUND MOUNTAIN MINING CO.**NEVADA**

Offices: 1011 First National Bank Bldg., San Francisco, and Round Mountain, Nye Co., Nev. **Officers:** L. D. Gordon, pres. and gen. mgr.; J. R. Davis, v. p.; H. G. Mayer, sec.-treas.; with W. H. Weber and Thos. Keane, directors. R. H. Ernest, supt.

Inc. March, 1906, in Nev. **Cap., \$1,000,000; increased to \$1,500,000 in 1914; shares \$1 par; outstanding, \$1,266,591.** Stock transferred in company's S. F. office. American National Bank, San Francisco, registrar. Annual meeting 3rd Monday in May. Listed on San Francisco and Nevada Exchanges.

Dividends: said to total \$363,000; the last one, 4c per share, was paid in August, 1913.

Annual report for year ending March 31, 1915, shows assets of \$1,896,646,

which includes: properties and rights, \$1,638,422; equipment, \$163,080; stocks, \$23,672; supplies, \$21,798; current, \$49,672.

Operating statement for 6 months, April 1 to Oct. 1, 1915:

(25,345 tons ore milled)		
Total revenue from lode operations.....	\$145,161	or \$5.73 per ton
Mining and milling costs	103,836	4.10
Net operating income	41,325	or 1.63 per ton
Depreciation	7,473	.29
Net lode operating profits	\$ 33,852	or 1.34 per ton
Placer operations:		
Bullion sales (from 18,150 yds.).....	33,102	or 1.82 per yd.
Placer operating costs	8,923	.49
Net placer profits	\$ 24,179	1.33 per yd.

Total cost of the Jett Creek pipe line, water rights and placer equipment, amounting to \$192,888, has been paid, and the company has no debts. Cash on hand, Sept. 30, 1915, \$7,545.

In 1914 company took over the Round Mountain Sphinx Mining Co., thus ending several years of litigation involving apex rights in the Los Gazabo claim.

Property: 910 acres, 242 patented, at Round Mountain, 60 miles N. E. of Tonopah, the nearest railroad point, contains large low-grade gold-silver deposits mined both by lode and placer operations. The deposits are replacements along fissures and sheeted zones in rhyolite, with E. W. strike, dip 15°; average width of lode ore, 8'.

Development: 1000' incline shaft, with about 7 miles of workings. Management reports a large tonnage of \$2 to \$7 ore blocked out in the mine.

Company has several hundred acres of placer ground and estimates 8 years required to work it; 67 acres have been tested and show values of \$1 per yd. Two monitors are used, tearing down and sluicing 1,200 to 1,500 yds. a day; main tail race is 2,700' long with two 600' laterals. The high pressure pipe line is 45,000' long, is spiral steel, commencing with 30" and reducing to 20", 18" and 16"; head 600' with 400 miner's inches of water. Operations started in June, 1915.

Equipment: includes two 50-h. p. hoists, Ingersoll-Rand compressor, electric power and 180-ton stamp mill.

Output: 369,482 tons to 1916. In 1915, ore milled averaged \$6 per ton. Company has an efficient management and has made a good record.

ROWLEY COPPER MINES CO. ARIZONA

Office: Baxter Springs, Kans. **Mine address:** Gila Bend, Maricopa Co., Ariz. **Officers:** T. H. Goodwin, pres.; Mrs. Dora Rowley, v. p.; J. T. McRuer, sec.; J. O. Goodwin, treas.

Inc. July, 1909, in Arizona. **Cap.**, \$10,000,000; shares \$1 par.

Property: 6 claims, unpatented, 120 acres, about 28 miles north of Gila Bend, developed by an inclined shaft to 80' below water level; is reported to have disclosed 3 strong veins of copper-gold ore. **Equipment:** includes 100-h. p. boiler, hoist, compressor, etc. Property was bought for \$20,000 cash and \$1,000,000 in stock, in 1910. Company is heavily overcapitalized. Closed down 1914, but reported starting work, 1915.

ROYAL BASIN MINING CO. MONTANA

Office: Makeever Bros., 170 Broadway, New York, and Journal Bldg., Boston, Mass. **Mine office:** Maxville, Granite Co., Mont. Walter Neal, mgr. **Cap.**, \$2,000,000; shares \$1 par; fully paid and non-assessable. The Montana Phosphate Co., formed in 1915 to treat phosphate beds near Maxville, is controlled by same interests as Royal Basin.

Property: the North Star mine of 2 lode claims, 90 acres, in Wymans gulch, within the Missoula forest reserve and 3 miles east of the Drummond branch of the N. P. R. R. Also owns the Northern Bell mine, a silver property near Princeton. Claims show a fissure vein 15 to 40' wide, in 3 upper tunnels, 100' vertically apart. A new lower tunnel is being driven which cut the vein 800' in and at a depth of 700'. At this point the vein

carries concentrating ore 12' wide with a paystreak of sulphide ore, assaying 7½% copper and 5 to 70 oz. silver per ton. The smelter returns for over 1,100 tons shipped showed 5.14% copper.

Mine is equipped with a leaching plant using sulphuric acid to get the copper into solution and depositing electrolytic copper as cathode plates in tanks, direct from the solution, by electrolytic current. This plant was designed by J. D. Fields, who built a similar plant for Capt. A. B. Wolvin at the Butte-Duluth mine in Butte, Mont.

While we have no details of this plant, the process, though simple and doing all that is claimed for it in the production of electrolytic copper, is not a cheap one when acid and electric power have to be purchased. Property considered promising, but advertising matter of fiscal agents is not favorably regarded.

Reported leased for 5 years, from April, 1916, to Northwest Cons. Mines Co., Spokane, Wash., and shipping in July, 1916.

ROYAL CONSOLIDATED COPPER CO.

NEVADA

Letter returned, 1915, from St. Louis, Mo., address. **Mine office:** Hawthorne, Esmeralda Co., Nev. **Officers:** L. L. Crisp, pres. and gen. mgr.; G. L. Werth, v. p.; R. E. Drake, sec.-treas.; B. H. Martens, supt.; preceding with Robt. W. Alt and Albert Lawson, directors.

Inc. April 27, 1907, in Arizona. **Cap.**, \$2,500,000; shares \$1 par; non-assessable; issued, \$1,434,477. Dec. 31, 1910. **Bonds:** \$300,000, authorized, at 7%; issued, \$2,300, Dec. 31, 1910. Annual meeting, first Monday in April.

There are two companies of this title, 1 an Arizona, the other a Nevada corporation, the Arizona company apparently holding stock in the Nevada operating company.

Property: 10 claims, 1 fractional, 200 acres, 8 miles from Luning and 16 miles from Hawthorne and Mina. According to the company's former expert, the formation is "dyarite," porphyry and limestone, with large "burns" of iron gossan, the ore deposits consisting of copper, gold and silver, lying in a fissure "cutting" a contact of porphyry and lime, the orebody being claimed to be 250' wide.

The company's past literature contains some ridiculous and misleading statements. Fully described Vol. XI., Copper Handbook. Unfavorably regarded.

ROYAL COPPER MINING CO., LTD.

MONTANA

Office: Wallace, Idaho. Mine near Belknap, Sanders Co., Mont. John H. Nordquist, pres.

Property: 12 claims, patented, near Thompson Falls, shows a vein of about 18' surface width, traced 1,500' on company land, carrying copper and lead carbonates and sulphides, said to average 6% copper and 18% lead, with small silver values. **Development:** by prospect tunnels of 50' and 600'. The property is a prospect on which assessment work only has been done for several years past.

ROYAL COPPER MINING & MILLING CO.

WASHINGTON

L. J. Winslow, pres. **Mine address:** Chewelah, Stevens Co., Wash. **Property:** 7 claims said to show 3 parallel ledges having slate and granite contacts. **Development:** by 400' tunnel said to show values in copper, lead, silver and gold. Property is a silver-lead mine with small amounts of copper.

ROYAL GOLD MINES CO.

CALIFORNIA

Offices: 50 Congress St., Boston, Mass., and Hodson, Calaveras Co., Calif. **Officers:** F. H. Thayer, pres.; H. M. Burton, v. p.; E. A. Fordyce, sec.-treas., with Jas. E. Simpson and F. W. Page, directors. F. W. Page, mgr., Hodson.

Inc. May, 1914, in Maine. **Cap.**, \$1,500,000; shares \$5 par; issued \$1,000,000. **Transfer office:** 50 Congress St., Boston. Federal Trust Co., Boston, registrar.

Property: 9 claims, 7 patented, 108 acres, in Salt Spring Valley at Hodson, 3 miles N. W. of Copperopolis, Calaveras Co., is on the west belt of

the Mother Lode. The property was operated extensively from 1895 to 1905, when it was closed down and in litigation for several years; rehabilitation was started by the present management in 1914; in June, 1915, the mill started operating 40 stamps.

Ore: low-grade gold quartz, occurs in a series of large lenses in a diabase dike; also numerous quartz stringers and veins intersecting the main Royal vein, which strikes N. 50° W. and dips 30° N. E. Ore zone reported to be 500' wide and 5,000' long, but explored for 1,000' only.

Development: an 1,100' 30° incline shaft, with 5,000' underground workings. Present management claims reserves of 5,000,000 tons of \$3 ore.

Equipment: includes an 80-h. p. boiler and two 150-h. p. boilers; a 1,500 cu. ft. compressor driven by 100-h. p. motor. Also a 120-stamp mill equipped with 1,150-lb. stamps, that can treat 600 tons per day; Standard concentrators, Wilfley tables and Johnston vanners.

Reported in March that mill was operating 40 stamps and treating 190 tons daily, and that production would be increased within 90 days to 400 tons daily. Employs about 100 men. Also reported that "stock must be considered speculative, and is not suitable for a woman's funds."

ROYAL MOUNTAIN MINING CO.

MONTANA

Absorbed by the Cactus Copper Co.

R. R. R. COPPER MINE.

ARIZONA

Described under Three R Mines.

RUBY COPPER CO.

ARIZONA

Office: 303 Midland Bldg., Kansas City, Mo. **Mine office:** Patagonia, Santa Cruz Co., Ariz. **Officers:** H. A. Sutermeister, pres.; F. D. Reasor, v. p.; C. E. Sweet, sec.; Chas. L. Cookson, treas.; preceding with A. E. White, R. W. Pierce, Harry J. Richards, F. P. Greenwood, and Dr. Emil Thielman, directors; C. A. Pierce, gen. mgr. and supt.

Inc. 1912 in Arizona. **Cap.,** \$2,000,000; shares \$1 par; issued, 1,210,855 shares. **Debentures,** \$200,000, at 6%; issued, \$67,460.

Property: the Lee group of 9 claims, 6 patented, about 12 miles N. of Patagonia. Claims show remnants of Tertiary lavas capping a series of limestones and other sedimentary rocks, altered by metamorphism and underlain by a dense black crystalline rock that carries ore. This rock, though seemingly devoid of crush zones or fissures, contains disseminated particles of chalcopyrite with occasional bunches and patches of high-grade ore assaying as high as 27% copper and 100 oz. silver per ton. This rock also holds kidneys, or globular masses of primary copper glance and bornite. Ores are estimated to average about 6% copper, 12 oz. silver and 11 cts. gold per ton.

Development: by 460' shaft and a drift tunnel, with about 5,000' of workings. The shaft is dry, unlike that of the Hosey mine to the N., and the Happy Jack to the S., both in higher ground.

Equipment: includes 30-h. p. gasoline hoist, Cameron pump and Leyner compressor. Idle 1915. Plans extending East drift on 460' level another 600', 1916.

RUBY COPPER MINING CO.

CALIFORNIA

Address: E. A. Walters, Eureka, Calif. **F. W. Belcher,** sec. **Mine near Korbelt, Humboldt Co., Calif. Property:** the Blind Lead and Ruby groups, 38 claims, 760 acres, unpatented, in Horse Mountain mining district; shows a copper deposit developed by a 1,000' tunnel. Ores are chalcopyrite, cuprite, chalcocite and bornite, with some black oxides and occasional gold values. Formation is serpentine with porphyritic diorite dikes and quartzite.

Company plans installation of concentrator in near future. Developed by 510' crosscut tunnel, 60' shaft and 250' of drifting. **Equipment:** several buildings. Mine is yet in development stage.

RUBY GOLD & COPPER CO.

ARIZONA

Mine near Parker, Yuma Co., Ariz. C. H. Ferry, director and chief owner; **W. E. Balcolm,** gen. mgr., at last accounts.

Property: the Billy Mack mine, 8 miles from Parker, covers an area of pre-Cambrian limestone and schist, whose beds dip steeply N. W. Ore occurs as a contact vein between schist and limestone, the deposit being an irregular replacement with no known connection between the small ore pockets. Ore consists chiefly of malachite, chrysocolla and specularite with porous quartz. In the main mine workings a bunch a few feet across consisted of a mass of needle malachite shot through with threads and stringers of gold. As a rule the ore, though often rich, occurs in short and very thin bunches and so far as known, does not afford a basis for profitable mining on a large scale.

Development: by 200' shaft with levels at 100', 150', and 200' below surface, and by several lesser prospect tunnels and inclines. Was developing, 1915, and is reported to have struck large orebody on 200' level, averaging \$20 per ton in copper-gold values.

RUBY KING COPPER CO.

CALIFORNIA

Mine near Ladoga, Colusa Co., Calif. Although generally known as a copper mine, no copper ore has as yet been discovered and property is operated as a mineral paint mine, by the Ruby King Mineral Paint Co., 1027 Eighth St., Sacramento, Calif.

Property: 6 patented claims, developed by 1,200' shaft and 1,000' tunnel. Ore is iron oxide containing a small percentage of cinnabar. **Production:** 500 tons in 1914.

RUBY MINING CO.

WASHINGTON

Mine and home office: Nighthawk, Okanogan Co., Wash. **Eastern office:** Mansfield, Ohio. **Officers:** Monroe Harman, pres. and gen. mgr.; Jas. A. Hower, v. p.; Chas. B. Bushnell, sec.-treas.; preceding with Dr. S. P. Ecki and M. L. Branyan, directors.

Inc. Nov. 5, 1902, in Washington. **Cap.**, \$1,500,000; shares \$1 par; non-assessable; issued, \$1,175,000. **Bonds:** \$100,000 authorized, at 7% maturing 1915; issued, \$35,100. Annual meeting, second Tuesday in June.

Property: 7 claims, unpatented, 136 acres, with 46 acres miscellaneous freehold lands, on Mt. Chopaca, near the Similkameen river, 3 miles south of the international boundary and within 600' of the Great Northern railroad. Claims show syenite, cut by veins containing lenticular orebodies running N. W.-S. E. and dipping at 47°. The vein under development is about 4' thick, traceable for 1,000', and carries cupriferous ore stated by management to assay 0.5 to 10% copper, 1.5% lead, 2.5% zinc, 5 to 2,800 oz. silver, and from a trace to \$4 gold per ton.

Development: by 3 crosscut tunnels with drifts on the vein. The main working tunnel, 300' below the old workings and about 350' below the outcrop, is 1,110' long, and has 550' of drifting on the vein and an equal amount of drifting run from a 100' upraise. An inclined shaft sunk on the vein from the lower tunnel has short levels at 100' and 200' depth. **Ore reserves:** estimated at 135,000 tons of ore blocked out, carrying 30 oz. silver besides copper and gold values and which it is believed can be profitably mined and milled.

Equipment: includes a 15-h. p. electric hoist and 5 buildings. Company's report shows a total expenditure at the mine from beginning of work to April 28, 1913, of \$118,000, of which ore sales furnished \$17,062, bonds \$35,100 and stockholders (175,000 shares) \$65,838.

Property promises to make a good small mine.

RUBY MINING & MILLING CO.

COLORADO

Weston Pass, Leadville, Colo. Is a new company holding a 5-year bond and lease on the Erie Mines Co. property, comprising the Ruby & Lafayette mines on Bull Hill. Mines show much ore in old workings, whose value has been tested in the Wild Horse mill. Company has erected a cyanide plant, known as the Worcester mill, near the Ruby dump. Shipments of calamine ore were made early in 1916.

RUBY SILVER MINING & DEVELOPMENT CO. NEVADA

Office: 15 Broad St., New York; George W. Abel, pres. Cap., 1,000,000 shares, \$1 par; 600,000 outstanding.

Property: 260 acres in the Lewis mining district, Lander Co., Nev., reported to have "opened a substantial ore-shoot" to a depth of 580', and to have found "excellent values" in the 4 tunnels which have been driven to intersect this orebody at various depths. Property is fully equipped. Management states a 50-ton flotation unit is being added to equipment. The mine has been operating for several years and in May, 1916, was brought out by one of the Broad St. (New York) brokers.

RUDOLPH LAND CO.**WISCONSIN**

Idle. Mine near Gordon, Douglas Co., Wis. Inc. 1905, as successor of Minong Range Copper Co. **Property:** 12 miles from Gordon, is in Secs. 11, 12, 13 and 14, T. 43 N., R. 10 W., on the southern fold of the Keweenaw syncline. **Development:** by two shafts, deepest 350', sunk at an angle of 36°, on a dark amygdaloidal trap bed carrying small quantities of native copper. Equipment includes a 6-stamp mill. Property fully described under title of Minong Range Copper Co., Vol. III., Copper Handbook.

RUSH & BROWN GROUP.**ALASKA**

Address: Kasaan, Prince of Wales island, Alaska. U. S. Rush, mgr., and Geo. F. Brown, owners.

Property: 9 claims, 180 acres and 5-acre mill site, near the end of Kasaan bay, 8 miles N. W. of Kasaan. The claims show greenstone intruded by granodiorite and carry three orebodies, 2 in an E. W. shear zone in the greenstone, the third orebody along the greenstone-diorite contact. The latter carries magnetite-chalcopryite ore in a body of unknown extent, but opened for 200' in length, width of 63' and to a depth of 63'.

One shear zone contains the "Sulphide" body. The ore occurs as massive chalcopryite in stringers, bunches and lenses, and also as a commercial impregnation of the greenstone and chloritic schists. The massive chalcopryite without waste, assays 20% to 30% copper, with \$12 to \$18 gold. The lenticular shoots of the clean ore run with the shear zone, and are as much as 7' thick. Pyrite, quartz and calcite are practically absent. The sulphide body, in which these lenses occur, has an average width of 14', varying from 8' to 20' between walls. It has been developed to a depth of 250', and for a length of 170' on the 100' level; 345' on the 200' level, and 90' on the 250' level, with drifts on ore both ways from a winze on the 250' level.

On the footwall side, and at a distance of 30' from the hanging wall, a parallel short vein, evidently in the same shear zone, has been exposed for 45' on the 200' level.

Development: exclusive of stopes amounts to 2,000', of which 1,090' are in ore. It includes a 177' shaft with 1,350' of drifting on the 1st and 2nd levels, and a 50' winze from 2nd level to 250' level.

Equipment: includes a steam plant with hoist and necessary mine buildings. Ore is taken over a 3-mile private railway of 42" gauge to Venus bay.

Work was suspended, 1907, because of the depression of the metal market and was resumed July, 1910.

Production: for 1912 was about 700,000 lbs. fine copper, with small gold and silver values; 1,900 tons shipped in 1914. About 30,000 tons of ore have been shipped from the mine. Smelter returns for four years reported to range between 3.31%-7.1% copper, 0.12-0.20 oz. gold, and 0.52-1.03 oz. silver. Mine considered promising.

RYE PATCH MINING & LEASING CO.**NEVADA**

Address: S. A. Greenwood, sec., 423 Douglas Ave., Salt Lake City, Utah. Mine at Rye Patch, Humboldt Co., Nev. C. A. Conklin, pres.; David W. Jeffs, gen. mgr.

Inc. 1910, in Utah, as a reorganization of the Rye Patch Consolidated Mines Co. Cap., \$250,000; shares 25 cts. par, assessable.

Property: 6 claims, patented, held under a 7-year lease. Mine is 14 miles from a railway, and is said to have been worked extensively prior to 1873, with a reputed production of \$12,000,000 in silver. **Development:** by 1,200' tunnel, in which the present company started new work and developed a 14" vein of extremely rich silver ore carrying 4 to 9% copper.

Equipment: includes a 10-stamp mill with a concentrator.

SACAJEWEA GOLD & COPPER MINING CO.

MONTANA

Office: 11 Broadway, New York. Mine near Helena, Mont. Col. Henry Altman, pres. and gen. mgr.; W. J. Anson, sec. **Cap.** \$3,000,000; shares \$10 par.

Property: 47 claims in the Scratch Gravel district, adjoining the Copper-Silver-Montana Mining Co. Idle some years, but work resumed 1916.

SACRAMENTO VALLEY COPPER CO.

CALIFORNIA

Office: S. W. Winn, fiscal agent, 135 Broadway, New York. Thos. G. El Patton, sec., P. O. Box 296, Placerville, Cal. Mine office: Greenwood, El Dorado Co., Calif. **Officers:** L. H. Wilkins, pres.; A. B. Wilkins, v. p.; Wm. Sheriff, v. p.; W. R. Usher, asst. sec., 135 Broadway, New York, with F. C. Voorhies and Donald Woodrum, directors.

Inc. in Arizona. **Cap.** \$1,000,000; shares \$1 par; fully paid; non-assessable.

Property: Shamrock group of 24 claims, about 492 acres, in Sec. 24, T. 12 N., R. 9 E., in the Greenwood district 42 miles N. E. of Sacramento. **Geology:** Property shows an extensive series of sedimentary rocks with igneous rocks of various ages, intercalated with the sedimentaries, or more commonly occurring as intrusives. Ores occur as sulphide deposits in contact and shear zones, the latter flat-lying, with chalcopryrite disseminated in pyrite, and almost invariably containing gold and silver, but low in copper tenor.

The mine has an 80' shaft, and several short tunnels. There is no power equipment. Management claims ore will average 6-8% copper per ton, with value of "the 100,000,000 pounds of ore ready for mining and shipment at present price copper \$2,950,000 (amount so blocked out is less than 1% of total orebody)"; all of which is grossly exaggerated and misrepresentative. Property is inactive at present; management raising money to begin operations which they hope to start in September, 1916. Among the contemplated improvements is a 250-ton smelter to be built "when the profits estimated would exceed \$1,000,000 per annum." The property has some merit, but it will be many years before the smelter is built under the above conditions.

SADDLE MOUNTAIN MINING CO.

ARIZONA

Office: 902 Chapel St., New Haven, Conn. **Officers:** Frank M. Travis, pres.; Everard Thompson, sec.-treas.

Inc. 1902, in Arizona. **Cap.**, \$2,500,000, increased from \$1,000,000; shares \$1 par; outstanding 1,306,585 shares. **Bonds:** \$1,000,000, first-mortgage, 6%, due July 1, 1918, which have been assumed by the Gila Copper Sulphide Co.

Property consists only of \$300,000 of the capital stock of the Gila Copper Sulphide Co., which acquired in October, 1909, the property of the Saddle Mtn. Mining Co., subject to its authorized outstanding first mortgage bond issue of \$1,000,000, all of which was exchanged in 1915 for the \$1,000,000 first mortgage 6% bond issue of Gila Copper Sulphide Co., due Oct. 1, 1918, convertible at par into stock of Gila Copper Sulphide Co. Interest payable April 1 and October 1. Fully described Vol. VIII, Copper Handbook.

SAFFORD COPPER CO.

NEVADA

Office: 67 Milk St., Boston, Mass. **Officers:** Jas. H. Kimball, pres.; Jas.

S. Whitelock, v. p.; Owen Goldsmith, treas.; Frank W. Smith, supt.; preceding officers are the directors.

Inc. 1915. Cap., \$300,000; shares \$1 par. Metropolitan Trust Co., Boston, transfer agents.

Property: 4 claims in Safford Mining district, Eureka Co., Nev., said to show copper-silver ore in quartz veins from 18"-30" wide, traversing porphyry and rhyolite formation.

Development: by 2 shafts, 30' and 80' deep, on the Evening Star claim. Developing in 1916. Merely a prospect.

SAGAMORE MINING CO.

CALIFORNIA

Idle. Offices: Third and Chestnut Sts., Philadelphia, Pa., and 401 1st Natl. Bank Bldg., Riverside Calif. Mine near Purdy, San Bernardino Co., Cal. Norman P. Sloan, pres. and mgr.

Property: 8 claims, 160 acres, known as the New York mine, 5 miles S. E. of Manvel, in the New York mountains, an extension of the Providence range, shows limestone, quartzite and schist, with intrusive dikes of rhyolite and felsite along which the principal veins are found. Ores found in the quartzite are gold bearing, the silver and copper ores being in limestone.

Development: by shafts of 30', 45', 100' and 150' and several tunnels. longest being 454', showing a number of veins ranging from 18" to 4' in width. A complete report on the property was made, 1902, by Carl Andersen.

Equipment: includes gasline power and a 50-ton mill.

SAGINAW COPPER CO.

MONTANA

Jackson, Beaverhead Co., Mont. **Officers:** Geo. North, pres.; E. M. Frank, sec.-treas.; with Elmer North and Kenneth Campbell, directors.

Inc. Jan., 1916, in Montana. Cap., \$125,000; shares \$25 par.

Property: 5 claims, including the Saginaw mine, in Beaverhead Co., shows fissure veins in porphyry, with E.-W. strike, dip 35° and 3' average width. Developed by a 300' incline shaft. **Equipment:** includes steam hoist. Management reports shipment of 19 cars ore in 1915, average assay, 11% copper.

SAINT ANTHONY MINES CO. (Tungsten)

NEVADA

Operating a 75-ton mill at Toy, 21 miles S. W. of Lovelock, on ore from an 8' vein of 3% scheelite. Producing 20 tons daily from another mine near Sodaville, Mineral Co., Nev., the latter ores being shipped to a concentration mill near Luning.

SAINT ANTHONY MINING CO.

NEVADA

Good Springs, Clark Co., Nev. Jos. Dederichs, gen. mgr. and chief owner. **Property:** 7 claims, 140 acres, in the Yellow Pine mining district, 2½ miles W. of Goodsprings. Ore is said to assay 10% to 18% copper in orebodies up to 15' in width. Developed by 2 incline shafts, 240' and 175' deep, located 500' apart. **Equipment:** includes 2 gasoline hoists and an aerial tram 850' long.

Production: to June, 1915, reported as \$60,000. Reported shipping one car of ore every 6 weeks.

ST. ANTHONY TUNGSTEN MINES.

NEVADA

See Toy Tungsten.

ST. CROIX CONSOLIDATED COPPER CO.

WISCONSIN

Superior, Douglas Co., Wis. **Officers:** Robt. Kelley, pres.; Dr. A. S. Andrews, v. p.; W. W. Strickland, sec.; Ernest A. Arnold, treas. and managing director. **Inc. 1903, in Wisconsin. Cap., \$1,500,000; shares \$1 par; nonassessable.**

Property: about 15,000 acres, 35 miles south of Lake Superior, on the St. Croix range, carries the western extension of the Keweenaw copper belt of Lake Superior. The corporation is a land-holding company that has done no mining work and plans none.

ST. EUGENE MINE.**BRITISH COLUMBIA**

See Consolidated Mining & Smelting Co. of Canada, Ltd.

SAINT FRANCOIS LEAD CO.**MISSOURI**

Leadwood, St. Francois Co., Mo. Inc. in Maine. Cap., \$500,000. Operates 350 acres land in St. Francois county, showing lead-zinc ore at 400' depth. Company ships the crude ore to plant of the St. Louis Smelting & Refining Co. Ignores requests for information.

SAINT JAMES MINING & MILLING CO.**IDAHO**

Mrs. Theresa James, mgr., Wallace, Idaho. Inc. 1911, in Idaho. Cap., \$1,000,000; shares \$1 par.

Property: the St. James mine, comprising the Ula and Try Me claims on Sunset peak near Wallace. Ore: carries lead and zinc. In Nov., 1915, reported as driving a lower tunnel to give a vertical depth of 800' on the vein; tunnel was in 100' with 500' to go. A 2' vein of high-grade zinc ore was reported in the bottom of a 60' shaft.

ST. JOE GOLD-COPPER M. & M. CO.**MONTANA**

Office: Wallace, Idaho. Property: 9 claims, well timbered, on Kelly creek, near Saltese, 3 miles west of the Monitor mine, and one-half mile from a railroad, showing 2 strong ledges. Idle some years.

ST. JOHN MINES (COLORADO), LTD.**COLORADO**

Edwin H. Platt, mgr., Equitable Bldg., Denver, Colo. M. F. Bremer, Broad St. House, E. C., London, Eng., sec.; Geo. A. Williamson, chairman; with Herbert Weld-Blundell, E. J. Nicholas, Chas. P. Winterton, directors.

Inc. Feb. 13, 1913. Cap., £75,000; shares 5 s. par; all issued and fully paid.

Property: company was organized to acquire from E. L. A. Munby and E. J. Munby, the St. John silver-lead-zinc mines, 19 claims, 100 acres, together with concentrator, located on the west side of Glacier Mt., 1½ miles south of Montezuma, Summit Co. Purchase price was £58,250, payable £3,000 cash and £30,000 in fully-paid shares for the property and £20,000 cash and £5,250 in fully paid shares to the promoters, the Tres Forcas Synd., Ltd.

In addition the company owns 50 acres timber land within a mile of the mining property. The bulk of St. John ore is milling grade; small shipments of high-grade ore, £4 to £7 per ton, coming from development work, were being made in February. Ore on dump, in stope fillings, and in the mine estimated at over 100,000 tons.

Company also holds an option on the Revenue Tunnel group of mines, 600 acres, in the Ouray district; this property includes the Virginus mine which is reported as having 400,000 tons of stope filling and 50,000 tons probable ore below the tunnel level. The purchase price of this property is \$187,000 of which \$85,000 has been paid. To provide for further payments a loan of £25,000 was decided upon; to Feb. £10,000 of this has been subscribed to. The undeveloped portion of this property was sold in Nov., 1915, for \$75,000.

In Sept., 1915, a 1/3 interest was acquired in the Hilltop mine at Leadville, said to be producing high-grade zinc carbonate ore, £8 to £9 per ton, until forced to close temporarily owing to the weather; the mine is at an altitude of 13,000'.

The company holds a 2/5 interest in the Ruby mine at Leadville. Production started in Dec., 1916, and in Feb. was returning a profit of £40 per day. A lease is also held on the Shamrock, Mt. Sneffels and Lake claims.

SAINT JOHNS MINES CO. (quicksilver) CALIFORNIA

Address: Box 606, Vallejo, Calif. Officers: C. G. Dennis, pres. and mgr.; John Martin, v. p.; C. F. Colmar, sec.

Inc. June, 1914, in Calif. Cap., \$150,000; shares \$1 par; outstanding, \$90,000. Transfer office: 600 Call Bldg., San Francisco. Annual meeting, January 1.

Condensed balance sheet for 1915 shows: assets, \$110,778. Liabilities include: capital stock, \$90,000; surplus, \$10,782; other liabilities, \$9,996. Gross earnings to Jan. 1, 1916, reported as \$55,239 with operating expenses of \$40,958.

Property: 713 acres on Soscol ranch, 6 miles N. E. of Vallejo, Solano Co., is said to show cinnabar ore occurring as bunches in sandstone and shale over a width of 2' to 30'. Developed by 320' shaft and tunnels; greatest depth of workings, 320'. Management reports 12,000 tons ore blocked out, average assay 0.40% quicksilver.

Equipment: includes a 25-h. p. gasoline hoist, two 7½-ton Neate and one 15-ton Scott furnace, capacity 30 tons daily.

Production: to Jan. 1, 1916, 7,000 tons ore, yielding 64,432 lbs. quicksilver; 9.27 lbs. recovered per ton of ore; cost per 75 lb. flask, \$52.44.

ST. JOSEPH LEAD CO. MISSOURI

Offices: 61 Broadway, New York and Bonne Terre, Mo. Officers: Clinton H. Crane, pres. and chairman Ex. Comm.; Hugh N. Camp, Jr., v. p. and treas.; Irwin H. Cornell, v. p. and sales mgr.; L. H. Besson, sec.; preceding are directors, with Ben Blewett, Daniel C. Catlin, Firmin Desloge, Max Kotany, M. F. Watts, all of St. Louis, Gust. Setz, San Antonio, Charles M. Chapin, F. W. Shibley, New York, and E. C. Smith, Vermont. C. J. Adami, gen. mg., W. A. Smith, mgr. of Herculaneum plant.

Inc. March 25, 1864, in New York. Cap., \$20,000,000; shares \$10 par; outstanding \$14,094,660. Annual meeting, third Monday in Feb. Transfer office: 61 Broadway. Registrar: New York Trust Co. Stock traded in on New York Curb. Bonded debt retired Jan. 1, 1916.

Dividends: 1885-1912, 6%; 1913, 5%; 1914, 2½%; 1915, 4%; 1916, 5% to June 20th.

Comparative General Balance Sheet:

Assets—

	Property & Equip.	Invest's	Working Assets	Cash & Accts. Rec.	Defer'd Accts.	Other	Total
1915	\$10,712,066	\$8,641,497	\$413,951	\$721,307	\$318,204	\$ 31,381	\$20,838,496
1914	10,797,051	9,684,793	763,504	648,943	379,637	512,797	22,776,728

Liabilities—

	Capital Stock	Miss. & B. T. Loan	Gold Notes	Accts. Payable	Due Affil. Cos.	Reserves & Surplus	Total
1915	\$14,094,600	\$2,359,769	.....	\$213,612	\$559,918	\$3,610,537	\$20,838,436
1914	14,094,050	2,415,934	2,239,000	502,276	618,476	2,906,992	22,776,728

Gold notes of the Miss. River & B. T. Ry. amounting to \$154,588 have been taken up.

Summary of Operations 1914-1915 (as reported in the Mining & Scientific Press):

	Lead Output	Value per Ton	Net Profit	Total Income	Net Income	Surplus after Divide.	Previous Surplus	Final Surplus
1915	84,356	\$90	\$4,283,425	\$4,392,360	\$3,489,064	\$1,908,883	\$9,416,629	\$11,415,512
1914	77,404	74	2,317,040	2,427,686	1,547,275	1,273,580	8,237,190	9,416,629

Subsidiary bonds: Miss. River & Bonne Terre Ry. 1st M. 5%, sinking fund gold bonds, due Oct. 1, 1931, \$2,394,922. During 1915, the company reduced its indebtedness by \$2,428,313; this reduction in debt saves the

company about \$130,000 per year in interest charges, exclusive of sinking fund.

The company is the largest independent lead producer in America and the second largest after the A. S. & R. Co. It owns over \$20,000 acres of land in the Southeastern Mo. lead district, in St. Francois and Jefferson counties, power plants, mill, smelting plants, the entire \$3,000,000 capital stock of the Miss. River & Bonne Terre Railway, except directors' qualifying shares; also \$483,940 of the \$500,000 capital stock of the Bonne Terre Farming & Cattle Co. and 98% of the capital stock of the Doe Run Lead Co.; the Miss. & Bonne Terre Ry. owns the St. Francois Co. R. R. Co.

The holdings are in the disseminated lead ore region of S. E. Missouri, where production from ores in the lower Bonne Terre dolomite began in 1869. The producing area is within 5 miles of the towns of St. Francois and Desloge. There are four companies operating and six concentrating mills in commission, those of the St. Joe Co. and its subsidiary handling 8,000 tons out of a total of 17,500 tons daily output.

In 1915, ten shafts were operated that furnished the ore for the old 1500-ton mill at Bonné Terre, for the 1500-ton mill at Owl Creek, and for the 4200-ton Doe Run mill at Rivermines in the Flat River district. The flotation process has recently been adopted by the company.

In 1914, the company finished reconstructing its smelting plant at Herkulaneum, Mo., and now has one of the most modern lead smelters in the country, capable of treating 12,000 tons of concentrates per month. Materials treated are lead concentrates from the company's mills at Bonne Terre, Leadwood and Doe Run; concentrates said to assay from 65 to 74% lead, 14% sulphur, and 1 to 5% zinc.

Equipment includes 8 Dwight-Lloyd sintering machines, 42x264", and 4 blast furnaces 42x192". Recovery of the plant is over 98%. Concentration practise at company's mills and in neighboring plants is fully and well described in Metallurgical and Chemical Engineering, July 15, 1916, p. 93.

The power plants of the St. Joseph and Doe Run Lead companies on a basis of 34,359,458 kw.-hr., showed a cost of 0.77 cts. per kw.-hr. Power consumption was equivalent to about 16.3 kw.-hr. per ton of ore mined and milled. Reported that a \$250,000 power plant will be built at Rivermines this fall; plant to be run in parallel with the present system.

Summary of 1914-1915 production:

Division	Tons Ore Milled	Tons Concentrates		Tons Lead Content		Recovery Per Ton Ore		
		1914	1915	1914	1915	1914	1915	1914
		Bonne Terre.....	592,687	506,123	37,033	28,326	23,146	18,668	78.7
Leadwood	490,283	515,948	36,973	35,601	24,971	23,796	101.8	
Doe Run.....	1,044,363	987,976	62,373	56,783	42,008	39,228	80.4	81.

Doe Run Lead Co.

Controlled through ownership of 98% capital stock by St. Joseph Lead Co., 61 Broadway, New York; Bonne Terre, and Rivermines, Mo.

Officers: Clinton H. Crane, pres., New York; F. H. Dearing, sec-treas., Bonne Terre, Mo.; preceding with Edward Whitaker and E. B. Pryor, St. Louis, and W. M. Harlan, Farmington, Mo., directors.

Inc. 1886, in Mo. **Cap.**, \$10,000,000; par \$100; outstanding, \$6,574,900. Stock transferred at company's office in Mo. Annual meeting, second Saturday after first Monday in Nov. at Bonne Terre, Mo.

Proceedings are under way for dissolution of the company.

Comparative General Balance Sheet:

	Assets—	Property & Equip.	Working Assets	Due from Affil. Cos.	Cash	Misc.	Total
1915	\$14,417,547	\$246,805	\$444,890	\$206,910	\$27,034	\$15,343,188	
1914	14,509,283	151,265	509,382	53,705	41,165	15,264,800	

Liabilities—

	Capital Stock	Bonds & Notes	Current	Due Affil. Cos.	Reserves & Surplus	Total
1915	\$6,574,900	\$1,039,500	\$136,753	\$ 48,558	\$7,543,476	\$15,343,188
1914	\$6,578,300	1,039,500	99,183	1,239,477	6,308,340	15,264,800

The \$986,000 bond issue has been paid since Jan. 1, 1916.

Property: in 1907 the properties of the Union Lead Co. and the Columbia Lead Co. were purchased. Company now owns about 6,700 acres of ore land in the Flat River district of the S. E. Missouri lead district.

ST. LAWRENCE PYRITES CO.**NEW YORK**

Offices: 41 Broad St., New York and DeKalb Junction, St. Lawrence Co., N. Y. **Officers:** Edward E. Thalmann, pres.; F. T. Rubidge, v. p.; W. J. Kingsbury, sec.; R. M. Atwater, Jr., treas.; O. F. Pattberg, supt. Controlled by Ladenburg, Thalmann & Co., New York.

Property: located in Hermon Twp., St. Lawrence Co., includes the Stella mines, and is one of the four largest pyrite mines in the U. S.

Ore: pyrite, occurring in lenses or veins in gneiss and schist. The orebodies strike and dip in the same general direction as the gneisses, strike N. E., and dip 20° to 30° N. W. The walls are not sharply defined; the average assay is about 21% sulphur.

Development: by 2 shafts 1,600' apart on parallel deposits. The north shaft, the Stella, is idle; here the orebody extends 1,100' along the strike, averages 10' in thickness and has been worked to a depth of 900' on the dip. The operating shaft, the Anna, opened by levels 50' apart vertically, has an orebody opened for 1,500' on the strike, and average thickness of 20'. The ore is put through a crusher at the shaft before sending to the mill.

Equipment: includes a 700-ton mill with gyratory crushers, trommels, rolls, Hancock and Harz jigs, Wilfley and Deister Machine Co. tables. In cold weather the concentrates, to prevent freezing, are dried in a Ruggles-Coles cylindrical dryer. Concentrate assaying 44% sulphur, is sold to sulphuric-acid manufacturers and to paper mills. Power is electrical, obtained from a hydro-electric company for about \$30 per h. p. per year. The property is thoroughly described in Eng. & Mining Journal, April, 1913, p. 689.

Production: approximately 150,000 tons ore per year, yielding about 60,000 tons concentrates.

ST. LOUIS COPPER CO.**MICHIGAN**

Office: 12 Ashburton Place, Boston. Mine office, Calumet, Houghton Co., Mich. Jas. MacNaughton, gen. mgr. **Inc.** in Michigan. **Cap.** \$1,000,000; shares \$25 par; fully issued. Is controlled by the Calumet & Hecla Mining Co., through ownership of entire share capital.

Property: lying next south of the Old Colony, east of the Laurium and S. E. of the Calumet & Hecla, was opened 1844, as the New York & Michigan, under permit from the Federal War Department, and later became the Washington, changing that name eventually to the present title. Lands 800 acres, being S. ½ of Sec. 19 and W. ½ of Sec. 20, T. 56 N., R. 32 W.

In very early days a shaft showing some fine copper was sunk at the junction between the trap belt and the eastern sandstone. Idle until 1910, when exploratory work was resumed. A cross-section of the formation was made, 1910-12, and ground broken for a shaft, on the St. Louis amygdaloidal bed, July, 1911. The shaft was 600' deep, Aug., 1912. Diamond drilling, in 1912, failed to locate the extension of the so-called Mayflower lode and operations were suspended.

Equipment: includes a 14x18" duplex-cylinder Lidgerwood hoist, with 5' drum, good for one-half mile depth, and a 12-drill air compressor. Google

ST. LOUIS SMELTING & REFINING CO.**MISSOURI**

Subsidiary of National Lead Co. Wm. W. Lawrence, pres. Address: St. Louis, Mo. Inc. in Mo. Cap., \$2,000,000. Controls 1,295 acres of lead-zinc land in St. Francois Co., Mo. Operates 6 shafts, 400' average depth.

Owms and operates a mill, built 1900, with a daily capacity of 2,500 tons. (See article on Concentration and Flotation of Lead Ores of S. E. Missouri, Met. & Chem. Journal, July 15, 1916, p. 93.)

ST. MARY MINING CO.**UTAH**

Office: 601 Providence Bldg., Duluth, Minn. Mine office: Milford, Beaver Co., Utah. Officers: Hansen Ev. Smith, pres.; J. Eton Bowers, v. p.; Paul M. T. Thompson, sec., all of Duluth. W. D. Ryan, mgr. Inc. 1908, in Arizona. Cap., \$500,000; shares \$1 par; assessable.

Property: 4 claims, 3 of 30 acres area, patented, near the Moscow and Red Warrior mines, on the east side of Topache peak, 4 miles from Milford in the Star district. Claims show 5 contact veins between limestone and an igneous intrusive. Orebody under development claimed to average 17% copper, 10 oz. silver and one carload said to have returned \$76 per ton. Development: by a 165' shaft with several hundred feet of drifts.

The mine, opened 1870, produced until 1890. Again opened, 1909, and operated intermittently, producing about 250 tons of ore annually.

ST. MARY'S MINERAL LAND CO.**MICHIGAN**

Office: 705 Sears Bldg., Boston, Mass. Mine office: Houghton, Houghton Co., Mich. Officers: Geo. Peabody Gardner, pres.; Chas. J. Paine, v. p.; Walter Hunnewell, v. p.; Chas. J. Paine, Jr., sec.-treas.; preceding with E. V. R. Thayer, W. Cameron Forbes, Albert S. Bigelow, Thos. N. Perkins, Charles E. Perkins, Richard Olney and Chas. N. King, directors; A. E. Coe, asst. treas.; Fredric W. Nichols, resident agt.; Dr. Lucius L. Hubbard, cons. geologist.

Inc. March 4, 1901, in New Jersey. Cap., \$5,000,000; shares \$25 par; issued, \$4,000,000. Controls, through ownership of entire stock issue, except founders' shares, the St. Mary's Canal Mineral Land Co., a corporation inc. 1863, in New York, to acquire 180,000 acres of land given by the state of Michigan for the construction of the first ship canal at Sault Ste. Marie. These lands in Houghton, Ontonogan and Keweenaw counties, Mich., formerly included the tracts on which the Calumet & Hecla, Baltic, Trimountain, Champion, Ojibway and other mines have been developed. Company has about 400 shareholders. Shares are listed on the Boston Stock Exchange. Old Colony Trust Co., Boston, registrar. Annual meeting, first Wednesday in March, in Jersey City, N. J.

Income of the company consists mainly of dividends from the Champion Copper Co., with a small but steady income from sales of lands, timber and wood, and occasional but irregular large receipts from sales of mineral lands. The balance sheet of Dec. 31, 1909, gave quick assets of \$4,489,273, and on Dec. 31, 1915, the company had \$289,544 cash on hand, with notes receivable, \$34,446, and was without liabilities.

Receipts for the year ending Dec. 31, 1915, were \$1,693,310, of which \$1,550,000 was from dividends of the Champion Copper Co.

Share assets of the company Dec. 31, 1915, were: 50,000 shares Champion Copper Co.; 25,000 shares Mayflower M. Co.; 20,165 shares La Salle Copper Co.; 79 shares Hancock Cons. Mng. Co.; 20,000 shares Pacific Copper Co.; 37,222 shares Houghton Copper Co.; 1,571 shares Franklin Mng. Co.; 2,000 shares Ojibway Mng. Co.; 56,778 shares Winona Copper Co.; 208 shares Copper Range Cons. Copper Co.; 640 shares St. Mary's Mineral Land Co.; 80 shares Old Colony Copper Co.; 8,340 shares Naumkeag Copper Co.; 17,902

shares Douglass Copper Co.; 10 shares Amphidrome Co.; 100 shares D. A. Stratton Co.

From 1863 to 1900 the old company paid cash dividends of \$2,200,000, and also paid stock dividends of 1 share of Tamarack, 1884; 1 share of Iroquois, 1890; 1¼ shares of Baltic and one-half share of Winona, 1898; 1 share of Old Colony and 1½ shares of Trimountain in 1899.

Dividends: (of the present company)

1903	\$1	1911	\$ 3
1904	1	1912	3
1905	2	1913	3
1906	4	1914	0
1907	5	1915	8(b)
1908	0	1916	11(a)
1909	1		
1910	1(c)		

(a) Including dividend declared Aug. 8, 1916. (b) Not including North Lake and Hancock stock distributions equivalent in cash to \$2.59 a share. (c) Not including Franklin stock distribution equivalent to \$4.

Property: Jan. 1, 1916, consisted of 93,012.69 acres freehold, with mineral rights to 14,132.96 acres additional, property being scattered along the Lake Superior copper belt, with principal holdings on the South Range, S. W. of Houghton, in Houghton and Ontonagon counties.

The company, since its reconstruction, in 1900, has refused to sell its mineral lands outright, preferring to join with other land holders in the formation of new companies, taking pay for its lands in shares, on a pro rata basis, or partly in shares and partly in cash. This policy involves heavy outlays for exploratory and development work, but has resulted in giving the company a half interest in a new mine, the Champion, which is capable, alone, of furnishing funds to St. Mary's company for both dividends and development work elsewhere, and a continuance of this policy must result in time in making St. Mary's Mineral Land Co. the part or sole owner of a number of fine mines. Owing to the great extent of its lands, located mainly on the Keweenaw copper belt, stretching along the mineral range for scores of miles, the landed holdings of the company are of great potential value. The management is vigorous and far-seeing.

ST. PATRICK MINING & MILLING CO.

UTAH

Idle. Office: 855 Sherman Ave., Salt Lake City, Utah. Mine office: Hughes Canyon, Salt Lake Co., Utah. Officers: D. A. Buck, pres.; H. H. Paterson, v. p.; B. A. M. Froiseth, sec.-treas.

Inc. March 17, 1906, in Utah. Cap., \$50,000; shares 20 cts. par; non-assessable; issued, 180,000 shares.

Property: 6 claims, unpatented, 7 miles from railroad, opened by shaft and tunnel, with about 650' of workings, showing gold and silver-copper ore. Annual assessment work only being done.

ST. PAUL MINING & REDUCTION CO.

COLORADO

Silverton, San Juan Co., Colo. Norwood Johnson, pres. and treas.; J. B. Ross, v. p. and gen. mgr.; Frank L. Ross, sec. Inc. March, 1908, in Colorado. Cap., \$100,000; shares \$1 par.

Property: the St. Paul group, in the Red Mountain district, an old mine that formerly shipped some ore netting \$1,000 per carload. The mine has a 300' shaft, with levels at 200' and 300', developing small but rich ore shoots, said by former management to carry about 8% copper, 10% lead, 10% zinc, 5 to 10 oz. silver and 1 oz. gold per ton. Since 1914 the mine is being worked by lessees, who are sinking a shaft, said to be in solid ore averaging \$6 per ton.

ST. PAUL MONTANA MINING CO.**MONTANA**

Maiden, Fergus Co., Mont. **Officers:** O. L. Taylor, pres.; Chas. W. Ames, Sr., v. p.; C. L. Ames, treas.; with L. P. Ordway and E. B. Coolidge, directors. **Inc.** in Ariz.

Property: 2 patented claims, at Maiden, said to show gold ore in contact deposits between porphyry and limestone. Developed by a 640' vertical shaft, with 5,000' of underground workings. Ore claimed to assay \$3 to \$5 per ton and property is said to have produced \$4,000,000. Has recently been under lease.

Equipment: includes a hoist and air-compressor; reported as building a cyanide plant.

ST. REGIS COPPER MINING & MILLING CO.**MONTANA**

Office: Missoula, Mont. **Mine office:** St. Regis, Missoula Co., Mont. **S. J. Wilson,** pres.; **F. W. Wilson,** sec.-treas. **Inc.** May, 1901, in Montana. **Cap.,** \$300,000; shares \$1 par; in half preferred and half common stock.

Property: 5 claims, also a 15-acre mill site and miscellaneous lands, 180 acres, on the Northern Pacific railway, shows quartzite and shale, with 2 orebodies under development of 6' estimated average width, carrying chalcopryite ore said to give average assays of 8% copper and \$1.50 gold per ton. **Development:** by tunnels of 60', 380', 800' and 600'. Presumably idle.

ST. REGIS MINING CO.**MISSOURI**

Duenweg, Jasper Co., Mo. **E. R. McClelland,** pres.-treas. **Inc.** in Sept., 1915. **Cap.,** \$100,000.

Company took over the 40-acre lease of the old American Beauty mine, N. W. of Duenweg, which had been idle for some time owing to low price of spelter. The company unwatered the property which is developed by two 208' shafts in sheet ground formation; said to have a 20'-25' ore face, and built a 350-ton concentrator. **Equipment:** includes 4 gas engines, 2 compressors, two 100-h. p. boilers and a change house.

SALIDA COPPER CO.**COLORADO**

Address: care: Wm. Tudor, treas., St. Botolph Club, Boston, Mass. **Mine office:** Salida, Chaffee Co., Colo.

Inc. Oct. 26, 1908, in Arizona. **Cap.,** \$500,000; shares \$1 par. Controls the Mountain Mining Co., of Georgetown, Clear Creek Co., Colo., through stock ownership. Property was formerly held by the Shawmut Consolidated Copper Co., which this company seems to have succeeded.

Property: the Sedalia mine, also various unpatented claims, about 200 acres, 5 miles from Salida. The Sedalia mine has a vein of 35 to 40' estimated average width, carrying oxidized copper ores, mainly below smelting tenor, to shallow depth, succeeded by chalcopryite ore said to average 3 to 4% copper and \$1.40 per ton in combined gold and silver values, but also carrying an average of 4.5% zinc. **Development:** mainly by a 2,000' tunnel to depth of 700' and is said to have about 2½ miles of workings. **Equipment:** includes electric power and an 8-drill air compressor and the mine is connected with the mill by a 1½-mile tramway. 12 men employed and regular shipments made during 1915.

The 50-ton reduction plant, known as the Colorado mill, includes a concentrator and leaching plant; the latter has been idle for several years.

SALISBURY COPPER CO.**NORTH CAROLINA**

Idle. **Address:** Capt. W. M. Wiley, Salisbury, N. C. **Mine** near Gold Hill, Rowan Co., N. C. **T. B. Brown,** pres.; **W. S. Blackmer,** sec.-treas.

Inc. 1904, in Arizona. **Cap.,** \$100,000; shares \$100 par.

Property: 50 acres, freehold, showing altered schists, carrying a fissure vein with N.-E. strike, and estimated at 4' width. Developed by a 100' shaft, showing chalcopryite reported to average 5% copper and \$5 gold per ton.

Ore can be treated by flotation and property probably worthy of careful prospecting.

SALMON RIVER MINING CO.**NEVADA**

Office: 19 West Granite St., Butte, Mont. Mine near Contact, Elko Co., Nev., carries gold and silver-bearing copper ore. Had gasoline power and a small smelter. Not operating, 1916.

SALT LAKE-CALIFORNIA COPPER CO.**CALIFORNIA**

Office: 302 Hooper Blk., Salt Lake City, Utah. Mine office: Smith River, Del Norte Co., Cal. **Officers:** W. Mont Ferry, pres.; Isaac Sparey, v. p.; J. H. Turner, sec.-treas. and gen. mgr.; preceding with C. W. Hoover, Jas. Ivers and E. A. Mehse, directors.

Inc. Nov. 29, 1907, in Utah. Cap., \$1,000,000; shares \$1 par; nonassessable; issued, \$841,615.

Property: 10 claims, unpatented, near Smith river, in the Low Divide district, 120 miles S. W. of Grants Pass, on the S. P. R. R. and 12 miles from the coast. The mine, which was one of the first copper properties on the Pacific coast, was operated 1857-67, when closed by the low price of copper. Claims show 4 parallel shear zones, with prominent gossans, traceable about 3 miles, ore occurring in lenticular masses and shoots, in serpentine or altered peridotite. The zone has a N.-S. strike, and average dip of about 70°, the orebodies, 3' in width, carrying chalcocite and chalcopyrite, estimated to average 2½% copper, \$4.50 in gold and 75c in silver.

Development: by 180' shaft and several tunnels, with about 3,500' of workings. Old workings extend down to the 500' level, but none of the main veins were located.

Equipment: includes 3 buildings. Frank Zaar is developing the Big Bonanza claim, 1915-16; the company itself has been inactive several years.

SALT LAKE COPPER CO.**UTAH**

Office: 11 Broadway, New York. Operating office: McIntyre Bldg., Salt Lake City, Utah. Mine office: Lucin, Box Elder Co., Utah. **Officers:** Frederick Lewisohn, v. p.; E. C. Westervelt, treas.; other directors, Walter Lewisohn, S. W. Peck, E. H. Westlake, E. J. Macnamara, O. B. Van Sant and Geo. B. Wilson, mgr.

Inc. Oct. 10, 1906, in Maine. Cap., \$2,200,000; shares \$10 par. Debentures, \$59,000, at 6%, payable out of net earnings.

Property: 108 claims, known as the Copper Mountain mine, at an elevation of 7,200' above sea level, in the Newfoundland district, and 100 acres within the limits of Salt Lake City.

The Copper Mountain mine has a number of tunnels and shafts, the 1,500' main tunnel having a back of about 400', and a 500' tunnel has been planned to be driven 1,200', to enter the hoped-for sulphide zone. The mine has upwards of 2 miles of workings, and is estimated to have in sight and blocked out 75,306 tons of copper ore of 1.1% average tenor, not at present commercial ore. For the last few years the mine has been worked by lessees.

SALT LAKE TUNGSTONIA MINES CO.**NEVADA**

Office: 212 Kearns Bldg., Salt Lake City, Utah. **Address:** R. W. DeWitt, supt., Tungstonia, via McGill, Nev. I. W. Robbins, pres.-mgr.; Gustav Wissler, v. p.; A. F. Stumpf, sec.; J. A. Rasmussen, directors.

Property: 7 claims adjoining the Shepherd or Ophir mine, in north end of Snake river range, shows a number of veins 1'-21' wide, carrying hübnerite ores said to average 2% tungstic acid. The veins occur in granite, near a limestone contact.

Company is erecting a 20-ton mill, using Marcy ball mill and Wilfley tables.

SALTESE MINING & MILLING CO.**MONTANA**

Office: 22 Symons Blk., Spokane, Wash. Mine near Saltese, Missoula Co., Mont. Officers: J. C. Johnson, pres.; Wm. Daxon, v. p.; O. V. Manning, sec.-treas.; preceding with J. B. Ward and G. A. Turner, directors.

Inc. March, 1911, as the successor of the Saltese Cons. Copper Mng. & Mfg. Co. Cap., \$1,500,000; shares \$1 par; assessable. Levied an assessment of .02c per share, Jan. 12, 1914.

Property: 12 claims, 240 acres, east of Mullan, near the National mine in the St. Regis district, about 8 miles N. W. of Saltese. Development: by 2 tunnels aggregating 1,400'. The lower one, 655' in length, opens a 13' vein, probably the Black Traveler vein, at 460' from the portal, which is said to show 5' of high-grade copper ore. The tunnel is being extended to cut the big iron-capped vein seen on the surface. Developing with a small force, 1915-16. Property considered promising.

SALTILLO, S. A.; COMPANIA MINERA DEL.**MEXICO**

Office: Primera de Galeana No. 2, Saltillo, Coahuila, Mex. Mine near Mazapil, Zacatecas, Mex. Lic. Miguel Cárdenas, pres. Inc. June 15, 1899, in Mexico. Cap., 100,000 pesos; shares 100 pesos par; fully paid. Dividends: were 10,000 pesos in 1907; 15,000 pesos in 1908. Annual meeting, Jan. 31, each year.

Property: the Jesus Nazareno mine with 116 acres of mineral land and 2,099 hectares of miscellaneous lands, in the Nazareno mining district of Mazapil, 10 miles from a railway. The mine has an orebody carrying auriferous lead and copper sulphides sufficiently developed to produce 1,000 metric tons of silver-lead ore monthly. Equipment: includes 5-mile private tram line, and 135-h. p. gas and electric plant. Presumably closed down owing to Mexican revolution.

SAMSON MINING CO.**UTAH**

Subsidiary of the Bingham Mines Co.

SAN ANTONIO COPPER CO.**MEXICO**

Address: Geo. J. Eisele, sec.-treas., Iron Mountain, Mich. Mine office: San Antonio de la Huerta, Sonora, Mex. Officers: Otto C. Davidson, pres.; Dr. J. A. Crowell, v. p.; preceding with John Uno Sebenius, D. M. Clemson, Hon. Richard C. Flanagan, E. G. Kingsford and W. H. Johnston, directors; John E. McIntyre, supt.

Inc. Sept. 23, 1908, in Arizona. Cap., \$2,500,000; shares \$10 par; issued, \$1,000,000 full paid and \$1,000,000, with \$3.50 paid on the latter. Direct title is held through the San Antonio Copper Co., S. A., inc. April 12, 1908, in Mexico, with all stock owned by this company. Annual meeting, second Monday in April.

Property: 9 groups, about 7,500 acres, with 2,000 acres about 3 miles from San Antonio de la Huerta, near the Yaqui river. The property was worked 1862 in a small way.

Lands show a mineralized zone of 200 to 500' width. Ore includes high-grade oxides and carbonates, with sulphides of good average tenor, there being a considerable quantity of chalcocite, giving assays up to 11% copper. Development: consists of 20 tunnels with 15,000' total workings, opening 7 separate orebodies in 2 tunnels, with 4,000' of workings in ore. Mr. Dwight E. Woodbridge estimated, March 4, 1910, that the San Antonio had exposed on one plane, 300,000 tons of ore, figured conservatively, averaging 7% copper, with very low values in the precious metals, and that the newer tunnels should increase this tonnage five-fold. Railway connections to within 2.2 miles of the main tunnels were secured, 1910, and will be extended to the tunnel mouth as soon as peace prevails again. Operations suspended on account of revolutionary disturbances. Property considered promising.

SAN ANTONIO MINING CO.**COLORADO**

Office: 312 Century Bldg., Denver, Colo. Mine office: Red Mountain, Ouray Co., Colo. **Officers:** M. T. Chestnut, pres. and gen. mgr.; Otto Koehler, v. p.; Wm. L. Stephens, sec.-treas., J. F. Roper, supt.

Inc. Feb. 5, 1908, in Colorado. **Cap.**, \$500,000; shares \$1 par.

Property: 37 claims, patented, about 200 acres, a 20-acre mill site and 10 acres miscellaneous lands, 1 mile from a railway, in the Red Mountain district of Ouray and San Juan counties. Lands, including the Carbon Lake mine, show porphyry, carrying several orebodies, estimated at 20 to 30' width, traceable for more than 3,000' and reported by the company to show enargite ore carrying 12% copper, 10% lead, 10 oz. silver and \$3 gold per ton, which is from a narrow paystreak.

Development: by shafts of 37' and 200', the Camp Robber tunnel of 625', and the Koehler tunnel of 2,800', with a back of about 500'. **Equipment:** includes a 5-drill air compressor and 10 mine buildings and dwellings. Idle several years.

SAN BERNABE y ANEXAS; COMPANIA MINERA.**MEXICO**

Zacatecas, Zac.; Mex. C. A. Bentley, mgr., at last reports. **Property:** 25 hectares, including La Confianza, El Faro and La Fama mines, west of the Malancho mine, includes the oldest mine in Zacatecas, discovered about A. D. 1546, which was a considerable producer of silver. Property formerly was under option to an English company, but option was dropped after unwatering the old shaft. Ore is copper, associated with some lead, values being mainly in silver. Idle.

SAN BERNARDO MINING CO.**MEXICO**

Is the Mexican incorporation of the Southern Sonora Development Co., controlled by the Sonora Central Mines Co.

SAN FELIPE MINING CO.**MEXICO**

Hostotipaquillo, Jalisco, Mex. Cof. N. Z. Seitz, pres. and gen. mgr. **Inc.** 1902, in Arizona. **Cap.**, \$1,000,000; shares \$1 par. **Property:** includes a 50-ton mill. The company is said to have paid dividends from stock sales and was considered by Horace J. Stevens as a rank bit of stockjobbery. Idle and probably defunct.

SAN FRANCISCO MINES OF MEXICO, LTD.**MEXICO**

Parral, Chihuahua, Mex. Harold A. Searle, sec., 65 London Wall, London, E. C., Eng. Rt. Hon. Earl of Denbigh, chrm. board of directors. Reg. March 27, 1913 in England. **Cap.**, £650,000; outstanding £350,000; shares £1 par. **Bonds:** £200,000 convertible first mortgage debentures, in denomination of £100 and £20 each; int. payable April and October 1, was paid to Oct. 1, 1914; payment of the next six half-yearly instalments has been postponed for a period of 3 years so that in each of the 6 half years ending Oct. 1, 1920, a year's interest will become due, and on the postponed interest 6% interest will be allowed.

Property: a group of silver, gold, lead and zinc mines, 194 acres, 14 miles from Parral, formerly worked by the San Francisco del Oro Mining Co., Ltd. Examined by Knox and Allen, New York. Property covers nearly 1½ miles on the strike of the San Francisco vein, a fissure lode in limestone. The oreshoot worked has a length of 2,600' with minimum width of 5½'; 4th level is in primary ore; ore minerals are galena, blende, pyrite, and chalcopryite.

Development: by 3 shafts, and 5 levels; deepest shaft, 484'. **Ore reserves:** estimated at 390,000 tons; average grade, 21 oz. silver, 1.4 dwt. gold per metric ton, 12.5% lead and 17.4% zinc. The ore is delivered to the mill by aerial tram. Many mistakes were made in the original design and construction of the mill, but present management has started to reconstruct it.

adding flotation equipment and when rebuilt it will have a daily capacity of 200 tons.

The property has been forced to suspend operations temporarily as a result of the Mexican revolution.

SAN JUAN REDUCTION CO.

MEXICO

San Antonio, Baja Calif. Paul Knapp, gen. mgr.; J. C. Puttner, mine mgr.; David Lawrence, mill supt. Operates a mine yielding gold-bearing arsenopyrite ore, 5 miles E. of Triunfo.

The reduction plant has dry rolls, Hardinge mills, roasting furnaces and cyanide tanks.

SAN LAZARUS MINES CO.

NEW MEXICO

Idle. Office: 2837 Hennepin Ave., Minneapolis, Minn. Mine near San Pedro, Santa Fé Co., N. M. Officers: R. C. Thompson, pres.; Dr. Edw. Gorgon, v. p.; L. J. Hemen, sec.; Clarence R. Thompson, treas.; Geo. W. Churchill, gen. mgr.

Inc. March 9, 1904, in New Mexico. Cap., \$2,000,000; shares \$1 par; nonassessable; issued, \$1,500,000.

Property: 10 claims, unpatented, 200 acres, shows a contact deposit between syenite and limestone, of 3' average width, N.-S. strike and dip of 15 to 25°. This deposit carries copper carbonates and chalcopyrite ore estimated by the management to average 3 to 12% copper, without lead or zinc, 15 oz. silver and \$2 to \$6 gold per ton. Lands are in 3 groups, 2 miles from San Pedro, adjoining the Santa Fé Gold & Copper Mining Co. **Development:** by a 405' incline shaft, and tunnels of 300', 350', 200' and 450', estimated to show 1,000 tons of ore.

Equipment: includes a small steam plant and 20-ton concentrator with Dodge crushers, Huntington mill and 1 Wilfley table. Have no recent information from company.

SAN LUCAS COPPER CO.

MEXICO

See El Magistral Copper Co.

SAN LUIS; CIA. BENEFICIADORA.

MEXICO

San Luis de la Paz, Gto., Mex. Owns the Ojo de Agua smelters. Idle.

SAN LUIS MINING CO.

MEXICO

Office: 15 William St., New York. Mine office: Panuco de Coronado, Durango, Mex. Officers: David F. Beggs, pres. and treas.; C. P. Jacobs, F. C. Hanford, W. B. Raymond, Wm. T. Read and Walter S. Logan, Jr., directors; Myra B. Martin, sec.

Inc. 1900, in West Virginia, and cap. increased, 1905, to \$3,000,000; shares \$1 par. First dividend, 1%, was paid Jan., 1906, and a second dividend was paid July, 1906, both unearned. Direct title to this property apparently is held in the name of Lucia Mining Co. Annual meeting, last Tuesday in February.

Property: 225 pertenencias, 500 acres, and a 25-acre mill site, in the San Lucas and Pánuco de Coronado districts of Durango. The mineral property shows limestone and porphyry, carrying fissure veins and contact deposits, estimated by the management to average 3% copper, 12% lead, 1% zinc, 35 oz. silver and \$4 gold per ton, mainly from sulphide ores. The mines were discovered 1650, and worked more or less irregularly until 1830, when closed on account of water and Indian troubles, remaining idle until reopened, 1901, by the present company.

The Potosina mine is said to show, at the western end, a considerable body of ore of smelting grade and a large quantity of milling ore.

The San Gonzalo mine, 450' deep, has a vein showing mainly low-grade ores carrying silver values above, with copper on the lower levels, and is also reported to have a 2' vein carrying 25 kgs. silver per ton, with some gold.

The Sidney has a 2' vein of galena, giving assays up to 45% lead, 4 oz. silver and 3 grams gold per metric ton, opened by a shallow shaft, but has been idle for some years on account of water.

The San Lucas mine, 19 hectares, about 35 miles N. W. of Gabriel, is an old property claimed to have nearly 2 miles of workings, carrying mainly lead and zinc ores, and presumably is idle.

The San Pablo mine has parallel veins said to carry 6 to 36" paystreaks of sulphide ore, giving assays up to 16% copper, 360 oz. silver and 14 grams gold per ton. Development is by an abandoned incline shaft and a 175' vertical shaft, latter equipped with headgear and hoist.

Equipment: includes steam plants, claimed to aggregate 750 h. p. with 6 hoists and 2 air compressors of 12 drills combined capacity. Buildings include a machine shop, carpenter shop, smithy, offices, 4 general stores and a large number of dwellings for workmen, with a total of 175 buildings. The mill has 2 crushers, 1 jig and 4 Bartlett tables. Concentration seems to have proven more satisfactory than leaching.

The Trinidad leaching mill, of 120 tons claimed daily capacity, has 2 calcining furnaces and apparently treated only about 40 tons of ore daily, when in operation.

Idle on account of revolution.

SAN LUIS POTOSI SMELTER.

MEXICO

See Mexicana; Compañía Metalúrgica.

SAN MARTIN y ANEXAS, S. A.; COMPANIA MINERA.

MEXICO

Office: Aptdo 145, Oaxaca, Mex. Mine office San Martín de los Cansecos, Oaxaca, Mex. **Officers:** Frank M. Leonard, pres. and gen. mgr.; Lic. Jesús Acevedo, v. p.; Ranulfo Bravo, sec-treas. and supt.; preceding with Frank J. Woods and Alfredo Castillo, directors, at last accounts.

Inc. Jan. 15, 1907, in Mexico. **Cap.**, 400,000 pesos; shares 10 pesos par, in 35,000 fully paid shares and 5,000 assessable shares; issued, 37,995 shares.

Property: 53 pertenencias, including El Billete de Banco, King Dodo, La Liga, Las Virginias, La Maria and La Roseta mines, about 10 miles from Ocotlan. Property shows diorite cut by a 6' vein carrying silver ore assaying 5 kgs. silver and 50 grams gold per ton.

Development: a 160' shaft, on the Maria, an 80' shaft on the Billete de Banco and a 350' tunnel on La Liga claims.

The political conditions in Mexico have stopped operations. Property considered promising.

SAN MATEO, S. A.; CIA MINERA.

MEXICO

Idle. Velardena, Durango, Mex. Carlos Michaud, pres. **Inc.** 1911, as successor of the Hileta Gold & Silver Mining Co.

Property: 72 acres, including the Santo Tomas, Bolsa and other mines, and a 60-acre mill site. Claims are reported to show 5 fissure veins in limestone and porphyry, having a generally E.-W. strike.

Development: one vein of 12" to 3' width is developed by a 1,600' tunnel, with 6,000' of workings, carrying ore said to average 1% copper, 6% lead, 36 oz. silver and \$10 to \$50 gold per ton. **Equipment:** includes steam and gasoline hoists, good for 1,000' each, and a 3-drill air compressor. There are 9 buildings. Shut down several years on account of political conditions.

SAN PEDRO COPPER CO., S. A.

MEXICO

A Mexican corporation; subsidiary of the Greene Cananea Copper Co. **Officers:** Geo. Kingdon, pres.; H. B. Paull, v. p.; Geo. Young, sec-treas.; J. W. Allen, asst. treas.; Casey Stites and W. S. Harper, asst. sec'ys.; L. D. Ricketts, gen. mgr. **Directors:** L. D. Ricketts, Geo. Kingdon, H. B. Paull, Geo. Young, Casey Stites.

Inc. July 28, 1906 in Mexico. Cap., 5,000 shares; \$10 par (Mexican); all issued and outstanding. The entire capital stock is owned by the Greene Cananea Copper Co. Balance sheet Dec. 31, 1915 shows assets, \$1,664,311, which includes property and equipment, \$1,054,899; current, \$609,412. Liabilities: capital stock, \$25,000; current, \$1,333,989; surplus, \$300,321. Total income in 1915, \$176,906; expenditures \$128,969.

Principal mines are the Cananea Duluth and America; also owns the following claims: America Copper Belt, El Oriente, Las Dos Naciones, Seguro, Square, Swansea and owns a 40% interest in the Sierra de Cobre mines, the other 60% being owned by the Cananea Cons. Copper Co., S. A.

Production: 1915, 15,574 tons of ore, at a cost of \$2,935 per ton. The yield per ton was 2.63% copper; 1.317 oz. silver; 0.006 oz. gold. (See Greene Cananea Copper Co.)

SAN ROBERTO MINING CO.

MEXICO

Zacatecas, Zacatecas, Mex. C. A. Bentley, gen. mgr. at last accounts. The mine, opened to depth of 300', shows copper, lead and zinc ores, occasionally assaying up to 30% copper with good gold and silver values. The mine has given a limited production of excellent ore.

SAN SIMON COPPER CO.

ARIZONA

Idle. Office: Marquette, Mich. Mine office: Paradise, Cochise Co., Ariz. Officers: Nathan M. Kaufman, pres.; Hon. Norman W. Haire, v. p.; S. R. Kaufman, sec.-treas.; preceding with Thos. F. Cole, John A. Duncan, Wm. G. Rice and Thos. H. Collins, directors.

Inc. 1907, in Arizona, as a reconstruction of the Chiricahua Development Co. Cap., \$2,500,000; shares \$10 par.

Property: 40 claims, 7 patented, about 750 acres, 16 miles from nearest railway, at Rodeo, previously operated by Capt. Thos. Burns as a silver mine. Development: a 750' crosscut tunnel with a 100' winze 700' from the portal, cutting 50' of leached ore, apparently the apex of a sulphide orebody. Also the 400' Mars shaft, bottomed in chalcopyrite ore of 2 to 4% copper tenor. The 400' Planet shaft has drifts on the 4th level.

Equipment: includes two 150-h. p. boilers, two 2,000' Lake Shore double-drum hoists, and a 16-drill Sullivan air compressor. Only assessment work done in recent years.

SAN TOY MINING CO.

MEXICO

Office: Oliver Bldg., Pittsburgh, Pa. Officers: Donald B. Gillies, pres.; C. A. Blanchard, v. p.; with Wm. L. Abbott, Jas. E. Brown, R. R. Brown, G. A. Deitch, Jos. Dilworth, D. L. Gillespie, Geo. E. McCague and M. R. Ward, directors. Edward Hoopes, sec.-treas.; W. P. Paterson, asst. sec.

Inc. 1901, in Maine. Cap., \$7,000,000; shares \$1 par; outstanding \$6,000,000; in May, 1913, \$250,000 was cancelled, leaving, outstanding, \$5,750,000. Dividends: 6% in 1911; 1% in 1912; 2% in 1913; none since. Colonial Trust Co., Pittsburgh, transfer agent. Commonwealth Trust Co., Pittsburgh, registrar. Annual meeting, third Monday in February at Augusta, Me. Stock listed on Pittsburgh Stock Exchange and New York Curb. Controlled by Chas. M. Schwab and associates. Shortly after flotation of the company stock sold up to \$1.25 per share, it has since sold down to 11c.

Comparative General Balance Sheet:

Assets	Mines & Equip.	Supplies	Accts. Rec.	Cash	Total	
1915	\$5,865,564	\$12,156	\$ 4,114	\$290,412	\$6,172,245
1914	5,864,172	18,085	11,209	346,155	6,239,621
Liabilities	Cap. Stock	Undiv. Profits	Reserve	Accts. Pay.	Total	
1915	\$5,750,000	\$352,274	\$67,236	\$2,735	\$6,172,245
1914	5,750,000	420,849	68,772		6,239,621

Comparative Statement of Earnings (years ending Dec. 31).

	Gross Value	Expenditures	Net Earn. & Misc. Inc.	Dividends	Surplus year	Balance Surplus
1915...\$	19,552	\$100,956	\$(b)68,575		\$(b)68,575	\$352,273
1914...	64,950	172,139	(b)92,379		(b)92,379	420,850
1913...	334,728	184,905	132,428	\$115,000	34,928	513,229
1912...	314,884	(a)229,539	106,458	60,000	46,458	478,301
1911...	793,319	321,314	496,493	360,000	136,493	431,844
1910...	529,470	376,762	157,566		157,566	295,350

(a) After deducting \$10,597, cost value of 526 tons ore on hand, Dec. 31,

1912. (b) Deficit.

Property: 5 claims, the Bustillos, La Fortuna, Independencia, Juarez and La Central; in the Santa Eulalia district, 12 miles S. E. of Chihuahua, adjoining the Potosi mine of the Howe Sound Co. Ore: lead, silver, occurring in chimneys and "mantas" (beds or blankets) in limestone. For detailed description of geology of the district, see Trans. A. I. M. E., Vol. LI, pp. 57-99.

Development: the 2,060' La Central, 1,401' Alta, Juarez and Galdeano shafts, last two out of commission. New work totaled 2,396' in 1913, and 2,410' in 1914. In 1915 La Central shaft was sunk 400' and a small amount of drifting and crosscutting done in addition to 5,000' of diamond drilling, which was without any specific result.

Comparative Statement of Operations:

	Ore Tons	Silver Oz.	Silver Oz. p. t.	Lead Lbs.	Lead % Silver	Ave. Net Value Oz. Lead-Lb.
1914	2,918	110,824	31.5			51.48c
1913	7,129	554,181	78.5			57.45
1912	7,851	485,712	66.3	260,989	1.8	60.07
1911	12,173	1,433,071	117.7	1,275,778	5.9	51.87
1910	20,181	879,492	43.6	1,584,528	3.9	52.10
1909	25,509	1,410,630	47.8	1,810,397	3.1	50.77

Ore is shipped to the smelter of the A. S. & R. Co., at Chihuahua. The political disturbances in Mexico have seriously hampered operations during the last three years; work was continued in a desultory way until September 9, 1915, when all American employees returned to the U. S. Operations will be resumed as soon as practicable.

SAN XAVIER COPPER CO.**MEXICO**

Idle. San Xavier, Sonora, Mex. C. C. Rountree, pres.; Wm. Foster, sec.; W. C. Laughlin, mgr. Inc. in Arizona. Cap., \$1,000,000; shares \$1 par and holds direct title to lands through the Cia. Minera de Cerro Verde, S. A., inc. in Mexico.

Property: 1,440 pertenencias, 3,500 acres, 80 miles east of La Colorado in the Hermosillo district, Sonora; also 300 pertenencias lying 24 miles to the southward and about 4 miles north of the Yaqui river.

SANDSTORM-KENDALL CONSOLIDATED MINES CO. NEVADA

Goldfield, Esmeralda Co., Nev. Officers: Geo. Wingfield, pres.; A. H. Howe, treas.; A. I. D'Arcy, mgr.

Inc. in Nev. Cap., 1,500,000 shares; \$1 par; assessable; outstanding 1,326,724. Listed in San Francisco.

Property: 70 acres at Goldfield, developed by shaft to 500' with a winze to the 700' level. Ore: gold in contact deposit between andesite and rhyolite. In April the company was doing development work on the 350' and 700' levels, seeking on the latter level "two large parallel veins. Both these veins were exposed on the 500' level, but at this depth the permanent water level had not been reached and the minerals were found to be too

widely disseminated through the great lode to permit of mining any large quantity of ore at a profit."

The mine is a prospect undergoing development.

SANTA FE GOLD & COPPER MINING CO.

NEW MEXICO

Office: 11 Broadway, New York. **Mine office:** San Pedro, N. Mex. **Officers:** E. J. Macnamara, pres.; Edw. H. Eckhoff, treas.; with Chas. N. King, Ernest W. Brown, M. Kaufman, Leon Raunheim, Frederick C. Fischer, Geo. B. Wilson, Oscar B. Van Sant, directors.

Inc. January 25, 1899 in New Jersey. **Cap.**, \$2,500,000; shares \$10 par. Old Colony Trust Co., -Boston, transfer agent; State Street Trust Co., Boston, registrar. Shares listed on Boston Stock Exchange and New York Curb. Annual meeting, fourth Tuesday in January.

Property: the San Pedro mine, 39,400 acres land, consisting of 3,400 acres of copper claims, and 36,000 acres of miscellaneous lands, comprising the San Pedro Grant in Santa Fe, Sandoval and Bernalillo counties, New Mexico. The San Pedro mine is 17 miles from Stanley on the New Mexico Central railroad.

Development: by a single 200' shaft and 1,600' adit on a blanket vein of 150' average thickness dipping at an angle of less than 15°, about half the orebody being workable. Ore as smelted averages 3% copper. The metal occurs as chalcopyrite, in a garnet and quartz gangue and is almost self-fluxing.

Equipment: includes a steam plant with hoist and 15-drill air compressor. The smelter at the mine has one 125-ton blast furnace, burning Colorado coke and producing matte of about 50% average copper tenor, which is shipped to El Paso, Tex., and Omaha, Neb., for conversion.

Employs 350 men, a good class of Mexican labor. Production started January 1, 1901, but smelting has been suspended many times since that date with mining development alone carried on until copper prices warranted the resumption of ore extraction and smelting operations.

	Production:	Copper	Silver	Gold	Cost per lb. copper (a)
		Lbs.	Oz.	Oz.	
1915 (c).....	1,747,090	24,570	2,104		10.6c.
1913	1,757,315	35,763	1,150		
1912 (b).....	801,895	13,133	494		
1907	1,223,457	17,625	786		14c.
1903	370,483				

(a) After crediting gold and silver. (b) Last 6 months. (c) May 24 to Dec. 31, inclusive.

Operations were suspended in 1914 at the inception of the European war; resumed May, 1915.

The property possesses a large tonnage of quite low-grade ore, besides a limited tonnage of smelting ore, recently developed. Company has no outstanding indebtedness, and can operate when copper prices are above 12c a lb. With the metal selling at a lower figure it is good policy to close down and conserve the ore supply.

SANTA GERTRUDIS CO., LTD.

MEXICO

(Controlled by Camp Bird, Ltd.)

Office: 1 London Wall Bldgs., London, E. C., Eng. A. A. Kelsey, sec. **Directors:** H. C. Hoover, chairman, F. W. Baker, L. Clerc, N. Craig, E. A. Govett, F. H. Hamilton, G. dePass, O. deRivaud.

Technical committee: R. J. Frecheville, J. A. Agnew, L. Chevillon, Wm. J. Cox, cons. engr. Hugh Rose, gen. mgr.

Departmental heads: general, C. A. Lantz; mining, T. C. Baker; accounting and purchasing, E. J. Craig; electrical, F. H. Walsh.

Inc. Dec. 31, 1909, in England. Cap., £1,500,000; increased Jan., 1911, from £1,275,000; shares £1 par; all issued and fully paid. (Camp Bird, Ltd., owns 1,126,901 shares.)

Company organized to acquire from Camp Bird, Ltd., an option to purchase the controlling interest in the Compania Minera de Santa Gertrudis y Guadalupe, owning the Santa Gertrudis gold and silver mines, for \$9,000,000 Mexican currency, approximately £922,130. Consideration for the option was £222,869, payable £20,000 cash and £202,869 in fully paid shares; the vendors also agreed to provide subscribers for 1,072,131 shares at par, and to provide £150,000 working capital, and also the purchase price of £922,130, the preliminary expenses to be repaid to vendors out of the first profits.

The name of the operating company is **Compania de Santa Gertrudis Inc.** Jan., 1910, in Mexico. Cap., \$250,000. Hugh Rose, gen. mgr. The company formed to treat the ores is known as **Compania Beneficiadora de Pachuca, inc.** in Mexico. Cap., \$500,000. Hugh Rose, gen. mgr. All shares in both these companies are owned by Santa Gertrudis Co., Ltd.

Balance Sheet: (year ending June 30).

Assets:	Property & Equip.	Investments (a)	Cash	Miscel.	Total
1915	£1,019,601	£503,507	£99,459	£17,722	£1,640,289

(a) Includes: cost of shares in Cia. Ben. de Pachuca, and Cia. de Santa Gertrudis, S. A., £252,100; Cia. de Santa Gertrudis, S. A., £2,459; Cia. Ben. de Pachuca, S. A., current account, £136,434; shares in Amistad y Concordia Aviado and Recuperadora £93,762; shares in the Messina Transvaal Dev. Co., Ltd., Messina. Zoutpansberg, Transvaal, South Africa, £18,750.

Liabilities:	Capital	P. & L. Acct.	Miscel.	Total
1915	£1,500,000	£130,394	£9,895	£1,640,289

Profit and Loss Account: for year ending June 30, 1915, shows receipts of £52,608, which includes £50,000 dividend declared by Cia. Ben. de Pachuca, S. A. Balance forward, £29,159, to which is added amount brought forward June 30, 1914, £101,526; total £130,685, of which dividend No. 4 paid Nov. 27, 1915, 1 s. per share, absorbed £75,000 and Director's remuneration of 1%, £291; leaving a balance of £55,393.

Dividends: 15% in 1911-12; 15% in 1912-13; nil in 1913-14, owing to unsettled conditions in Mexico and Europe; 5% in 1914-15, paid Nov. 27, 1915.

Property: 626 acres in the Pachuca mining district. State of Hidalgo, about 62 miles from Mexico City, examined by W. J. Cox, R. J. Frecheville, F. J. Pope and E. E. Chase. The ore carries silver-gold values in large fissure veins or crush zones, 50' to 100' wide in andesite. The great ore-shoot is 3,000' long, 18' thick and 600' high and prongs extend upward from the 800' or 900' level, but do not reach the surface.

Development: by shafts with extensive underground workings. New work in year ending June 30, 1915, totaled 15,838'.

Ore Reserves: estimated June 30, 1913, 1914 and 1915, respectively 1,047,000, 1,194,000 and 1,287,000 tons, the latter with an estimated recoverable content of 72,977 oz. gold and 14,595,567 oz. silver, recovery figured at 90%. At normal rate of production the present reserves would be sufficient for about 3½ years. Operating expenses under normal conditions about 18 s. 6d. per ton. For mining and milling practice, see Trans. A. I. M. E., Aug., 1916, pp. 1295-1332.

Equipment: includes a 60-stamp mill and cyanide tank; wt. of stamps, 1,550 lbs. Mill also contains 10 tube mills; capacity, 25,000 tons per month. Crushing commenced June 14, 1911.

Production: (years ending June 30).

	Tons	Value	Gold Oz.	Silver Oz.
1915	211,669(a)	£249,728	10,727	2,000,856
1914	293,836	498,754		
1913	263,554	631,718		

(a) Operations were at 52.7% normal rate. Ore consisted of 136,152 tons filling ore and 59,807 tons new ore; averaged 26 s. 2 d. per ton, of which 18.8% was in the form of gold and 81.2% silver.

STA. MARIA de la PAZ y ANEXAS, S. A.; C. M. B. MEXICO
Tejupilco, Mex. Inc. Aug. 20, 1913. Cap., 15,000 pesos. Owns the Helvetia mine carrying silver-copper ores, apparently but slightly developed. No returns secured.

SANTA MARIA DE LA PAZ; NEGOC. MIN. MEXICO
Office: 10 Cinco de Mayo, San Luis Potosi, Mex. Mine office: Matehuala, Catorce, San Luis Potosi, Mex. Pedro Barrenechea, pres.; Edgardo Mead, sec.; W. B. A. Dingwall, gen. mgr.

Inc. in Mexico. Cap., 240,000 pesos; shares 25 pesos par. From 1895 to 1904 inclusive, the mines yielded 11,327,210 pesos worth of ore, and the company paid 5,778,270 pesos dividends therefrom.

The mines, which are extensively developed, carry gold and silver-bearing copper and lead ores, with values mainly in silver and lead, the gold and copper being byproducts. The ores are mined to depth of 1,500'.

Equipment: includes steam and electric power. The reduction plant includes a 300-ton concentrator with Blake crushers and Chilean mills, and a smelter with two 40-ton furnaces. Company employed about 1,500 men, but closed down 1913, on account of revolution.

SANTA MARIA GOLD & COPPER MG. & REDUCTION CO. UTAH
Office: P. O. Box 517, Ogden, Utah. Mine office: Utah Hot Springs, Box Elder Co., Utah. Don Maguire, pres. and mgr. Inc. 1907, in Utah. Cap., \$500,000; shares \$1 par.

Property: well watered and fairly timbered, includes mill and smelter sites, lying in a very rugged territory in the Sierra Madre district of the Wasatch mountains. Land carries 7 fissure veins, practically parallel, with a strong cross-fissure, and 1 contact deposit. The veins range from 12 to 70' in width, and ore contains chalcopryrite, associated with pyrite and occasional small amounts of galena, ore being mainly of concentrating grade.

Development: by the 2,000' Clara Belle tunnel, cutting 3 veins, and planned to cut 5 more, with backs of 200 to 1,800'. The mine has about a mile of workings, showing ore developed regarded as sufficient to warrant a mill.

Equipment: includes a power house, air compressor, smithy and boarding house. Idle several years.

SANTA MARIA MEXICO MINING ASSOCIATION. MEXICO
Idle. Mine near Parral, Chihuahua, Mex. Wm. G. Gruber, pres. and gen. mgr.; Arthur H. Gruber, sec. and treas. Inc. in Wisconsin. Cap., \$250,000, shares \$1 par.

Property: 50 claims, La Lolita, La Viola and Santa Clara groups, in the Galeana district of the San Blas mountains. **Development:** is on La Lolita group, which has shafts of 75' and 150', showing oxidized ores, shipments from which are said to have averaged 15% copper.

SANTA RITA COPPER MINING & SMELTING CO. ARIZONA
Office: care C. F. Elliott, P. O. Box 592, El Paso, Tex. Mine office: Arivaca, Pima Co., Ariz. Inc. June, 1901, in Arizona. Cap., \$3,000,000; shares \$1 par; issued, \$2,750,000.

Property: 12 claims, unpatented, 220 acres, in the Tyndall district of the

Santa Rita mountains, 13 miles from Arivaca, shows granite, porphyry and diorite, carrying several veins of sulphide ore, usually at the contact of the diorite and granite. Veins range from 4 to 12' in width.

Development: 2 shafts and several tunnels, with a total of about 2,000' of workings, mostly in low-grade ore. A new tunnel, planned to give a back of 110', was 200' long, at last accounts. The mine is without power equipment. Company is a promotion of A. A. Post.

SANTA ROSA MINING CO., LTD.

MEXICO

Subsidiary of the Exploration Co., Ltd.

SANTAQUIN CHIEF MINING CO.

UTAH

Office: 529 Newhouse Bldg., Salt Lake City. L. A. Martin, pres.; C. E. Martin, sec.-treas.

Inc. April 29, 1911, in Utah. **Cap.**, \$100,000; shares 10 cts. par; assessable. In treasury, April, 1916, 176,993 shares stock and \$476 cash. Total debt reported as \$1,955. Listed in Salt Lake City.

Property: 7 unpatented claims, in Santaquin mining district, 65 miles S. E. of Salt Lake City, several miles from a railroad, and adjoining its twin brother, the Santaquin King on the south. Is said to show a well-defined fissure in limestone.

Development: consists chiefly of 250' of tunnels with 225' of winzes. Reported that "The ore found consists of silver, lead and zinc. The ore in sight has not been determined, according to official information." One tunnel is said to show a 3' width of vein with lead-zinc ore. At last accounts work had been resumed and in April a contract let for extending the main tunnel 300'. Property is a prospect, but not in the "preferred" class.

SANTAQUIN KING MINING CO.

UTAH

Office: Newhouse Bldg., Salt Lake City, Utah. R. B. Young, pres.; Ben C. Rich, sec.-treas.

Inc. 1911 in Utah. **Cap.**, 1,000,000 shares, increased in 1912 to 2,000,000; 50 cts. par. In treasury May, 1916, 242,065 shares stock and \$344. Listed in Salt Lake City.

Property: 9 unpatented claims, located in Santaquin mining district, 65 miles S. E. of Salt Lake City, 7 miles from a railroad, adjoins the Santaquin Chief on the north. Ore occurrence said to be similar to that of the Santaquin Chief.

Development: in May, 1916, consisted of 350' of tunnels with total underground workings of 780'; estimated "1,500 tons of commercial ore in sight." Reported that "unquestionably they will still be mining there after we have given way to the next generation"; unquestionably they will, if the old saying holds true that "a sucker is born every minute."

SANTIAGO CONS. MINING, MILLING & TUNNEL CO. COLORADO

Office: 1625 Broadway, Denver, Colo. **Mine office:** Georgetown, Clear Creek Co., Colo. Calvin Jordan, sec. Mine has a 5,000' tunnel showing gold and silver bearing copper ores. Recent development work on the 4th level opened up a 3½' ore body said to give smelter returns of \$70 per ton. The 7th level is now being extended 800' into new ground.

Equipment: includes steam power and a 50-ton concentrator. **Shipments:** in 1916, mainly from the 6th level, said to run 5 oz. gold; 27 oz. silver, and 10% copper. Mine is worked both by lessees and on company account.

SARATOGA MINING CO.

ARIZONA

Crown King, Yavapai Co., Ariz. J. L. Deming, mgr. According to report the company was reorganized in 1915, and in Dec., 1915, completed a 75-ton mill to treat Saratoga ore and also the dump ore of the adjoining

Crown King mine, belonging to the Yavapai Consolidated Gold-Silver-Copper-Co. The shaft will be deepened to the 250' level.

SARATOGA MINING CO.**COLORADO**

Office: Union Trust Bldg., Detroit, Mich. Mine office: Idaho Springs, Clear Creek Co., Colo. Officers: F. L. Colby, pres.; Chas. R. Dunn, sec.; E. W. Pendleton, treas.; with Edwin Lodge, directors. John Owen, gen. mgr.

Inc. Nov. 18, 1911, in Colorado, as the successor of the Clear Creek Mining & Reduction Co. Cap., \$300,000; shares \$10 par; nonassessable; issued. 20,024 shares.

Property: the Saratoga-Gaston group, and the Cyclops claim, at Russell Gulch, opened through the Newhouse tunnel. Equipment: includes steam power. The smelter, at Golden, has been disposed of. Idle 1914-1915.

SARITA MINING CO. (Pittsburgh Liberty)**CALIFORNIA**

Masonic, Mono Co., Calif. Has lease on Pittsburgh Liberty mine and mill, which has been remodeled at a cost of \$15,000 and now has 10 stamps, tube mill, and cyanide equipment, with a capacity of 60 tons per day.

SASCO SMELTER**ARIZONA**

Sasco, Ariz. Operated by A. S. & R. Co. under lease.

SAVANNA COPPER CO.**NEW MEXICO**

Address: Henry Hovland, Lonsdale Bldg., Duluth, Minn. Mine near Leopold, N. M. I. J. Stauber and I. L. Wright, lessees.

Inc. Sept. 16, 1908, in Arizona. Cap., \$2,000,000; shares \$10 par, half in full-paid and half in part paid stock, latter \$5 paid. The company was a merger of the Copper Gulf Mining Co. and Comanche Mining & Smelting Co., and also absorbed the Casa Grande Development Co., owning in fee simple all property formerly owned by the Comanche Mining & Smelting Co. and holding all but 320 shares, or 99.36%, of the stock issue of the Copper Gulf Mining Co. In Jan., 1913, the company had 133,116 shares of full-paid stock outstanding. Cash balance, Feb. 1, 1913, was \$12,628.

The Copper Gulf Mining Co. owns its property in fee and owes the Savanna Co. \$124,464 for money borrowed to develop its claims. The combined properties consisted of 199 claims, about 4,000 acres, all in Grant county, N. M., but in 5 districts. The company has 28 claims, 16 patented, in the Pinos Altos district, 4 patented claims in the Anderson district, 17 unpatented claims in Chloride Flat district and 1 patented claim in the White Signal district.

The claims in the Burro Mountain group sold, Jan., 1916, to Phelps, Dodge & Co. for \$700,000, constituted the principal and most valuable holdings. The Comanche group comprised 43 claims. The Copper Gulf group consisted of 1,440 acres. The Jennie group of 4 claims, patented 1910, on the Gila river, 35 miles N. W. of Silver City, is not worked owing to its inaccessibility, and development on the Chloride Flat property has been confined to assessment work.

SCHEELITE MINES, LTD. (Tungsten)**NOVA SCOTIA**

Scheelite, N. S. Inc. 1914. Cap., £750,000. Property: at Scheelite, Moose River, has 6 veins discovered 1907, showing 4" of ore. There are 9 shafts varying from 30-120' deep.

SCHOOL HOUSE MINING CO.**MISSOURI**

Joplin, Jasper Co., Mo. Inc. in Mo. Cap., \$100,000. Operates on 40 acres lead-zinc land near Carterville. Development: by 3 shafts, average depth 167'. Equipped with 800-ton concentrator. Does not reply to requests for information.

SCHOOL SECTION LEASING CO.**COLORADO**

Alfred La Montague, pres.-gen. mgr., Victor, Colo. Operates under lease

from State, block 8 of School Section 16, on Bull Hill, near Cameron. Company is reported to have operated for 15 years consecutively and to be a steady producer.

SCHUMACHER GOLD MINES, LTD.**ONTARIO**

Schumacher, Ont. F. W. Schumacher, pres., Columbus, Ohio. S. W. Wookey, mgr. Inc. July 16, 1914, in Ont. Cap., \$2,000,000.

Property: the Schumacher mine, adjoining the McIntyre, said to be a good little mine, but not extensively developed, the amount of ore blocked out being small. In April, 1916, diamond drilling located an orebody on the 600' level, said to be the fourth so located. A 150-ton mill was constructed in 1915 and put into operation in October; reported May, 1916, to be running at capacity with ~~mining~~ costs at 80c per ton, and total costs at \$4. During April, 1916, \$23,000 in bullion was shipped.

SCRANTON LEASING CO.**UTAH**

Address: c/o Wade & Funkel, Scranton Mine, Eureka, Utah. Operates under lease the Scranton mine at North Tintic, Utah. Produces lead and zinc ores from new discovery on surface and from Magazine tunnel. Employs 52 men and is producing 50 tons a day in 1916.

SCRANTON MINING & SMELTING CO.**UTAH**

Offices: McIntyre Bldg., Salt Lake City and Scranton, Tooele Co., Utah. **Officers:** T. G. Wolf, pres.; H. A. Knapp, treas., with B. H. Throop, all of Scranton, Pa., R. J. Deighton, sec.-mgr., and Wm. H. Bramel, Salt Lake City, directors. Cap., \$30,000; shares \$1 par.

Property: in the North Tintic district, is an old producer of silver, lead and zinc ores and the stopes were pretty thoroughly worked out. The company operated the mine until 1915. Lessees are now working it; reported in May that 1,200 tons of lead and zinc ores, yielding \$23,000 had been shipped during the past two months. About 50 men employed at present.

SCRATCH GRAVEL GOLD MINING CO.**MONTANA**

Hefena, Mont. **Officers:** W. E. Cullen, pres., Spokane, Wash.; H. I. Wilson, v. p.; John MacGinnis, treas.; T. B. Miller, sec., above with E. M. Hall, directors. Walter Larson, supt.

Inc. Nov. 5, 1915, in Montana. Cap., \$1,000,000; shares \$1 par; \$910,500 outstanding, Jan. 10, 1916; Security Transfer & Registrar Co., New York, transfer office and registrar. Listed on New York Curb.

Financial statement as of Dec. 31, 1915, shows: assets, \$1,116,731 which includes: land and mining rights, \$999,500; equipment \$10,431; cash in bank, \$17,300; treasury stock, \$89,500. Liabilities show accounts payable, \$29,250; capital stock, paid up, \$1,000,000; surplus, \$87,481.

Operating statement for period Nov. 5, to Jan. 1, 1916, shows: income from ore sales \$19,630 with expenses of \$9,399, leaving a profit of \$10,231.

Property: known as the Head property, 34.7 acres lies 1½ miles N. of Helena. Located on same fissure vein as the Franklin mine belonging to the Cruse estate. **Development:** to 300' depth, by 3 incline shafts, 90, 50 and 300', with 800' of drifting. In April the west drift on the 300' level was reported as showing a 5' vein of ore, of which 2' was sulphide said to assay around \$50 per ton; this had been opened for a distance of 30'. Only high-grade ore is being shipped, the low-grade being stored pending the construction of a mill.

Ore reserves: estimated in Nov., 1915, by C. E. Fryburger, E. M., as \$1,400,000 in ore blocked out, of which 35% was shipping ore; balance averaging \$20 per ton.

SEA COAST MINING CO.**ALASKA**

Address: Seattle, Wash., and Valdez, Alaska. **Officers:** C. Christopher, pres.; Earl R. Pulver, sec.-mgr.

Property: 8 claims on Shoups Bay, near Valdez, said to show 6 gold quartz veins in graywacke and argillite. Developed by tunnels. Sampling is said to give results of \$30 per ton. Development work is being done, 1916, and a 10-stamp mill, hydro-electric power plant, 1,800' aerial tram are being built; an air compressor will also be added. Mill and power plant sites are near the landing, while the mine workings are at elevations from 1,750' to 2,600'. See U. S. G. S. Bulletin 622, p. 178.

SEABOARD COPPER CO.**VIRGINIA**

Idle. Office: 77 South Market St., Boston, Mass. **Mine office:** Virgilina, Halifax Co., Va. Geo. R. Leghorn, pres.; Edward L. Pond, sec. **Inc.** July, 1902, in New Jersey. **Cap.**, \$300,000; shares \$1 par.

Property: the Dorothy and Bailey mines, 135 acres, in the Virgilina district, 3 miles from the Southern railroad, shows an 8' fissure vein in schist, carrying bornite ore, estimated to average 3 to 4% copper, with combined gold and silver values of \$1 to \$1.20 per ton. **Development:** by shafts of 30', 265' and 115', and by 2 tunnels, of 165' each, with a total of 840' of underground workings. The ore occurs in well-defined shoots: the proportion of shipping ore is small but mine might be profitably worked if flotation is used.

Equipment: includes a 275-h. p. steam plant, with a 25-h. p. Lidgerwood hoist, good for 500' depth, and a 5-drill compressor. There is a 100-ton mill, and buildings include an engine house, bunkhouse and office. Company inactive since 1904, but still alive.

SEATON MINING & MILLING CO.**COLORADO**

Address: Cincinnati, O. H. E. Machol, supt., Idaho Springs, Colo. **Property:** the old Seaton mine on Seaton Mountain, near Idaho Springs. Mine reopened 1916 through Argo tunnel and 650' raise to be put through from west drift on Seaton vein to connect with Foxhall tunnel. The Seaton vein is cut at 6,007' from entrance to the Argo tunnel.

SEATTLE-ALASKA COPPER CO.**ALASKA**

Office: 638 New York Blk., Seattle, Wash. **Mine office:** Latouche, Latouche Island, Alaska. **Officers:** E. Sparks, pres.; Geo. W. Terwilliger, v. p.; Geo. J. Hodge, sec.; Jos. Bjorn, treas. and O. B. Hess, directors.

Inc. in Washington. **Cap.**, \$1,000,000; shares \$1 par; nonassessable.

Property: 35 claims, about 700 acres, near Montgomery bay, in the southern and central part of Latouche Island. Claims are in 2 groups, one of 10 claims on tide water, with another of 25 claims about a mile from the harbor, latter being said to carry the extension of the Beatson-Bonanza vein.

Development: by a 287' tunnel, on the Delta claim, showing a vein of 4 to 6' width; ore when sorted, assays 11 to 22% copper. The Santa Clara No. 1 claim has a 101' shaft, with a 140' tunnel and an 85' crosscut, showing 2 veins, 1 of 4' width.

Equipment: includes steam power, and there is a mill operated by water power, having five 1,000-lb. stamps, with room for additional stamps, 2 Card tables, and 1 slime table. Small shipments made to the Tacoma smelter in 1914 and 1915.

SEATTLE-BOSTON COPPER CO.**WASHINGTON**

Idle. Company owns water rights of 40,000 est. h. p. and a charter for a railway to open large timber tracts and reach the Dutch Miller mine, described under title of Dutch Miller M. & S. Co. The former mine holdings of the Seattle-Boston C. Co. are described in Vol. VIII, Copper Handbook.

SEATTLE CONTACT MINING CO.**NEVADA**

Address: J. V. Marshall, gen. mgr., Contact, Elko Co., Nev. T. A. Marshall, pres., L. B. Walters, sec., Seattle, Wash.

Property: the Delano mine, 8 claims, in 3 tiers at Contact, Nev., carries the Brooklyn contact vein, the Palo Alto and Blue Bird veins, 150' apart. The latter is a fissure vein, 1'-15' wide, in grano-diorite, with high-grade streak mined in 1916 for 2' to 10' wide, and yielding copper ore.

Geology: and development of this group are fully described by Schrader, Bull. 497, U. S. Geol. Survey, 1912, pp. 119 and 121. **Development:** mainly by tunnels and to a depth of 175'; a new shaft being 170' deep in July, 1916.

Production: Feb.-July, 1916, 1,950 tons, averaging \$45 per ton, and carrying 18% to 23% copper, 6 oz. silver and 80 cts. gold per ton. Production costs are given at \$17.50 per ton. Company has held this property since 1905 and deserves the success it is now having.

SEATTLE MINING, MILLING & POWER CO.**NEVADA**

Contact, Nevada. Henry Smith, mgr. Company owns the Mammoth mine covering 12,000' along a contact deposit 20' to 125' wide, reported to show 55' of 5% ore in one face.

Production: begun May 20, 1916, up to Aug., 1916, amounted to 165 tons containing 9.5% copper, 6 oz. silver and \$2 gold, averaging \$43 per ton. Transportation to the railway at Rogerson is reported as \$7 to \$11 per ton, railway freight \$3.75, smelting \$2 and sampling 50c, or a total of \$13.75. Twelve men are employed.

SECRET MINING & MILLING CO.**UTAH**

Offices: Judge Bldg., Salt Lake City and Alta, Utah. Reported "dead" in Copper Handbook, Vol. X. Reorganized and rejuvenated in 1915.

Officers: Wm. M. Minor, pres.; H. W. Sherwood, v. p.; Judge H. S. Harper, sec.; H. Pingree, treas., with R. W. Clough, directors.

Inc. about April, 1906, in Utah. **Cap.,** \$300,000; increased in 1915 to \$600,000; shares, \$1 par. The additional 300,000 shares were to provide funds for development.

Property: 15 claims, 300 acres, 100 patented, at Alta, Little Cottonwood mining district, adjoining the Albion on the S. E., said to show lead-silver ore. Country rock is quartzite. **Development:** by tunnels; reported in April, 1916, that an 80' tunnel would be extended to cut the surface showings at a depth of 800'. The company is also reported as having obtained the right from the Albion to drive a crosscut into Secret ground from a point 2,500' in from the portal of the Albion tunnel. An upper tunnel is in 500'. Workings total 700'. No orebodies large enough for production have been found. Property is in the speculative class.

SECURITY COPPER CO.**WASHINGTON**

Address: 720 Peyton Bldg., Spokane, Wash. **Mine office:** Chewelah, Stevens Co., Wash. **Officers:** J. F. McGinnis, pres.; M. C. Hunter, v. p.; A. H. Syverson, sec.-treas.; L. K. Armstrong, gen. mgr.; G. E. Hyatt, supt.

Inc. 1913. **Cap.,** \$1,000,000; shares \$1 par.

Property: 9 claims, 120 acres, includes the Matterhorn and Van Slyke groups, adjoining the Standard-Chewelah, and the June-Echo mines. **Development:** by about 2,000' of surface and underground work on a series of six veins. Sinking of shaft on Matterhorn claim, now down 190', will be continued during 1916 to 500', with crosscuts to the No. 4 vein at 350' and 500' levels. **Equipment:** includes a gasoline hoist and a 3-drill air compressor.

SEDALIA COPPER CO.**COLORADO**

Property under lease to the Salida Copper Co., which see.

SEEMANN INVESTMENT & FINANCE CO.**COLORADO**

Address: Box 1375, Denver, Colo. **Officers:** Henry I. Seemann, pres.; K. R. Seemann, v. p.; W. S. Lippencott, sec.-treas., Flint, Mich.

Inc. July 12, 1904, in Colo. **Cap.**, \$100,000; shares \$100 par.

Company owns the following mining claims at Cripple Creek, Teller Co.:—Black Crow Lode, Mayflower Lode, Pride of Grassy Lode, W. E. S., E. F. C., & Rittenhouse, The 4-11-44, Idlewild & Mexican, Dark Cloud and Nada Lodes; and in Clear Creek Co.: Golden Star Lode, Ace of Diamonds Lode, Deuce of Diamonds Lode, Jack of Diamonds Lode, Und. ½ Surprise Ext. West, Vindicator Lode.

The company is not a mining company. It is the intention to lease or sell, or probably form a mining company, and turn the properties over to such company.

SELBY SMELTING & LEAD CO.**CALIFORNIA**

Office: Merchants Exchange Bldg., San Francisco, Cal. **Works office:** Selby, Contra Costa Co., Cal. **Officers:** H. B. Underhill, Jr., pres.; Eugene B. Braden, v. p.; Chas. J. Durbrow, sec.

Inc. 1875, in Nevada and controlled, through stock ownership, by American Smelters Securities Co., a subsidiary corporation of the **American Smelting & Refining Co.** The works represent an investment of about \$4,000,000.

The smelter, at Vallejo Junction, near Carquinez Strait, receives ore by rail and water, from all of the Pacific states, but principally from Nevada. The works include a 400-ton smelter having lead stacks, a 200-ton lead reverberatory, a refinery for parting gold and silver, and a plant for the manufacture of bluestone. **Equipment:** includes steam, electric and air power. The plant includes a bag house, and also a special chamber having the Cottrell process for precipitating solids from fumes, used in connection with the parting room of the gold and silver refinery.

The Selby is perhaps the largest smelter producer of gold in the United States, or possibly in the world.

SELLS MINING CO.**UTAH**

Address: Judge Bldg., Salt Lake City and A. O. Jacobson, supt., Alta. **Officers:** Ezra Thompson, pres.; L. R. Eccles, v. p.; Jas. Murdoch, sec.; John Pingree, treas., with A. O. Jacobson, J. C. Lynch, and Lynn Thompson, directors.

Inc. 1914, in Utah. **Cap.**, 600,000 shares; 25c par; 400,000 issued. In May, 1916, there was \$3,994 in the treasury; debts amounted to \$13,500 on the property and \$24,446 on the 6 patented claims, latter amount is due Sept. 1, 1916. Listed on Salt Lake City Exchange. Company has remained courteously non-communicative to requests for information.

Property: 16 claims, 6 patented, in the Alta-Cottonwood mining district, Salt Lake Co., 8 miles from a railroad, said to cover 1,800' to 3,000' along the mineralized zone passing through the South Hecla property which adjoins on the west. **Ore:** carries silver-lead-zinc-copper, in fissure veins in limestone and in contact deposits between limestone and granite; veins strike N. E.-S. W.

Development: mainly through the Dwyer tunnel of the South Hecla company, consists of a 200' shaft, 2,200' of tunnels and 600' of raises. Reported in May, 1916, 200' of ore proven on the strike, with ore in a 100' raise; average width of ore 6'. Shipments of about 125 tons were made early in 1916, returning \$2,768 net. Initial shipment is said to have assayed 77 oz. silver, 3% lead, 1.6% copper, 1.6% zinc and 19% iron per ton. Is a speculative mining venture, that has promising ground.

SELMA MINES CO.**UTAH**

Office: Kearns Bldg., Salt Lake City, Utah. **Mine office:** Knightsville,

Juab Co. **Officers:** L. C. Peterson, pres.; L. F. Bello, v. p.; O. W. Carlson, sec.-treas.-supt., with C. E. Beers and Edgar Farmer, directors. L. P. Peterson, mgr.

Inc. Dec., 1909, in Utah, as successor of Selma Consolidated Mining Co. Cap., \$50,000; shares 5c par; assessable.

Property: 10 claims, unpatented, near the Lehigh Tintic mine, supposed to carry the northern extension of the mineral zone of the Colorado mine, 2 miles from a railway. The property has a lime-porphry contact, with 3 principal fracture zones carrying silver-lead and copper ores, and has secured small quantities of exceedingly high-grade ore.

Development: by a 3-compartment shaft, and tunnels showing leached ground, with occasional bunches of good ore. The old company expended about \$75,000 on development.

Equipment: includes electric power, with an electric hoist and an air compressor.

Developing: in 1915-16. Reported in Oct., 1915, "Selma has no high-grade orebodies in sight at present, but all indications point to them at any time"; apparently conditions of "low visibility" prevent the ore from being sighted.

SELWAY-BOND COPPER GROUP

MONTANA

Address: Herbert B. Selway, 109 Washington St., Dillon, Mont. **Property:** 6 claims, 120 acres, situated 1½ miles from Armstead, Mont. Claims cover 4,000' on the course of several E.-W. fissure veins, 3' to 3½' wide that cross beds of quartzite, schist and limestone. The ore carries 3%-9% copper.

Development: by 130' shaft and several shallow openings, all said to show ore.

SENECA MINING CO.

MICHIGAN

Subsidiary of the Calumet & Hecla Mng. Co.

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. Mine near Mohawk, Mich. **Officers:** Rodolphe L. Agassiz, prés.; Geo. A. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr.; preceding with Francis L. Higginson and Thos. L. Chadbourne, directors.

Inc. March 23, 1860, in Michigan. Cap., \$500,000; shares \$25 par; fully issued, \$10 paid. Is controlled, through ownership of 11,207 shares, by the Calumet & Hecla Mining Co. The company had a debit balance, Jan. 1, 1916, of \$179,702. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, fourth Monday in March.

Property: 1,880 acres, just north of the Mohawk and Ahmeek mines, is a swampy tract, somewhat irregular in outline and heavily covered with drift. The property carries the Calumet, Keweenaw and Allouez conglomerates and the Osceola, Kearsarge and other amygdaloidal beds, this statement being based mainly upon the outcrop of the Kearsarge lode seen in the N. E. corner and extending for 1¾ miles across the property. The mine is on the Keweenaw Central railway.

Development: The property was diamond drilled, 1907-08, giving some good cores from the Kearsarge amygdaloidal bed. This was followed by the sinking of a single 3-compartment shaft, located about 3,000' north of No. 1 shaft of the Gratiot mine. The shaft is sunk in the footwall, being 60' from the Kearsarge bed on the 1st level, 250' on the 3rd level, and 220' on the 5th level. The shaft is 957' deep, with 5 levels. Development shows little or no copper values above the 4th level, but the bed has been opened by crosscuts and drifts on several levels, with about 2,000' of laterals. On the 5th level the Kearsarge bed is about 15' wide and for a distance of 150' carries a 4' pay-streak having fair copper values. No. 1 shaft has a temporary frame shaft rock house, with crusher.

There is room for a second shaft on the outcrop of the Kearsarge bed, but this lode must be reached by vertical or sharply inclined shafts on the balance of the property as the lode outcrops outside the holdings, though the underlay extends under the entire tract.

Equipment: includes a small power house, Lake Shore duplex hoist, good for 2,000', a 15-drill air compressor and 2 locomotive firebox boilers. Buildings include a boarding house and bunk house. Operations were suspended April, 1911.

Early in 1916 an attempt was made to form a new company, Seneca Copper Co., to take over the property, but the project is reported abandoned by the Boston brokers who were underwriting the stock, and money paid in by subscribers is said to have been returned to them. Property considered promising.

SENECA SUPERIOR SILVER MINES, LTD. ONTARIO

Offices: 103 Bay St., Toronto and Cobalt, Ontario. **Officers:** S. Harry Worth, pres.; F. W. Zoller, v. p.; R. F. Segsworth, treas., with W. E. Segsworth and A. H. Dewey, directors. W. E. Segsworth, managing director. R. H. Lyman, mine mgr.

Inc. Sept. 29, 1911, in Ontario. **Cap.,** \$500,000; shares \$1 par; 478,884 shares issued.

Annual report for 1915 shows: assets, \$794,509, which includes: mining leases, \$150,000; discount on capital stock, \$262,275; ore on hand and in transit, \$194,748; Peterson Lake Mng. Co., \$47,563; accounts receivable, \$3,339; cash, \$132,766; miscellaneous, \$3,814. Liabilities include: profit and loss, \$306,585; current, \$9,039. Net profit on operations was \$568,501 in 1915, compared with \$320,629 in 1914.

Dividends: \$263,136 in 1913; \$335,219 in 1914; \$335,219 in 1915. Total dividends for the three years equaled 205%.

Property: an 8-year lease on a part of the Peterson Lake property at Cobalt. Starting from a shaft on the shore of Cart Lake, the company ran a crosscut southward and discovered, in Oct., 1912, the Worth vein which is said to have produced 335,575 oz. silver, valued at \$194,847, to the end of the year. Up to 1915 the mine had 9,098' of underground workings.

Ore reserves: at beginning of 1916 consisted mainly of broken ore in the stopes, ore in floors and pillars, and low-grade ore below the 4th level and on the dump, estimated to yield 400,000 to 450,000 oz. of silver, compared with reserves of approximately 2,000,000 oz. the year previous.

Equipment: includes electric power, hoists, compressors, electrically-driven machine shop and a small but complete mill.

Production: in 1914 and 1915—

	Silver Oz.	Cost per Oz. (a)	Profit per Oz.
1915	2,047,150	23.45c	27.84c
1914	1,430,674	30.53c	22.49c

(a) includes a royalty of 25% on silver produced.

In spite of the higher price of supplies in 1915 the cost per oz. of silver extracted was greatly lowered, but this was done at the expense of curtailed development, which was reduced to a minimum; also due to the fact that much of the ore produced came from ore that had been broken in former years. Ore reserves were depleted early in 1916 and lease was closed down in April.

SEOUL MINING CO.

KOREA

Office: 1002 First National Bank Bldg., Denver, Colo. **Mine office:** Hol-Kol, Hwang-Hai, Korea. **Officers:** H. Collbran, pres.; H. R. Bostwick, 1st v. p.; S. S. Selden, 2nd v. p.; H. E. Collbran, sec.-treas.; A. H. Collbran, gen. mgr.-mng. engr.; preceding with J. S. Collbran, aud., F. B. Lawson, and

A. Coors, directors. R. M. Blamey, mine supt.; F. F. Bostwick, purch. agt.; H. G. English, mach. supt.; F. C. Brown, mill supt.; W. T. Hall, resident engr.; E. W. Mills, supt. Tul Nu Chung mine; B. V. Barton, supt. of prospecting.

Inc. April 27, 1908, in Connecticut. Cap., \$500,000; shares \$25 par; issued 20,000 shares. Bankers' Trust Co. of New York, registrar. Annual meeting, third Monday in October.

Dividends: have been 25% in 1910; 50% in 1911, 1912, 1913, 1914 and 1915.

Statement submitted December, 1915, shows total earnings, \$703,701 for 1914; operating expenses were \$290,401 and profits, \$413,300. Cash balance at end of 1914 was \$252,106.

Property: a lease on the Suan concession, granted Nov. 4, 1905, to the Korean Syndicate, comprising a tract of land 13x20 miles in extent, about 52 miles from Pyeng-Yang. The concession carries full rights to examine, develop and operate all mines and deposits contained within the area covered by the grant. Company also has permission to cut timber and to use all the water required for mining, milling and other purposes from sources within, or adjacent to the district. These privileges are given for a royalty of 1% on the gross value of the output of the mines. There is an additional annual tax of about 30 cts. per acre (50 sen for each 1,000 tsubo), on all land actually selected for mining operations, such selections to be made at any time before Feb. 1, 1916.

The rights in this concession are secured to the Seoul Mining Co. by an agreement made with the Korean Syndicate which provides for the payment of 8% royalty of the actual profits derived from the concession, clear of all depreciation charges.

Geology: property shows both granite and limestone, the principal ore-body, known as the "Collbran Contact," lying between limestone and a batholith of granitoid rock. Ores carry gold, copper, tungsten and bismuth, the gold seldom being visible and rarely in coarse condition. Silver is also present, alloyed with the gold to an appreciable percentage. The copper ores contain chalcopyrite, bornite and tetrahedrite, with a high gold content, of fair average, probably being about 1.5% copper and \$12 gold. The orebodies are irregular and in general parallel with the limestone-granite contact, connected more or less by generally well-defined fissures. The gangue is a highly silicious crystalline limestone, altered by contact action and containing a considerable amount of magnesia and alumina.

Ore reserves:	Tons	Value p. t.	Total Value
1914	1,208,600	\$12.42	\$15,015,000
1913	633,300	12.07	7,646,000
1912	421,000	14.44	6,080,000
1911	211,400	16.55	3,499,000

Development: by a 500' inclined shaft and several tunnels, with about 25,000' of workings. **Equipment:** includes 1,200-ton stamp mill, 400-ton ball mill, a steam plant, with hoist and air compressor.

The 40-stamp mill at Soctario, in operation since 1910, treated the following tonnage:

	Tons Ore	Rec'y p. t.	Cost p. t.	Profit p. t.
1914	74,550	\$9.44	\$3.90	\$5.54
1913	71,535	9.39	4.13	5.26
1912	74,432	8.25	3.52	4.73
1911	70,229	7.83	3.01	4.82
1910	32,793	9.86	4.35	5.51

In 1916 the output has averaged \$150,000 per month in bullion and concentrate, the ore running about \$9.60 per ton, with expenses of about \$53,000 per month.

SEVEN DEVILS COPPER CO.

IDAHO

Office: 217 Linden Ave., Ithaca, N. Y. **Mine office:** Landore, Adams Co., Idaho. **Officers:** Wm. K. MacNamara, pres.; Chas. F. Riddle, v. p.; Chas. H. McColloch, sec.; Fred D. Smith, treas.-gen. mgr.; preceding with M. J. Brundage, and Chas. Marvin, directors; Geo. A. Jones, supt.

Inc. March 31, 1908, in Ariz. **Cap.**, \$2,000,000; shares \$1 par; non-assessable; issued, \$1,558,993. **Bonds:** \$250,000 authorized at 6%. Annual meeting, second Tuesday in March.

Property: 15 claims, partly patented, 134 acres, including the Arkansaw, Margaret mines, and bond and lease on the Decorah mine, 16 miles from a railway. Lands show contact deposits, between diorite and limestone, having a strike of N. 75° W., and said to be 15 to 50' in width. These deposits carry oxidized ores, succeeded at a little depth, by sulphides, the chalcopyrite and bornite ores said to average 5% copper, 2 oz. silver and \$1 gold per ton. **Development:** exclusively by tunnels, there being drift tunnels of 900' and 150', and a 483' crosscut tunnel, with 2,800' of workings, estimated by the management to show 182,700 tons of ore blocked out for stoping. The Arkansaw mine has produced a little high-grade ore in the past.

Equipment: includes a 125-h. p. electric plant, taking power from the Oxbow station of the Oregon-Idaho Power Co., and there is a sawmill near the mine.

Production: to 1916, 555 tons ore said to average 11.2% copper.

Inability to pay off \$20,000 debentures caused closing down of mine and suspension of all operations except leasing, in 1915. Arrangements are being made, 1916, for the financing of this loan. Management plans further development of Iowa tunnel and addition of compressor, drills, etc. in 1916.

SEVEN TROUGHS BUCKHORN MINING CO.

NEVADA

Vernon, Humboldt Co., Nev. Operates property showing a 6' vein of gold-silver ore.

SEVEN TROUGHS COALITION MINING CO.

NEVADA

Lovelock, Nev. **Officers:** L. A. Friedman, pres.-gen. mgr.; Wm. Adams, 1st v. p.; M. R. Vanderkloot, 2nd v. p., with J. T. Goodwin, directors. H. J. Murrish, sec.; R. Nenzel, asst. sec.; Frank Bird, supt.

Inc. Sept. 29, 1908, in Nevada, to take over the Seven Troughs Kindergarten Mining Co. and the Seven Troughs Therian Gold Mining Co., together with some other ground. **Cap.**, \$1,500,000; \$1 par; outstanding August 27, 1915, 1,433,027 shares. Security Transfer & Registrar Co., New York, transfer agent and registrar. Listed in Salt Lake City and on New York Curb.

General balance sheet for fiscal year ending June 30, 1915, showed assets of \$1,516,613, which included: mining property, \$1,242,058; buildings and equipment, \$40,698; total current assets, \$142,931. Liabilities showed capital stock, \$1,443,027; accounts payable, \$655; taxes, \$628; surplus, \$71,629.

Report for year ending April 30, 1916, shows total income, \$337,577; total expenses, \$241,136; leaving operating profits of \$96,441. Cash on hand Jan. 1, 1916, \$69,024; current assets, \$122,681.

Dividends: paid in 1915 totaled \$180,380, consisting of four quarterly and one extra dividend in December, all of 2½ cts. per share. Total dividends paid to 1916, \$216,493.

Property: 14 patented claims at Seven Troughs, has high-grade gold-silver ore in a narrow vein which varies in width from 4" up to 20 and 30". Developed to the 1,630' level which is 130' on the dip below the 1,500' level.

Management claims 2½' of \$250 ore on the 1,600' north drift, this ore-shoot also showing on the 1,500' level, and the raise between. No ore reserves given. In 1915 the output totaled 4,509 tons of ore, yielding \$416,084; the ore handled by the mill averaged about \$93 per ton.

No engineer's report on the property has ever been made. Management has not replied to requests for information.

SEVEN TROUGHS MINING CO.

NEVADA

Seven Troughs, Humboldt Co., Nev. **Officers:** L. A. Friedman, pres.; A. A. Williams, v. p.; R. Nenzel, sec.-treas.; with J. D. Hilger and R. J. Evans, directors. C. W. Poole, gen. mgr.

Inc. Nov. 26, 1906, in Utah. **Cap.**, \$1,000,000; shares \$1 par; outstanding, 897,700 shares. Annual meeting, second Monday in June. Listed in Salt Lake City.

General balance sheet, Jan. 1, 1916, shows assets of \$1,107,107, which includes: property and equipment, \$1,086,502; current assets, \$20,605. Liabilities show a surplus of \$16,691. Income for 1915, \$3,528, was mainly on lessee's production; total expenses were \$4,175, leaving a net loss for the year of \$647, compared with profits of \$1,205 in 1914.

The discord among the company's stockholders was apparently settled in May, 1916, when a new management was put in with the purpose of actively developing the property which during the past few years has been worked by lessees.

Property: 29 claims, 26 patented, including the Fairview mine, for several years one of the heaviest producers of the district, located in the Seven Troughs mining district. Developed by a 700' vertical shaft. Said to show gold-silver ore occurring in fissure veins in basalt.

Equipment: includes a 50-h. p. gasoline hoist. Output in 1915 consisted of 260 tons of ore with a gross yield of \$15,000.

The new management, according to report, intends to sink a winze from the 700' level with the hope of developing ore at depth. In a supplemental report to the annual report for 1915, C. W. Poole, gen. mgr., states that the lessees operated in 1915 at a loss to themselves of over \$40,000; he claims there is nothing in the mine it will pay the company to work, and that it will not pay to sink deeper.

SHAPTER MINING CO.

COLORADO

Office: 1 Broadway, New York. **Mine office:** Idaho Springs, Clear Creek Co., Colo. M. S. Payton, pres.; Chas. D. Ross, sec.-treas. Inc. 1880, in New York. **Cap.**, \$100,000; shares \$100 par.

Lands carry copper ores with values mainly in gold. **Development:** by an 800' shaft and a 5,500' tunnel. Has been idle for several years.

SHAPTER SILVER MINE

TEXAS

Owned by the Presidio Mining & Smelting Co., which see.

SHAMROCK CONSOLIDATED MINES, LTD.

ONTARIO

Cobalt, Ont. **Officers:** P. Kirkegaard, pres.; Malcolm Lang, v. p., with Jos. Montgomery, Louis Wintner and Wm. H. Price, directors. A. M. Bilsky, mgr. **Cap.**, \$1,000,000.

Company was formed to reopen the Shamrock mine at Cobalt; considerable development work was done on the property a number of years ago. Reported in April, 1916, that the company was looking for extensions of the Beaver vein by driving a crosscut on the 400' level along the boundary.

SHAMROCK MINING CO.

ARIZONA

Duncan, Yuma Co., Ariz. **Officers:** Robt. McEntee, pres.; Lawrence McEntee, v. p., with B. F. Barbour and G. N. Neal of Birmingham, Ala., directors.

Property: 840 acres, in the footslopes of the Plomosa range, Vicksburg district, Yuma Co. **Equipment:** includes hoist, compressor, etc. **Shipments:** made intermittently since 1913, have been high-grade, running from \$800 to \$1,050 per carload.

SHAMROCK MINING CO.**WISCONSIN**

J. Maloney, mgr., Mifflin, Wisconsin. **Officers:** H. F. Cochenus, pres., 1536 First Nat'l Bank Bldg., Milwaukee, Wis. P. C. Kolinski, gen. mgr.

Property: 37 acres in Mifflin, said to show a 32' vein, running N. W. - S. E., carrying a 10" to 12" streak of lead-zinc sulphides, averaging 35% zinc, 25% lead. Mine is the old Shamrock & Peni mine on the so-called old 80 tract, mined 100 years ago for lead, recently quarried for glass rock and now for its 10" to 12" of coal black "Jack" ore.

Development: by 340' tunnel, and opened to 28' depth, by quarry, stripping off the "glass rock." About 800 tons shipped in 1915, that averaged 30% zinc and 10 tons of lead concentrate.

Ore is treated in 50-ton mill and concentrate goes to DePue smelter. Property worked by double shift 1916. Company took over the Sunset mine, July, 1916.

SHAMROCK MINING & MILLING CO.**NEW MEXICO**

L. D. Harrigan, pres.; Geo. A. Kalar, supt., Steeple Rock, Grant Co., N. M. **Property:** the Shamrock mine, shows gold-bearing copper ore, developed by tunnel work. Has steam plant and railroad spur at mine.

In 1915 company attempted to sell 400,000 shares of treasury stock at 25 cts. a share to provide funds for further development.

SHANNON COPPER CO.**ARIZONA**

Office: 67 Milk St., Boston, Mass. **Mine office:** Metcalf, Greenlee Co., Ariz. **Works office:** Clifton, Ariz. **Officers:** Nathan L. Amster, pres.; H. N. Stonemetz, v. p.; Chas. R. Jeffers, sec.-treas.; preceding with Kenneth McNeil, Wm. A. Paine, Jas. Virdin, C. J. McGilvray, Carl M. Loeb and David A. Ellis, directors. J. W. Bennie, gen. mgr.; H. H. Dyer, mine supt.; Wm. H. Bond, mill supt.

Inc. Nov. 13, 1899, in Delaware. **Cap.,** \$3,000,000; shares \$10 par, increased July, 1909, to \$3,300,000; issued, \$3,000,000, with \$300,000 held in the treasury. **Bonds:** \$600,000 at 7% were retired 1911, but the company has guaranteed an issue of \$600,000 of 6% bonds, authorized May, 1909, by the Shannon-Arizona Railway Co., reduced by purchase to about \$198,000. The company has paid 5 dividends, aggregating \$750,000, to end of 1913. Shares are listed on the Boston Stock Exchange. National Shawmut Bank, Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, third Wednesday in March.

Controls the Coronado Mining Co., through ownership of 53% of the stock issue and operates, under lease, the property of the Leonard Copper Co., owning the Copper Belle mine at Gleeson, Cochise county, Ariz.

Comparative General Balance Sheet:

	Assets:		Liabilities:			
	Mines & Equip.	Current	S. A. Ry. Bonds	S. A. Ry. Cur. Acct.	S. A. Ry. Suspense	Total
1915.....	\$3,408,115	\$595,830	\$381,000	\$64,945	\$5,204	\$4,455,094
1914.....	3,412,862	388,047	383,000	53,601	3,590	4,241,100
	Capital		Oper.			Total
	Stock	Current	Reserves	Credits	Surplus	
1915.....	\$3,000,000	\$33,139	\$610,056	\$5,771	\$ 806,128	\$4,455,094
1914.....	3,000,000	31,784	75,168	4,977	1,129,171	4,241,100
Balance sheet of Shannon-Ariz. Ry. Co. for 1915 shows assets: \$1,307,977,						

which includes: road and equipment, \$716,643; bond issue guarantee account, \$590,000; cash, etc., \$1,333. Liabilities include: capital stock, \$600,000; bonds outstanding, \$575,000; Shannon Copper Co., \$64,945; accrued interest, \$6,230; reserves, \$33,910; loss in 1915, \$27,891.

Income Account:

	Metal Sales	Expenses	Profit
1915.....(c)	\$1,102,275	\$ 853,625	\$248,650
1914.....(b)	1,291,539	1,190,345	101,194
1913.....(a)	3,153,412	2,713,837	439,575
1912.....	2,594,867	2,034,252	581,015
1911.....	2,014,219	1,895,365	118,854

(a) 16 months to Jan. 1, 1914. (b) operated first 9 months only. (c) add interest, \$16,228, and deduct expenses 5 months during which property was idle, \$43,044, leaves \$221,833 net profit for 1915.

Property: 34 claims, 562 acres, at Metcalf, in the Greenlee district, also about 600 acres mill and smelter sites at Clifton, Ariz., and some limestone claims on the San Francisco river. The Shannon has a side-line agreement with the Arizona Copper Co., Ltd., by which extra-lateral rights are waived mutually, obviating all possibility of future litigation over apex rights.

Geology: ore occurs between limestone and porphyry, under hematite gossans, the oxidized ores favoring the limestone, while the ores in the porphyry side are mainly silicious sulphides. The ore occurs in irregular deposits, some of which are up to 300' in the greatest dimension. Many of the orebodies are large, and though low-grade and bunched, the quantity is very great. The upper levels in the mine show oxide and carbonate ores of 3 to 8% copper tenor; sulphide ores of 2 to 6% copper tenor are mined in the lower workings, the ores holding chalcopyrite with a little chalcocite. The mine as a whole is deficient in sulphide ores, and about one-third of the production is silicious ore, too low in grade to smelt, not readily amenable to concentration, but giving good results with the Bennie system of leaching when mixed with other ores. The concentrating ores average 2.5% and smelting ores about 4%.

Development: by shafts, tunnels and open pits, workings reaching a depth of 1,300' below the crest of the mountain, and totaling about 28 miles, 1916, with considerable ore reserves. The mine is timbered with 12x12" square sets. Extraction is by 3 double-track tunnels, connecting with a 1,400' double-track incline tram leading to the Shannon-Arizona railway, with 6 ore bins at either end, the tramway, inclined at 36°, having 10-ton cars, operating in counterbalance, the steel cable passing around a 13' double drum, which runs a small air compressor serving as a brake.

Shannon-Arizona Ry. Co. The Shannon C. Co. owns the entire stock of the Shannon-Arizona Railway Co. Cap., \$600,000, shares \$100 par, and \$381,000 of the railway's \$575,000 6% 10-year bonds, guaranteed by the Shannon, and convertible into Shannon Copper Co. stock. The officers are: Nathan L. Amster, pres.; Chas. R. Jeffers, v. p.-sec.-treas.; John W. Bennie, W. A. Paine, B. F. Spriggs and C. G. Cole, directors.

This standard-gauge line, of about 10 miles length, was built and equipped at a cost of about \$700,000, the territory traversed being very rugged and including a 900' tunnel. The line was completed 1910, and not only is saving considerable money to the Shannon on ore haulage, but also gives immunity from serious interferences formerly caused by frequent floods.

Mill: the 500-ton concentrator at Clifton, on the San Francisco river, 8 miles from the mine, has ore bins 100' long, in 2 sections, for first and second-grade ores. The mill is of steel, in 2 connected sections, terraced,

the upper section having two Blake crushers, four 6' Huntington mills, a 220' Robins belt conveyor, Hartz jigs and Wilfley tables. The lower section has 38 sand and slime tables. The steel power house at the concentrator has two 250-h. p. Stirling water-tube boilers and a 300-h. p. Nordberg tandem-compound engine. Water is pumped from the wells near the San Francisco river by a 600-gal. electric triplex pump.

Smelter: the smelter at Clifton, 7 miles from the mines, has 3 blast furnaces with a combined daily capacity of 1,800 tons of ore and treats concentrates and oxidized ores from the mines at Metcalf and pyritic ore from the Copper Belle mine of the Leonard Copper Co. The mixture is almost self fluxing. Above the charging floor are 23 ore bins, with chutes. Fumes from the blast furnace pass through a 10' dust flue to a 20x20x100' dust chamber with hopper bottom, discharging periodically into cars on a railway track in a tunnel beneath, fumes passing from the dust chamber through a 170' flue to a 150' steel smokestack. Slags are hauled by an electric locomotive. The converter plant has 2 stands and is capable of turning out 120,000 lbs. of copper daily. The briquetting plant for fine ore, concentrates and flue dust, has a daily capacity of 60 tons, and there is a small sampling mill in connection. Slag haulage, converters, slag elevators, dust conveyor, briquetting plant and custom sampler, are all operated electrically. The smelter power house has a 300-h. p. tandem-compound condensing engine, direct-connected to blowers, and converter blast is supplied by a 250-h. p. Nordberg air compressor. Fuel is petroleum.

In 1916 a 150-ton leaching plant was built, thorough experimental work having proven that mill tails and probably a very large tonnage of semi-oxidized ore can be treated at a profit.

The company owns general stores, at Metcalf and Clifton. There are about 60 dwellings for employees. The Shannon owns and operates a water plant. Forces are about 1,200 men at the mines, mill and smelter.

Production:

	Copper Lbs.	Silver Oz.	Gold Oz.	Cost Per Lb.	Sell.Price Per Lb.
1916.....(a)	5,364,570				
1915.....(b)	6,017,642	35,450	690	13.40c	17.80c
1914.....(b)	9,003,169	69,603	1,295	12.26c	13.63c
1913.....(c)	18,793,724	169,197	3,412	13.50c	15.87c
1912.....	16,511,525	202,975	3,129	11.42c	14.87c
1911.....	14,775,829	97,339	1,563	11.58c	12.38c
1910.....	15,873,481	47,726	984	12.10c	12.84c
1909.....	15,379,588	43,751	1,233	12.20c	13.23c
1908.....	16,281,983	50,189	925	12.60c	13.15c
1907.....	10,874,619	34,037	950	14.50c	

(a) To Aug. (b) 9 months. (c) 16 months.

The property was closed down in Sept., 1914, on account of the low price of copper. Operations were resumed March 1, 1915, but in September the company was compelled to close down again, due to the miner's strike in the Clifton-Morenci district. This is most unfortunate for Shannon, for it is a high cost producer (13.4 cts. per lb. in 1915) and it is only on high priced copper that the company can earn money for dividends. Operations were started in Feb., 1916, and in July company produced 968,000 lbs. of copper, at a cost of 17c a pound. Earnings for Feb. to May inclusive were \$320,000 or about \$1 per share.

SHARP MINING CO.; BYRON E.

Owns Cleveland group of 10 claims, north of Springdale, Stevens Co.,

Wash., an old property closed down because the silver-lead ore was zinciferous; 15,000 tons reported on dumps and blocked out.

A 50-ton mill is to be erected 1916.

SHASTA BELMONT MINING CO.

CALIFORNIA

Office: Carson City, Nev. Mine office: Winthrop, Shasta Co., Cal. Officers: Will E. Casson, pres.; W. Brougher, v. p.; Jas. T. Davis, sec.-treas.; with S. L. Lee, W. H. Cavell, directors. Wm. Arps, supt. Cap., \$1,000,000; shares \$1 par; 684,000 issued.

Property: 8 claims, unpatented, 140 acres, known as the Graham group, in the Copper City district and in the west central part of the Shasta copper belt. The group is about 3 miles east of the Bully Hill mine and smelter, and 8 miles from the Mammoth mine. The property is said to have a surface outcrop resembling that of the Bully Hill mine. Development: by a 75' shaft, 4 short tunnels and several opencuts, all showing streaks and bunches of high-grade copper ore. Buildings include a cabin and smithy. Company did development work in 1914-1915 and made one small shipment of ore to the Mammoth smelter, which ran 7.21% copper and about 4 oz. silver. Driving lower tunnel in 1916 to reach the main orebody.

SHASTA COPPER EXPLORATION CO.

CALIFORNIA

Redding, Shasta Co., Cal. M. E. Dittmar, mgr.; O. Scribner, sec.; Chas. Wheelock, supt. Property: about 650 acres, lying between the Balaklala and Iron Mountain mines, near Kennett, is developed by 8 tunnels, of about 3,000' aggregate length. No. 7 tunnel cut 3 small stringers of copper ore. Company did a large amount of exploration and development work, 1915.

SHASTA MAY BLOSSOM COPPER CO., CONS.

CALIFORNIA

Office: Fruitvale, Cal. Mine near Del Mar, Cal. Officers: Frank J. Golden, pres.; Lucius A. Booth, v. p.; S. Peter, sec.-treas.; H. B. Ward, mgr. Inc. 1903, in Arizona, as a reconstruction of the Shasta May Blossom Mining & Smelting Co. Cap., \$10,000,000; shares \$1 par.

Property: known as the Keith group, has 22 claims, about 300 acres, ½ mile north of Del Mar in the Pittsburgh district. Claims show several deposits between granitic porphyry and slate. The gossan main outcrop 30' wide, said to be traceable about 1,500', shows low-grade copper ore with gold and silver values. The middle vein, 5 to 40' wide, and said to be traceable 1,900', carries sulphide ore, and is opened by tunnels of 200', 300' and 650' with about 1,500' of workings said to show a considerable tonnage of sulphide ore. The West vein, reported to be upwards of 100' in width, has a 100' shaft and 400' tunnel which show ore giving assays of 2 to 7% copper and \$2 to \$2.000 per ton in combined gold and silver values. The mine is reported to have about 2,000' of workings.

Equipment: includes a gasoline hoist, compressor and electric light and power. Property is a prospect.

SHASTA MONARCH MINING CO.

CALIFORNIA

Redding, Shasta Co., Cal. T. W. Rogers, supt. Property: 80 acres at Stella (Whiskeytown), Shasta Co., has been worked for many years; credited with a production of \$127,000 from 1870-1912. There are 4 parallel veins, strike N. 50° W., dip 50° N., in alaskite porphyry near the contact with meta-andesite; pay shoot averages 18" in width; ore is free milling.

Development: by tunnels. Equipment: includes a 10-stamp mill, erected 1914, at which time 10 men were employed. (For geology, see U. S. G. S. Bull. 540, pp. 38, 39, 50, 51.)

SHASTA NATIONAL COPPER CO.

CALIFORNIA

Redding, Shasta Co., Cal. Directors: C. F. Brouillard, Wm. H. Mc-

Ewen, S. S. Norton, M. F. Fries of Redding and A. J. Shields of Anderson, Cal.

Inc. in 1915. Cap., \$5,000,000; shares \$1 par. Company was organized to develop 1,000 acres of copper bearing land adjoining property of Mammoth Copper Co.

SHATTUCK-ARIZONA COPPER CO.

ARIZONA

Office: 120 Broadway, New York. Mine office: Bisbee, Cochise Co., Ariz. Officers: Thos. Bardon, pres.; H. L. Mundy, v. p.; Archibald M. Chisholm, sec.-treas.; Lemuel G. Shattuck, managing director; preceding officers and Louis W. Hill, directors; Norman E. LaMond, asst. sec.; Arthur Houle, supt.; G. L. Allen, met.

Inc. March 22, 1904, in Minnesota. Cap., \$3,500,000; shares \$10 par; nonassessable; fully issued. Company is closely connected, in ownership and management, with the Denn-Arizona Copper Co. National Shawmut Bank, Boston, and Bankers Trust Co., New York, registrars; Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, transfer agents. Shares listed on the Boston and New York Stock Exchanges. Annual meeting, third Saturday in February.

Dividends: \$2 in 1910; \$1 in 1911; \$1.50 in 1913; \$1.50 in 1914; \$2.50 in 1915; \$3.50 in 1916, to August.

Annual report for 1915 shows net profits of \$1,174,028 as compared with \$587,497 in 1914. Total net surplus, Dec. 31, 1915, was \$897,679. Net profit for first 6 months of 1916 was \$1,470,995, at a rate of \$8.40 a share per year.

Property: 8 claims, patented, 109 acres, lying in the northeastern portion of the Bisbee camp, about one-half mile south of the original workings of the Copper Queen, and to the north of the Calumet & Arizona. The property shows carboniferous limestone, with intrusive porphyry dikes, and a big fault, covered with a silicious gossan of 30 to 50' width. Ores carry copper and lead with gold, silver and vanadium values, and are oxidized down to 800', with low-grade sulphides at depth.

The orebodies occur as irregular replacements along certain bedding planes, and along dike contacts.

Development: the mine is opened by a 935' three-compartment shaft, 15x4' 6" in size, connected with the Uncle Sam shaft of the Copper Queen on the 800' level, with the Powell shaft of the Calumet & Arizona on the 600' level, and with the workings of the Wolverine & Arizona on the 200' level. Mining work was begun Aug., 1904, and ore shipments started Sept., 1906, continuing until Nov., 1907, when the panic put a stop to all work for some months. Production was resumed Dec. 4, 1908. The mine is opened by levels at 100' intervals from 200 to 900', inclusive, and at the end of 1915 had 90,240' of workings. New work in 1915 totaled 14,978'.

Development work for the first quarter of 1916 was done on all levels from the 100 to 900' level. On the 100' level a new ore-shoot developed for 400' in length in the Southwest claim, shows a width of 18', averaging 6% copper. This will probably prove to be a continuation of the Southwest orebody being worked between the 200 and 300' levels.

In the Iron Prince claim an ore-shoot averaging more than 7% copper has been opened between the 100' and 200' levels.

In the Ray claim, on the 500' level, a continuation of the ore found along the Contention fault has been developed; this shoot is 33' thick and averages 6½% copper. On the 600' level a continuation of the lead ore-shoot was proven for a length of 60', showing a 21' width of lead ore averaging 26% lead and \$6 per ton in gold and silver.

In the Copper Rock claim an important find of 5½% copper sulphide ore was made on the 800' level, and in the Leo claim on the 800' level, 4.8% copper ore was opened for a length of 60' and width of 16'. On the 900' level development work has shown massive pyrite, containing 1 to 2% copper. The sulphide ores come in between the 700' and 800' levels, occurring in shoots, estimated to contain 104,000 tons of 3.5% copper ore, and extending downward to the 900' level, where there is a considerable tonnage of massive sulphides of about the same grade blocked out. The company's ore reserves are estimated at 40,000 tons of 15% ore, 110,000 tons of 7% ore, 185,000 tons of 6% ore, 104,000 tons of 3.5% ore, 180,000 tons of 12% lead ore, and recently a large body of vanadium ore has been opened up. A great body of siliceous gold-silver ore with a little copper has been developed in a hitherto unexplored part of the tract.

Equipment: 12 mine buildings, including machine shop, carpenter shop, smithy, boiler house, engine house, warehouse, sawmill, and a change house with accommodations for 300 men.

The 750-h. p. steam plant has five 150-h. p. boilers. The main hoist is an 18x48" Allis-Chalmers duplex double-drum engine, working under 125 lbs. steam pressure, with 2 drums, each carrying 1,500' of 1½" round steel cable, capable of handling continuously a 15,000-lb. unbalanced load at a vertical hoisting speed of 2,000' per minute. The air plant includes a 40-drill Sullivan cross-compound air compressor. Fuel is petroleum, with a normal yearly consumption of about 20,000 bbls.

A 3,300' aerial tram of 500 tons daily capacity, with average grade of 18%, supported by 14 towers of 12 to 40' height, built of 12" timber and set on concrete foundations, leads from a 1,000-ton ore bin near the shaft to the El Paso & Southwestern railway, the buckets discharging loads direct into 50-ton ore cars.

The ore is smelted by the Calumet & Arizona Mining Co., at Douglas, under a 5-year contract dating from July 1, 1913. About 50 tons are shipped daily, returning 6% copper, with appreciable gold and silver values.

Recent Production:

	Copper Lbs.	Lead Lbs.	Silver Oz.	Gold Oz.	Copper Cost	Per Lb. Sold
1916..... (a)	10,277,009	1,847,937	182,570	2,897	(*)8.44c	
1915.....	11,154,211	2,345,342	201,869	3,151	8.44c	18.5c
1914.....	10,846,918		198,419	2,444	(b)8.47c	14.13c
1913.....	13,219,756		236,000	2,033	(c)7.22c	

(a) First 7 months. (b) Under curtailed production from Aug. 14 to Oct. 23, when shipments were discontinued, resumed in April, 1915. (c) After crediting gold, silver and lead. (*) 6.44c per lb. for 1st quarter 1916 and 10.44c per lb. 2d quarter 1916.

It was reported in May, 1916, that the company had taken an option on the Calumet & Jerome property at Jerome, Ariz.

Producing about 18 million lbs. of copper annually at a cost of 8½c, the company can earn \$3 to \$3.50 per share on a 15c copper market, with much increased earnings if a higher price is realized.

SHAWNEE COPPER MINING CO.

WYOMING

Idle. J. M. Bovee, mgr., Shawnee, Okla. Inc. in Okla., July 1, 1915. Cap., \$1,000,000; \$1 par.

Property: 5 claims, unpatented, in Medicine Bow Mts., French Creek district, Carbon Co., Wyo., near New Rambler mine, shows granite and

schist cut by a fissured zone 200' wide, carrying \$4.10 gold ore. **Development:** by 160' and 210' shafts. A new 1,500' tunnel is planned. Examinations have been made by H. C. Beeler, A. M. Coffin, J. J. Hinton and other engineers. **SHEA COPPER CO. ARIZONA**

Officers: D. J. Shea, pres.-mgr., Jerome, Ariz. J. P. Connelly, sec.-treas., Nathan Schultz, directors. **Inc.** 1916 in Ariz. **Cap.**, \$750,000; shares 50c par.

Property: 4 patented claims, south of Copper Chief group, carrying 8 or 9 outcrops with gold-silver copper values. **Development:** by shallow shafts, tunnels, etc., all in ledge matter.

SHEEPHERDER'S DREAM MINE

NEVADA

J. F. Goodin, First Nat'l Bank, Lovelocks, Nev. **Property:** at Camp Willard, in section 36, one mile north of Lovelocks, shows strong quartz veins with 1½" of very high gold values. Three leases were let in 1915, with production of about 5 tons of \$100 ore per day, with specimen ore in addition. Bonanza ore was mined out 1915, but property again opened and active 1916.

SHELDEN & COLUMBIAN COPPER CO.

MICHIGAN

Idle. Address: care J. H. Rice, Houghton, Mich. **Property:** lies next north of the Isle Royale mine and includes mineral rights under many private residences, near Portage Lake. An important discovery of sheet copper was made Sept., 1915, in an unidentified lode opened in excavating a cellar in this tract. Described in Vols. I and II of Copper Handbook.

SHELDON MINING CO.

ARIZONA

Address: Care Stukey Bros., Walker, Arizona. John F. Pell, pres., Newark, N. J.; A. R. Ackerman, treas., Walker, Arizona.

Inc. Aug., 1916, in Arizona, as a merger of the Sheldon group, the H. T. Andrews holdings and those of the Empire Mining Co., Metals Mining Co. and the Majors Mining & Milling Co. These holdings include nine very attractive copper-gold properties, several of them pioneer mines of the district. The tract is a few miles south of Prescott.

SHENANDOAH MINES CO.

CALIFORNIA

Address: Clumie Bldg., 519 California St., San Francisco. A. Tisher, mgr.

Property: 3 claims and 2 mill sites, 63 acres, on Jesus Maria Creek, 5 miles N. W. of El Dorado, has a quartz vein 2'-5' wide in mica schist and quartzite. **Development:** by tunnels. The mine is operated through the lower, No. 1, tunnel, which is about 1,700' long and gives a 900' back on the vein. Five other tunnels ranging in length up to 800' have been driven higher up on the vein.

Equipment: 10-stamp mill, 1,000 lbs. per stamp, dropping 6", 100 drops per minute, crushing 3 tons per stamp. Mill is run by 50-h. p. gasoline engine during the dry season and by water obtained from Jesus Maria Creek; water wheel is a 3' Knight, running under a 90' head. At last account a cyanide plant was being built. Twenty-two men employed.

SHERMAN MINING CO.

IDAHO

See Pine Creek Development Co.

SHILL GOLD MINING CO.

ARIZONA

c/o Salt River Valley Bank, Mesa, Ariz. **Officers:** F. J. Davis, pres., G. W. Silverthorne, sec.-treas., M. G. Shill, Frank Griffin and W. J. Lempke, directors. **Inc.** 1914 in Ariz. **Cap.**, \$1,200,000; shares \$1 par. Company offered 50,000 shares at 25c in June, 1916.

Property: the Mesa Copper Group, one mile south of the Humboldt smelter, shows veins in Yavapai schist belt.

Development: two shafts with levels at 100' and 200' said to block out 12,500 tons of \$12 to \$75 ore,

SHIPPER COPPER MINING CO.**NEVADA**

Luning, Mineral Co., Nev. Frank Everett, pres.; Jas. E. Quinlan, mgr. **Property:** 2 claims, 4 miles S. E. of Luning, developed by a 400' shaft, shows a small vein of high-grade copper ore in dolomite, shipments from which are reported to have yielded 8% copper. Management plans early resumption of development work.

SHIPPER GOLD MINING CO.**WASHINGTON**

J. P. Blaine, pres.-mgr., Chesaw, Wash. **Officers:** H. L. Mooney, v. p.; A. C. Blaine, sec.; W. A. Harry, treas. **Inc.** May 31, 1916, in Wash. **Cap.**, \$1,000,000; \$1 par; 600,000 issued.

Property: 3 claims, unpatented, 56 acres, located $\frac{1}{4}$ mile north of Chesaw, Wash., contains a $3\frac{1}{2}'$ flat quartz vein running E.-W., with 22° dip. **Ore:** contains gold values with pyrite, and is said to average \$20 per ton.

Development: 700' of work including 110' shaft, connected with 380' tunnel, blocking out 1,000 tons of \$20 ore. **Production:** 1,200 tons of \$40 ore. Company owns 25-ton mill with rolls and vanners, etc., and will remodel same, develop mine and mill ore in 1916-17.

SHORT CREEK ZINC & LEAD CO.**MISSOURI**

F. A. Homaday, mgr., Joplin, Mo. **Inc.** April, 1916, in Missouri. **Cap.**, \$100,000; \$1 par. **Dividends:** paid $1\frac{1}{2}c$ per share, regular May, July and 2% extra, or $8\frac{1}{2}c$ in three months. Stock dealt in on New York and Boston Curb.

Property: lease on 15 acres of zinc land, 2 miles from Joplin, Mo. Mines have been in active operation since 1914, producing concentrates, returning \$107,000 October, 1914, to Dec., 1915.

SHOSHONE POLARIS MINING CO.**NEVADA**

Lloyd E. Marsden, sec., Room 515 E., No. 30 Church St., New York. Last balance sheet for year ending Dec. 31, 1914, is as follows:

Credit:	Debit:
Mine expenses in year 1914. None	Dec. 31, 1913, to cash on hand. \$ 7.08
General expenses in year 1914. \$289.00	To assessments collected 1914 None
Paid dividends in year 1914. None	To amounts received from
Balance on hand Dec. 31, 1914' 7.08	other sources 289.00

Property: at Bullfrog, Nye Co., Nevada has been idle for two years.

SIERRA ALASKA MINING CO.**CALIFORNIA**

W. S. Schuyler, pres.-mgr., Pike, Calif. J. F. Dickson, v. p.; O. Crook, sec. **Inc.** Jan. 22, 1912, in Calif. **Cap.**, \$2,000,000; \$1 par; all issued.

Property: near Pike, Sierra Co., carries a quartz vein with gold and pyrite, without base sulphides. Developed by 900' shaft and 1,700' of workings. 130 tons ore a day treated in a 40-stamp mill with 10-ton cyanide annex.

SIERRA CONSOLIDATED MINES CO.**MEXICO**

Office: 1400 Alworth Bldg., Duluth, Minn. **Officers:** Jos. B. Cotton, pres.; G. Ashley Tomlinson, v. p.; Frederick R. Kennedy, sec.-treas.; John W. Neukom, asst. sec.-asst. treas.; H. B. Paull, aud.; preceding with Thos. F. Cole, L. D. Ricketts and Chas. D'Autremont, Jr., directors. Robt. Linton, gen. mgr.

Inc. Aug. 18, 1909, in Arizona. **Cap.**, \$5,000,000; shares \$10 par; issued 76,500 shares, full paid, at \$10 each, \$765,000; and 223,500 shares, part paid at \$6 each, \$1,341,000; total outstanding \$2,106,000. Stock transferred and registered at company's office, Duluth. Annual meeting, 1st Tuesday after 1st Monday in May. Stock listed on New York Curb and traded in on Boston Curb.

Balance Sheet: as of Dec. 31, 1914—

Assets:		Liabilities:	
Sierra Mng. Co., S. A.—		Cap. Stock	\$2,106,000
Stock Acc.	\$1,452,602	Accounts Pay.	20,490
Sierra Mng. Co., S. A.—			
Loan Acc.	578,559		
Cash	4,399		
Accts. Receivable	21,000		
Investments	45,000		
Loss and Gain.....	24,930		
	\$2,126,490		\$2,126,490

To further finance the company at this time there was authorized in 1915 the execution of a collateral trust mortgage for \$100,000, and the issuance thereunder of notes dated Oct. 1, 1915, payable on or before 3 years after date with interest at 6% per annum; notes to be issued in denominations of \$100 and multiples thereof. This company owns the entire capital stock of the Sierra Mining Co., S. A., which see below.

COMPANIES CONTROLLED BY SIERRA CONS. MINES CO.**Sierra Mining Co., S. A.**

Principal office: Ciudad Jurez, Chihuahua. Mines and works at Ocampo district of Rayon, Chihuahua, Mex. This company is the Mexican title-holding and operating corporation for the Sierra Cons. Mines Co.

Officers: Jos. B. Cotton, pres.; E. J. Maney, treas.; Juan N. Amador, sec., Ciudad Juarez, Chih., Mex.; John W. Neukom, asst. sec.; Robt. Linton, gen. mgr., Pittsburgh, directors. Henry O. Flipper, commissario.

Inc. Dec. 11, 1908, in Mex. **Cap.**, 25,000 shares at \$20 each (Mexican currency).

Balance sheet as of Dec. 31, 1914, shows assets, \$834,961, which includes: mining property, \$243,073; current assets, \$38,455; cons. and equip., \$170,173; development, \$383,054; suspense, \$205. Liabilities include: capital stock, \$250,000; Sierra Cons. Mines Co., \$578,559; accounts payable, \$6,402.

Property: at Ocampo, 110 miles from Temosachic, a station on the R. G., S. M. & P. R. R., covers about 50 square miles; also owns over 100,000 acres of timber land in the same district, including water rights and timber thereon; also owns real estate in Ocampo, together with valuable water rights and mill sites, mining concessions and rights. The company had reopened several of the old mines on the property and had done about 13,000' of work when they were forced to cease operations in March, 1912, due to the revolution in Mexico. No work has been done since, but property will be reopened on short notice when conditions in Mexico permit. There are said to be six ore-shoots now developed that will produce 100,000 tons of ore, averaging \$12 per ton in gold and silver. The silver-bearing mineral of the ore is practically all argentite, with some associated gold, in a siliceous gangue; the ledge matter is an andesitic breccia cemented with quartz.

Equipment: includes the old El Salto 20-stamp mill. Machinery for the first unit of a 40-stamp is on the ground. Power is furnished by a 300-h. p. steam-electric power plant, at Durazno, 6 miles N. E. of Ocampo.

SIERRA NEVADA CONSOLIDATED MINING CO.**IDAHO**

Subsidiary of Bunker Hill & Sullivan Mining & Concentrating Co., which see.

Production:	Tons Extracted	Gross Value	Cost-Extr. Trans. & Red.	Net Profits
1915.....	15,159	\$110,328	\$63,973	\$46,364

Net profits in 1914 were \$159,339, a decrease in 1915 of \$112,985.

Company began production in July, 1913, selling its output under contract to April 29, 1915, to the American Sm. & Ref. Co. Management being unable to extend contract satisfactorily, discontinued production and only moderate exploration and maintenance work has been done since. Said to have considerable ore reserves.

SIERRA NEVADA MINING CO.**NEVADA**

Office: 339 Bush St., San Francisco. Inc. Nov., 1904, in Calif. **Cap.**, 200,000 shares; all outstanding; shares \$1 par; assessable. Registration Trust Co., San Francisco, registrar. Listed on New York Curb and on San Francisco Exchange.

Property: 3,000' along the Comstock Lode, in the Virginia mining district, at Virginia City, credited with a production of \$1,035,000 to 1908, is being operated in conjunction with the Mexican Gold and Silver Mining Co., which see.

SIERRA RANGE COPPER CO.**CALIFORNIA**

A. L. Beardsley, mgr.; Sioux City, Iowa. **Mine office:** Genessee, Plumas Co., Cal. **Property:** the Mountain Lion group, shows a vein of gold-silver-copper ore, developed by tunnels; and the Iron Dyke and Hirschman groups. Company is doing assessment work only.

SILVER BELL & ALPHA CONSOLIDATED MINES CO.**NEVADA**

Officers: Lorin Hall, pres., Salt Lake City; Clinton D. Ray, sec.; C. B. Smith, supt., Rye Patch, Nev. Inc. 1915 in Utah. **Cap.**, \$1,000,000; shares \$1 par; 450,000 in treasury; 100,000 were to be sold June, 1916, to erect a mill.

Property: two noted silver-gold mines at Rye Patch, Nevada, with reported production of \$11,000,000. Mine is 3.6 miles from railway.

Development: by shaft sunk through old workings and tapped by 1,000' working tunnel, with reserves of 200,000 tons of ore in old workings, said to assay 5 to 30 oz. silver per ton with 40c to \$1.40 gold per ton. Company figures \$2 mine and transportation costs and will erect a mill in 1916. A strike of ore was reported July, 1916, carrying 2,520 oz. silver per ton in brittle silver and black sulphurets. 1,000 sacks were shipped in July.

SILVER CABLE MINING CO.**MONTANA**

Jas. Corbett, pres.-gen. mgr., Missoula, Mont. **Cap.**, \$1,250,000; shares \$1 par; assessable. Listed on Butte Exchange.

Property: 7 claims in east Coeur D'Alene district, just over the Montana line on the eastern slope of Bitter Root Mts., 5 miles from the Northern Pacific R. R.; part of the land lies in Idaho. Said to have a large body of silver-lead-zinc ore; from 500 to 700' of stoping ground, proved for over 200' in length, and from 4 to 6' wide. Ore is said to average better than 15% zinc. Developed by tunnels.

Production: reported shipping in 1916.

SILVER CITY MINING CO.**IDAHO**

Silver City, Owyhee Co., Idaho. Requests for information unanswered.

Property: near Silver City, adjoins the Trade Dollar Consolidated on the east and has a system of parallel fissures containing gold-silver ores. In 1914 the company remodeled the old Blaine mill, purchased from the Trade Dollar Consolidated, located in Long Gulch, ½ mile S. E. of Silver City. Mill has 10 stamps, classifiers, concentration tables, and a 25-ton cyanide plant. Production for 1915 not reported.

SILVER CLIFF GOLD & COPPER MINING CO., LTD.**IDAHO**

Idle. Office: Wallace, Idaho. Mine near Larson, Shoshone Co., Idaho. Jas. D. Young, pres., treas. and gen. mgr. Edw. C. Young, sec. **Cap.**, \$1,500,000; shares \$1 par; an assessment of 5 mills was levied Oct. 11, 1913.

Property: 18 claims, 7 miles from Mullan, developed by 3 tunnels, the

lower of 850' and longest of 1,500', showing copper ore with some lead and fair gold values. **Equipment:** includes a Pelton wheel and an 8-drill air compressor. No report received, 1916.

SILVER COMET MINING CO.

NEVADA

Panaca, Lincoln Co., Nev. **Officers:** E. D. Smiley, pres.-mgr.; F. W. Russell, v. p., 811 Center St., Boston, Mass.; M. J. Smiley, sec.; J. W. Baker, treas., with W. A. Burnett, directors, all of Boston, except E. D. Smiley.

Inc. Jan., 1913, in Nevada. **Cap.**, \$500,000; shares \$1 par. **Annual meeting** in July. Operating expenses for 1914-15 reported as \$30,000; no profits.

Property: 5 unpatented claims, 100 acres, in the Comet mining district, Lincoln Co. **Ore:** gold-lead-silver-tungsten, occurs in nearly vertical fissure veins in quartzite, said to assay \$30 per ton in gold, silver and lead. Developed by 145' vertical shaft, with 950' underground workings.

Equipment: includes a gasoline hoist and 50-ton mill completed in 1915; the mill contains a crusher, rolls, Huntington mill and a Wetherill magnetic separator. Production was supposed to start early in 1916.

SILVER CREEK MINING & MILLING CO.

WASHINGTON

Company dead and property sold for taxes. Now owned by Gold Cord Mining & Milling Co., Keller, Wash.

SILVER FISSURE MINING CO.

MONTANA

Idle. Sec., A. W. S. Cochrane, 30 Broad St., New York. Mine near Polaris, Beaverhead Co., Mont., known as the Polaris mine, formerly operated by F. Aug. Heinze, carries silver, gold and copper ores, latter produced in small quantities as a byproduct. **Equipment:** includes steam and electric power, and a 100-ton smelter. Shut down during 1915.

SILVER FLAT MINING CO.

UTAH

Property: the old Nebraska mine in Delta Creek, Silver Lake section, American Fork, Utah, shows silver-lead ore in fissures in limestone cut by porphyry dikes. Ore is high in zinc.

Development: by 1,200' of tunnels. Work resumed, June, 1916.

SILVER HOARD MINING CO.

BRITISH COLUMBIA

Office: 614 Hutton Bldg., Spokane, Wash., and Ainsworth, B. C. **Officers:** Geo. Chew, pres.-gen. mgr.; E. R. Northrup, v. p.; L. R. Hawley, sec.-treas.; W. S. Hawley, asst. gen. mgr.; preceding with A. B. Lee, W. H. Carder and D. T. Fox, directors, all of Spokane.

Inc. in Wash., registered in British Columbia. **Cap.**, \$1,000,000; \$925,000 issued; shares \$1 par. Listed on Spokane Exchange.

Bonds: authorized, \$75,000, 10% 1st mtge., due Jan. 24, 1921; int. payable semi-annually; \$25,000 offered for sale in denominations of \$100, \$500 and \$1,000 each, carrying stock bonus of one share treasury stock for every dollar's worth of bonds.

Property: 5 claims, 202 acres, crown-granted, near Ainsworth, which are said to carry the vein mined at No. 1 mine of Cons. M. & M. Co., which is 2,400' away. **Ore:** silver-lead-zinc in limestone; claimed that milling ore averages \$15 to \$25 per ton. **Development:** 7,000' of workings. **Ore reserves:** said to be 50,000 tons.

Equipment: includes hydro-electric power, compressor, hoist and saw mill.

Production: since beginning of operations in 1911 to 1916, reported as 43 cars of ore, assaying 46.9 oz. silver, 4% lead, and 15% zinc per ton, with net smelter returns of \$32,000. Management claims ore can be loaded on barges at Ainsworth for 50 cts. per ton. Reported in 1915 that a 50-ton concentrator would be built.

SILVER KEYSTONE CO.**ARIZONA**

J. D. Fields, mgr., Chloride, Ariz. Company planning erection of milling plant, jointly with Keystone Co., which see.

SILVER KING COALITION MINES CO.**UTAH**

Offices: Kearns Bldg., Salt Lake City, and Park City, Utah. **Officers:** David Keith, pres.; Thos. Kearns, v. p. and gen. mgr.; J. S. Bransford, 2nd v. p.; W. S. McCornick, treas.; preceding with Henry Newell, W. M. Ferry, Jas. Ivers, J. F. Judge and M. C. Fox, directors. F. J. Westcott, sec.; B. E. Kearns, asst. sec.; Jas. Humes, supt.

Inc. May 20, 1907, in Nevada. **Cap.**, \$6,250,000; shares \$5 par, all issued. Annual meeting third Monday in May. Transfer agents: Empire Trust Co., New York; Federal Trust Co., Boston, and F. J. Westcott, Salt Lake City. Registrars: Equitable Trust Co., New York; First National Bank, Boston, and Utah Savings and Trust Co., Salt Lake City. Stock listed on Salt Lake City and Boston Stock Exchanges.

Balance sheet as of Dec. 31, 1914, showed: assets, \$6,520,264, which included property account, \$6,320,950; ore in transit, \$62,903; cash, \$135,713. Liabilities included accounts payable, \$90,292; reserved for depreciation, \$124,358; dividend checks not deposited, \$47,970; surplus, \$7,644.

Profits for May, 1916, reported as \$60,000 to \$80,000.

Dividends to Jan. 1, 1916, \$13,772,385, which includes \$10,675,000 paid by original Silver King Mining Co. Present rate, 15c quarterly.

Property: 327 patented claims, about 2,250 acres, covering 19,000' along the strike of the ore zone at Park City, 35 miles S. E. of Salt Lake City, consists of the holdings of the following mining companies: Silver King, Union, Park City, Fairview, Alliance, Woodside, Mass., Jupiter, Kearns-Keith, Crescent, Apex, Boss, Baltimore, St. Louis-Magnolia, Pinyon Ridge, Odin, Belmont and Uintah Treasure Hill Coalition.

Ore: silver, lead, copper and a minor amount of gold, occurs in limestone and quartzite. For geology see U. S. G. S. Prof. Paper No. 77.

Development: shafts and tunnels, with many miles of workings. One of the main workings is the 3-compartment Silver Hill winze sunk from the Alliance tunnel level, at a point 8,500' from the portal; the collar of the winze is 1,600' from surface. In 1915 a complete hoisting plant was installed at this winze.

Ore reserves not reported. The management gives out but little information, which may be due to the fact that the company has had considerable litigation over apex rights.

The mine is electrically equipped, and company owns a 600-ton mill; 400 tons being treated daily at last accounts. A flotation section which started operating Dec. 5, 1915, is said to give an increased saving of from 10% to 15% silver and 10% lead. Company employs 400 men.

Output: for first 11 months of 1915 reported to contain 21,517,219 lbs. lead; 1,053,858 lbs. copper; 1,632,733 oz. silver, and 2,009 oz. gold.

SILVER KING CONSOLIDATED MINING CO. OF UTAH **UTAH**

Office: Newhouse Bldg., Salt Lake City and Park City. **Officers:** Solon Spiro, pres.; R. P. Morris, v. p.; Wm. Pischel, treas., with D. L. Wertheimer, H. A. Lee, Sherman Fargo, W. C. Lewis, directors. G. W. Browning, sec.

Inc. 1902, in Wyoming as the Silver King Consolidated Mining Co.; re-incorporated Feb. 24, 1908, in Utah. **Cap.**, \$700,000, increased Sept. 12, 1912, from \$500,000; shares \$1 par; issued Jan. 31, 1916, 637,582 shares. Annual meeting in February. Security Transfer & Registrar Co., New York, transfer office and registrar. Listed on New York Curb and on Salt Lake City Exchange.

Annual report for year ending Feb. 1, 1916, shows: balance, Feb. 1, 1915, \$210,471; receipts for year, \$539,294, of which \$519,478 was from ore sales; balance, Feb. 1, 1916, \$232,645.

Dividends: year ending Jan. 31, 1914, \$308,791, derived from judgment paid by co-tenant; 1915, \$251,033; 1916, \$255,032; total, \$814,856; to July 2, 1916, \$942,373. Present rate, 40c per annum, payable quarterly.

Property: 543 acres near Park City, adjoins Silver King Coalition on the west. **Ore:** carries lead, silver, gold and copper in replacement deposits in limestone and quartzite. For geology of the district see U. S. G. S. Prof. Paper No. 77.

Development: by shafts; lowest level is at 1,800' depth. Ore mined during 1915 came mostly from stopes adjacent to the 1,700' level, none being stoped on the 1,550' level. The flat ore-shoots adjacent to the main fissure are said to be over 32' thick and 4' to 30' wide. Branches from this main orebody, 1' to 5' thick, extend out into the adjoining country on both sides of the vein, making a mass of ore in places 100' wide. Average grade of ore produced in 1915 was silver, 47.5 oz.; gold, .044 oz.; lead, 28.6%; and copper, 1.5% per ton, sold for an average of \$37.87 per ton. Company employs 200 men.

Production (years ending Jan. 31):

	Ore Tons	Lead Lbs.	Silver Oz.	Gold Oz.	Copper Lbs.	Net Value
1916.....	13,719	7,843,139	652,076	605	411,086	\$519,478
1915.....	9,987	5,593,786	503,784	514	257,912	346,990
1914.....	609	316,434	22,319	40	6,343	19,847
1913.....	612	461,830	27,813	55	9,656	27,143

New work includes a 13,000' working tunnel which is on company ground and will serve for drainage, transportation and development. Estimated cost of tunnel, \$400,000. A 10,000' tramway was built 1916 to convey ore to the mill and railroad. A mill, initial capacity 50 tons daily, is being built by Traylor Engr'g & Mfg. Co., and flotation process will be used.

The property has become a steady producer during the past two years and the company, apparently, is on a sound footing; its earnings are mainly from the lead-silver content of the ore and vary with the market price of these metals.

SILVER KING MINES, LTD.

BRITISH COLUMBIA

Office: Trail, B. C. **Mine address:** Nelson, Kootenay district, B. C. **Officers:** R. H. Stewart, pres.; S. G. Blaylock, v. p.; T. W. Bingay, sec.; W. M. Archibald and R. S. Lennie, directors. Company is owned jointly by the Kootenay Bonanza Co. and the Consolidated Mining & Smelting Co. of Canada, Ltd., in the proportion of $\frac{1}{4}$ and $\frac{3}{4}$, respectively.

Property: 5 claims, on Toad mountain, include the old Silver King mine, formerly owned and operated by the Hall Mining & Smelting Co., Ltd. Mine is opened by a shaft to the 10th level, showing 3 well-defined veins in diabase schist. The ore occurs in those portions of the veins which are intersected by 2 dikes, and in the altered surface zone is principally bornite, with tetrahedrite, iron pyrites and silver occurring in the unaltered zone below. Gold is present in small amounts. Considerable ore was extracted in the past from above the 5th level in the Main vein. The South vein and the K vein are practically untouched. The Main vein is lower in silver but higher in copper than the South vein, and the K vein is higher in silver than either of the others. The total ore reserves in the mine are conservatively estimated at 100,000 tons. Ore in the Main vein has been proven to a depth of 1,130' by diamond drill borings.

Equipment: includes electrical motors of 50-h.p., a 100-h. p. electric

pump, an 1,850' tramway, and all necessary mine buildings. Shut down 1915-16.

SILVER KING MINING CO.**OREGON**

Albany, Ore. Officers: J. J. Lamack, pres.; Wm. S. Risley, sec.-treas. Inc. July, 1916, in Oregon. Cap., \$500,000; shares \$1 par.

Property: a group of claims on Little North Fork of the Santiam river, Elkhorn district, in the Cascade Mts., 75 miles from Portland. Claims show 4 veins, carrying ore with gold and silver values.

Development: by tunnels; the main working tunnel now being driven is expected to cut one vein at 70' and a larger vein at 980' from the portal, at a vertical depth of 1,000'.

SILVER KING OF ARIZONA MINING CO.**ARIZONA**

Office: 25 Broad St., New York City. Officers: Alex B. Downe, mgr., Superior, Ariz.; E. Cowper-Thwaite, pres.; Alex. B. Downe, v. p.; F. C. Masson, sec.-treas.; F. Kent Shiener, Mimon Benzaquen, directors.

Inc. May, 1916, in Ariz. Cap., \$1,500,000; \$1 par; \$63,400 debentures, redeemable by 100,000 shares stock. Security Transfer & Registrar Co., New York, transfer agent.

Property: the Silver King mine, 5 lode claims, nearly 100 acres, 3 miles from Superior, on the Stoneman grade, is an old silver mine, popularly credited with a production of \$10,000,000, and known to have paid \$1,950,000 in dividends up to July, 1887. Opened to a depth of 1,000', the mine was originally worked for gold and silver, copper ore in the form of tetrahedrite coming in at a depth of about 310' and continuing to depth of 510', below which very high-grade silver ores were again encountered. There are about 6 miles of old workings.

Development: recent operations have been limited to work above the water level, 70' from surface, in a number of narrow stringers carrying high-grade silver-copper ores.

The geologic conditions are described in Bull. 540, U. S. Geol. Survey. Though currently spoken of as a vein, the orebody is a stockwork, in which the extraordinarily rich ores, carrying various silver arsenical and antimonial sulphides of silver, with argentite and stromeyerite, apparently gave out at the bottom levels. Below this level, lower grade but payable concentrating ore, amenable to flotation may be expected and lateral development is also expected to develop more ore. Believe property worthy of reopening but that more capital will be needed than present plan provides for.

SILVER LAKE MINES**COLORADO**

Owned by American Sm. & Ref. Co. L. R. Clapp, supt., % A. S. & R. Co., Denver.

Property: 143 patented claims in the Animas mining district, Silverton, San Juan Co., Colo. Ore: gold, silver, lead, copper and zinc in fissure veins in andesite. Veins dip 70°, and have an E.-W. strike. Ore reported to occur in shoots from 1'x20' to 8'x1,200', and said to assay 0.20 oz. gold; 6 oz. silver; 2.5% lead; 1% copper; 3.5% zinc.

Development: by tunnels, the two longest 12,000' and 7,500'; greatest depth of workings 1,700' below surface; total workings 165,000'. **Equipment:** includes 2 air compressors, aerial tram and a 450-ton mill equipped with flotation plant.

Mine has been worked by lessees since 1911 and production figures are not available.

SILVER LEAF MINING CO., LTD.**ONTARIO**

Inc. 1906, in Ont. Cap., \$5,000,000; shares \$1 par. Owns the Silver Leaf mine, adjoining the Crown Reserve property at Cobalt, and was considered a good prospect at one time. It has not been an important

producer and has proven a great disappointment. Mine is being operated by Crown-Reserve Mining Co., Ltd., which see.

SILVER MOON MINING CO.

UTAH

Officers: Myron W. Davis, pres.; Wm. Crome, sec.-treas. **Inc.** Jan. 29, 1912. **Cap.**, \$10,000; shares 2c par, assessable. In treasury, May, 1916, 264,310 shares and \$525 in cash; no debts. Listed in Salt Lake City.

Property: 7 unpatented claims in the Big Cottonwood district. **Ore:** carries silver, gold, lead. Little development has been done. Four men employed. Property is a prospect.

SILVER MOON MINING CO., LTD.

IDAHO

Burke, Idaho. **Officers:** Eugene Sage, pres.; Gus Ehrenberg, sec.-treas.; Ed. Ehrenberg, supt., with Dr. Lambach, Spokane, Wash., and Geo. Steward, directors. **Cap.**, \$1,000,000; shares \$1 par; in treasury 60,000 shares. Listed in Spokane.

Property: 9 claims, north side of Canyon Creek, 4½ miles from Wallace, adjoining the Frisco mine, shows 2 veins of lead ore. Developed by tunnels. Work was stopped two years ago, resumed in 1915 and company reported to be driving a crosscut tunnel to intersect the vein at 1,000'. **Equipment:** includes a 200 cu. ft. compressor, electrically driven. Property is a prospect; reported that "buyers must be prepared for a long pull"—which is undoubtedly true.

SILVER MOUNTAIN MINING CO., LTD.

IDAHO

Office: Potlatch, Idaho. **Officers:** L. Tice, pres.; E. D. Wilkins, v. p.; W. E. Horstkotte, sec.; G. L. Fulton, treas.; directors; Arthur Horstkotte, mgr.

Property: 9 claims, 4 patented, near the Alice mine, on St. Joe Gulch, shortly west of the Morning Mill, about 3½ miles from Mullan. The mine has 3 tunnels, and a 900' crosscut tunnel intersects an 8' vein carrying ore said to give assays of 2% copper, 3 oz. silver and \$1.80 gold per ton. **Equipment:** includes a small steam plant and an air compressor. Development with a small force.

SILVER PEAK MINING CO.

UTAH

J. R. Rickards, mgr., Cedar City, Utah. R. B. Shephard, pres., 408 State St., Salt Lake City. T. F. Kennings, sec.-treas., Garfield, Utah.

Inc. July, 1915, in Utah. **Cap.**, \$10,000; shares 1c par; 600,000 issued.

Property: the Blair mine, 6 claims, 120 acres, unpatented, near Pinto, in Pinto Iron mining district, Iron Co., Utah, shows a contact deposit 8'-10' wide carrying copper-lead ores with gold-silver values.

Development: 200' shaft and 2 others. Dumps show 100 tons of \$8 to \$300 ore. Company doing assessment work only.

SILVER PICK CONSOLIDATED MINES CO.

NEVADA

Goldfield, Nev. **Officers:** Herman Zadig, pres.; D. D. Dewey, v. p.; Chas. D. Olney, sec., with E. P. Barrett, and E. C. Watson, directors. Geo. F. Dyer, mgr.

Inc. in Nev. **Cap.**, \$1,500,000. Listed in San Francisco and Salt Lake City.

Property: at Goldfield, developed by 700' shaft. Reported in May, 1916, that a drill operating from the 700' level cut the shale-lattice contact at a depth of 1,000' from surface, and that the shaft would be sunk to this depth on the strength of assay values found at the contact. The mine is a development proposition. Company has not replied to requests for information.

SILVER PLUME REDUCTION CO.

COLORADO

Operates the Burleigh mill near Silver Plume, Colo., and has a lease on Seven Thirty mine. Installed an Edison plant and oil flotation, 1915.

SILVER QUEEN MINING CO.**WASHINGTON**

Kettle Falls, Stevens Co., Wash. J. J. Budd, supt. Owns sundry claims, 2 miles south of Kettle Falls, developed by shaft and crosscut tunnel, showing silver-copper ore.

Equipment: includes steam power plant. Reported making regular shipments to the Northport smelter in 1916.

SILVER REEF MINING & SMELTING CO.**ARIZONA**

Property: includes the Lake Shore and the Silver Reef mines, at Vekol. Pinal Co., Ariz., originally worked for their silver ores. **Development:** by a 375' shaft and 425' tunnel. **Ores:** are silver-lead and copper.

Equipment: includes a gasoline hoist and air compressor, and a 50-ton all-slime cyanide plant. Company planning development work.

SILVER ROCK MINING CO.**IDAHO**

Company has sold its property to the Rainbow Mining & Milling Co., Ltd., which see.

SILVER SEAL MINING CO.**MEXICO**

Mine at Pilares de Teras, Sonora, Mex. Fred O. Colsen, lessee at last accounts.

Property: includes El Aguaje mine, 12 miles east of Nacozari, showing a fissure vein in andesite rock cut by granite and carrying narrow paystreaks of gray copper, chalcopyrite and galena ore. The mine has yielded ore assaying up to 15% copper and 20 oz. silver per metric ton. Property worked intermittently during recent years.

SILVER SHIELD MINING & MILLING CO.**UTAH**

Office: McCornick Bldg., Salt Lake City. **Mine office:** Bingham Canyon, Salt Lake Co., Utah. **Officers:** Henry Cohn, pres.; H. S. Joseph, v. p.-gen. mgr.; H. W. Cram, sec.-treas., with J. M. Hayes and Lou Moore, directors.

Inc. in Utah. Cap., \$300,000; shares \$1 par; assessable; 225,000 shares issued. Paid \$9,000 in dividends prior to 1903. Listed in Salt Lake City. Requests for information ignored.

Property: about 320 acres, at Bingham Canyon. **Ore:** carries mainly silver-lead, with some gold. **Development:** by a tunnel over 9,000' long, connected with tunnel of the U. S. Mng. Co. Reported in April, 1916, that a 4' vein of \$40 ore had been found by a lessee, 3,500' from the tunnel portal. Several carloads of ore reported to have been shipped and mine now worked on company account. Also reported "Sundays have been designated as days upon which visitors will be welcome."

Company offering 10,000 shares of stock for sale at 50c a share, Aug. 1916, to finance drilling.

SILVER STANDARD MINING CO.**BRITISH COLUMBIA**

Office: New Hazelton, B. C. D. G. Norrie, mgr. Owned by A. L. McHugh, Angus Stewart, D. McLeod, and J. W. Stewart, all of Vancouver. Company reports gross earnings 1914-1915, \$70,000; operating expenses \$60,000.

Property: Silver Standard mine, 15 crown granted claims, 700 acres, 7 miles north of Hazelton, in Cariboo district. Ore carries gold, silver, lead and zinc in a series of fissure veins in quartzite. Veins have a N.-S. strike, dip E. 50° to 80°; vary in width from a few inches to 6'. **Development:** 400' inclined shaft, with 3,000' of workings. In Dec., 1915, 5,000 tons ore were blocked out. **Equipment:** hoist, 2,000 cu. ft. compressor, pump and boilers.

Production: to 1916, 1,200 tons ore; average assays reported as .26 oz. gold, 172 oz. silver, 17.7% lead, and 25% zinc. Plans increased development work and erection of concentrator. The mine is well located for cheap mining; wood and water are plentiful and railway transportation is within a short distance.

SILVER TIP MINING CO.**MONTANA**

Office: care J. N. Keenan & Co., stockbrokers, 78 Broad St., New York. Cap., \$150,000; shares 10c par.

Property: 140 acres in Coeur d'Alene district on Montana side of divide, north of Wallace and 2 miles from Snowstorm mine and Big Eight. Development: 800' of tunnel work. Is a prospect.

SILVER TRAIL MINING CO.**WASHINGTON**

Office: care J. Richard Brown, W. 1619 Clark St., Spokane, Wash. Dr. Robt. Bell, pres., Paulsen Blk., Spokane; A. O. Smith, mgr. Inc. 1915 in Washington. Cap., \$125,000; shares 10c par.

Property: the old Clungstone mine, 8 miles E. of Evans in Colville mining district, opened in early '90s by Col. I. N. Peyton.

Development: tunnels, the lower one 700', with 400' drift on a 2'-6' vein of silver-lead ore. Shipments made to Trail, 1916.

SILVER TUNGSTEN MINING CO.**NEVADA**

Office: 222 Judge Bldg., Salt Lake City. Raymond Ray, pres.; Ernest Kimball, sec.-treas.

Inc. 1916, in Utah. Cap., \$50,000; shares 10c par; assessable; outstanding 38,000 shares. Listed in Salt Lake City. Cash on hand, April, 1916, \$458; no debts except a bond of \$1,750 due May, 1917.

Property: 3 claims, unpatented, in the Cherry Creek mining district, 8 miles from a railroad, said to show an 8' vein, containing tungsten ore. Development work to May, 1916, consisted only of 24' of trenching and 20' of tunneling. Evidently one of the mushroom tungsten companies brought out when tungsten was selling high.

SILVERADO MINING CO.**IDAHO**

Office: C. D. Muxen, sec., Old National Bank Bldg., Spokane, Wash. Officers: Dr. W. B. Pickrell, pres.; W. Wood, v. p.; preceding with John Wyand, Gus Eiler, H. A. Long, directors. W. L. Zeigler, supt., Osborne, Idaho. Cap., \$2,500,000; about 1,850,000 shares issued.

Property: a group of claims near Osborne, reopened in 1915, after several years' idleness, shows fissure vein in shale, running downward into the underlying quartzite.

Development: 4,000' tunnel, 400' of it a drift on a 1-3' vein showing 6"-18" silver-lead and gray copper ore. A 120' winze shows persistence downward.

Equipment: includes compressor and electric power. A mill with flotation plant is under construction, expected to operate by October, 1916.

SILVERED-COPPER MINING CO.**BRITISH COLUMBIA**

Office: 1621 Madison St., Denver, Colo. Mine Office: Aldermere, Atlin district, B. C. Officers: F. Thoman, pres.; C. W. Peaslee, v. p.; C. A. Hubbard, sec.-treas.; C. E. Thoman, gen. mgr.

Inc. March 23, 1908, in Arizona. Cap., \$1,000,000; shares \$1 par; non-assessable; issued, 568,754 shares. Debentures, \$50,000 authorized and unissued.

Property: 6 claims, 300 acres, in the Hunter Basin, Omineca district, about 15 miles from the railway at Telkwa, shows a bedded agglomerate of volcanic rocks, chiefly diorite, beds standing almost perpendicular and striking N. 35° E. Orebodies occur as true fissure veins in diorite. Ores contain bornite and chalcocite. Three cars ore shipped to smelter in 1914 said to have averaged a little over 100 oz. silver and 5% copper per ton.

Development: by a short tunnel, numerous pits and opencuts, with a total of about 200' of workings.

The mine has no power equipment. A concentrator is planned, but ore reserves should first be developed. The company is pinched for funds, but

apparently has a valuable property, which, if handled right, may develop into a paying mine. Idle in 1915.

SILVERFIELDS MINING CO., LTD.

NEVADA

Secretary's address: J. M. Hamilton, Suffolk House, London, E. C., Eng. Mine near Golconda, Humboldt Co., Nev. Inc. Dec 27, 1906, in Great Britain. as. Golconda Consolidated Co., Ltd., and changed name to present title Feb., 1909. Cap., £250,000; shares £1 par; issued, £143,353, fully paid.

Property: sundry claims, with a third interest in the Honolulu group, balance of which is owned by the Golconda-Nevada Copper Co., in the Kennedy and Battle Mountain districts, 8 miles west of Millers.

Development: by a 250' shaft showing a 3' vein in limestone said to assay 8% copper, 26% lead, 390 oz. silver and \$4 gold. Equipment: includes a 25-h. p. hoist and necessary mine buildings. Idle.

SILVERTON MINES, LTD.

BRITISH COLUMBIA

Silverton, B. C. George Stillwell, mgr. Property: the Hewitt-Lorna Doone mine at Silverton, carrying silver-lead-zinc ores, which are concentrated in a mill having a flotation unit. In 1914, 18,000 tons of ore was mined. The silver-lead concentrate is sent to the Trail smelter.

SIMILKAMEEN CONSOLIDATED COPPER CO.

BRITISH COLUMBIA

Office: Miller Bldg., Scranton, Pa. Mining property at Voigt Camp, B. C. Officers: W. S. Ayers, pres.-cons. engr.; Geo. B. Markle, Jr., v. p.; J. Foster Barber, sec.; W. E. A. Wheeler, gen. mgr., with A. Mitchell, Jr., B. R. Bromley, E. T. Beck, S. Davies, H. F. Ferber, W. S. Robins, directors.

Inc. 1914, in Maine. Cap., \$2,000,000; shares \$5 par. Proposed to increase capital to \$5,000,000.

Property: 68 claims, 2,633 acres mining land, 1,700 acres timber land, together with water rights, located at Voigt Camp, 6 miles from Princeton, district, 1 mile from a railway. Claims show Revett quartzite, mineralized in the Yale mining district, 120 miles east of Vancouver.

Geology: the mineralized area, $2\frac{1}{2} \times 3$ miles in extent, lies between two large porphyritic dikes and is said to consist of about 25 veins, separated by smaller dikes. Ore on the east side has considerable iron; that on the west is siliceous. The ore carries copper, occurring as chalcopyrite, containing gold and silver. Company claims to have spent \$200,000 on development, all surficial, consisting of 1,400' of shafts, deepest 170' with 275' of workings, 4,000' of tunnels and 10,500' of trenches and opencuts, together with some diamond drilling.

According to company's statement under date of April 15, 1915, "the average value of the larger orebodies so far exposed appears to be about 2% copper and about \$1 in gold and silver," also "there are large bodies of ore exposed that will average better than \$10 per ton on which the company proposes to begin operations."

The property may have merit, but it will take considerable money to prove its worth. Not only does the official statement of the company underestimate the amount required to put it on a producing basis but its prospectus contains statements, and estimated results accredited to J. C. Laws, which are both ridiculous and misleading.

SIMILKAMEEN MG. & SM. CO., LTD.

BRITISH COLUMBIA

Idle. Office: Bank of British North America Bldg., Vancouver, B. C. Mine near Princeton, Boundary district, B. C. Fred Buscombe, chairman; W. H. Armstrong, managing director; Chas. F. Law, sec.

Inc. Feb. 8, 1906 in British Columbia. Cap., \$2,000,000; shares \$10 par.

Property: the St. Lawrence and St. George groups, 5 claims, 3 crown granted, about 300 acres, 3 miles from Tulameen City, at the head of Bear creek, a few miles from the Great Northern railway.

Development: 4 shallow shafts of about 50' depth each, besides a short crosscut tunnel and numerous trenches. The work shows a strong orebody between schist and granite with intrusive porphyry dikes. The St. Lawrence mine has an 8' vein of massive cupriferous iron sulphide, giving average assays of about \$10 per ton in copper, silver and gold. The St. George group shows a 4' vein, carrying ore with quartz gangue, giving average assays of 1.38% copper, 2.08 oz. silver and some gold per ton. Inactive some years.

SINALOA SMELTING & REFINING CO., S. A.

MEXICO

Subsidiary of the Pacific Smelting & Mining Co.

SIOUX CONSOLIDATED MINING CO.

UTAH

Provo, Utah Co., Utah. **Officers:** Reed Smoot, pres.; R. L. Anderberg, treas. **Inc.** about 1890 in Utah. **Cap.**, \$1,000,000; outstanding \$745,387; shares \$1 par. Listed in Salt Lake City. Has paid total dividends of \$872,105; last 4 cts. per share, July 25, 1911. No report has been issued for about 4 years and stock has been practically dead on the Exchange, quoted around 3 cts. In Feb., 1916, it jumped to 24 cts. Reported in April to have a working fund of \$25,000.

Property: 6 patented claims at Eureka in Tintic mining district, said to show silver-lead ore. Many years were spent in developing the prospect and then it was allowed to lie idle for a number of years. About 1907 work was resumed and ore found in 1908; this put the mine on a dividend basis for a time. Known ore reserves were exhausted in 1911 and mine closed down in May, 1912, to be worked since in a desultory way by lessees.

The rise in stock early in 1916 is attributable to the reported strike of high-grade copper ore at depth in the adjoining Iron Blossom, and to the fact that ore in the Sioux, heretofore too low in grade to be handled, can now be treated at a profit by the new Tintic mill.

Development: by shaft to the 600' level. In April, 1916, the company resumed work; it plans to drive 200' to 300' E. of the old ore zone on the 600' level in search of the continuation of the orebody recently found in the Iron Blossom.

SIXTEEN TO ONE MINE

CALIFORNIA

Property: situated $\frac{3}{4}$ of a mile south of Alleghany, Sierra Co., Calif., was located in 1908 and is credited with a production of \$150,000 to \$300,000 in gold to 1914. **Ore:** quartz in a vein ranging from a narrow streak up to 4' in width. Country rock is amphibolite. **Development:** by tunnels, main tunnel 900' long. Twenty men employed in 1915. Production not given.

SKIDOO MINES CO.

CALIFORNIA

Address: E. A. Montgomery, pres., L. A. Investment Bldg., Los Angeles. Mine at Skidoo, Inyo Co., Calif., J. H. Cooper, supt. **Cap.**, \$1,000,000; shares \$5 par. Reported to have paid dividends of \$385,000 up to April, 1915.

Property: the Skidoo gold mine, is developed by adits and equipped with 15-stamp mill. Water power used.

Production: in 1914, 9,406 tons ore, gross returns \$14.54 per ton. Costs total \$6 per ton. Operated in 1915, but production not reported.

SLICK BROS. MINING & MILLING CO.

COLORADO

Dr. B. B. Slick, mgr., Ridgeway, Colo. W. B. Slick, pres., Boise, Idaho. **Inc.** 1909 in Nevada. **Cap.**, \$1,500,000; \$1 par.

Property: 10 claims, 100 acres, patented, on Mt. Hayden, Uncompahgre district, Colo., shows fissure vein in andesite. The vein runs N. W.-S. E., dips at 45°, which for 2,400' long shows 3' of sulphide copper ore carrying gold-silver values, and reported to average \$35 per ton in all three metals. The shoot is said to carry ore for 600' x 600' x 3'.

Development: by 3 tunnels, aggregating 1,200' and having back of 350'. Property reported on by F. M. Kilmer of Boston Inst. of Technology.

Company was to install machinery and power, expending \$60,000 for this and development work in 1916.

SLOCAN STAR MINES, LTD. (N. P. L.) **BRITISH COLUMBIA**

Offices: 901 Vancouver Block, Vancouver and Sandon, Slocan district, B. C. **Officers:** R. S. Lennie, pres.; A. C. Burdick, v. p., with J. B. White, John Elliott, John McPherson, J. M. Harris and J. P. McGoldrick, directors. T. B. Hooper, sec.-treas.; Bruce White, gen. mgr.

Inc. in British Columbia, Oct. 20, 1911, under the "Companies Act." **Cap.**, \$2,500,000; issued \$2,125,028; shares \$1 par. Listed in Spokane.

Balance Sheet: year ending Oct. 31, 1915—

Assets				Liabilities			
Prop. & Def. Chgs.							
Equip.	P. & L.	Current	Total	Cap. Stock	Current	Total	
\$2,100,127	\$74,464	\$8,766	\$2,185,358	\$2,125,028	\$60,330	\$2,185,358	

Bonds: authorized, \$100,000, 2-yr., 7%, 1st mtge.; issued, \$70,000. **Dividends:** paid in former years, \$542,000. Total quick assets, May 1, 1916, \$43,000 against an indebtedness of \$70,000 represented by the bond issue.

Property: at Sandon, Slocan district, consists of Slocan Star and Rabbit Paw groups of 12 Crown Granted claims, which formed the subject of protracted and costly apex litigation between the Star Mining & Milling Co., plaintiff, and the Byron N. White Co., in the Supreme Court of B. C. for about 10 years, finally determined by a judgment of the Supreme Court of Canada. Holdings also include a patented mill-site and extensive water rights.

Ore: carries silver, lead, zinc. The main vein, the "Slocan Star" is a strong fissure in slate, traceable over a mile. Vein strikes N. E.-S. W., dips S. 47°, width 6-8', widening out in places to as much as 50'.

Development: 10 main adit levels; No. 10, the lowest is 2,300' long; total workings 13,000; new work in 1915, 1,310'. Silver-lead ore has been almost all extracted down to 5th level; from 6th level to surface several zinc-siderite orebodies have been left intact as unprofitable under former market conditions. **Ore reserves:** recently estimated as 49,000 tons zinc concentrating ore in sight with net value of \$190,000 and 100,000 tons partially blocked ore, valued at \$400,000. Average assay value reported as 3 oz. silver, 1.2% lead, and 10% zinc, or total value of \$11.50 per ton. Costs estimated at \$7, spelter figured at 5c.

Equipment: provided for by the recent bond issue includes, 15-drill compressor, 1,500-h. p. electrical plant, 4,000' aerial tram connecting mill with shipping bins at Sandon and flotation units added to the 100-ton concentrator, increasing capacity to 250 tons. Mill is at level of No. 10 adit.

Production: in 1915—

	Tons Average Assay				Tons	Average Assay			
	Crude Ore	Silver Oz.	Lead %	Zinc %		Concts.	Silver Oz.	Lead %	Zinc %
Lead..	204	89	60	6.9	665	66.5	58.3	8.1	
Zinc.	43	12		43.6	1,400				

Gross value crude ore shipped, \$21,937; gross value lead concentrates, \$60,775; zinc concentrates, unsold at end of year.

Management anticipates gross monthly returns of \$50,000 after new equipment is added, with operating expenses of \$10,000. The future of the mine looks very favorable now that litigation is ended, transportation is being bettered and mill capacity increased.

SLOCUM COPPER CO.

Phoenix, Maricopa Co., Ariz. John G. Hardin, pres. and gen. mgr.

ARIZONA

Property: in the Winifred district, 22 miles north of Phoenix, has shafts of 130' and 150', showing ore assaying well in copper, silver and gold. Active development work to be resumed.

SMALL HOPES-BOREEL MINING CO.

COLORADO

Property: the Robert Emmet mine at Leadville, a great producer of lead-zinc ore, is now owned by the Empire Zinc Co. (See New Jersey Zinc Co.)

SMITH VALLEY MINES CO.

NEVADA

E. J. Cooper, Receiver, Yerington, Nev. H. L. Van Valen, representing the stockholders, 410 Advertising Bldg., Chicago, Ill. Inc. 1912, in Nev. Cap., \$2,000,000. Placed in Receiver's hands Oct. 30, 1914; debts were about \$17,000. Reported Jan. 5, 1916, that obligations "are being rapidly paid off; it is expected that the Receiver will be discharged in about 60 to 90 days from present date."

Property: 23 claims, 467 acres at Yerington, said to show gold ore in a contact deposit between andesite and porphyry; width of ore, 6" to 3', with average assay reported of \$16.80 per ton. Claims 60,000 tons ore in sight.

Development: 200' incline shaft, with 900' of workings. **Equipment:** includes 25-h. p. gasoline hoist and a 6-drill compressor.

SMOKEHOUSE MINING CO.

MONTANA

Subsidiary of the Davis-Daly Copper Co., Butte, Mont.

SMOKEY DEVELOPMENT CO.

NEVADA

Property near Ely, Nev., sold at delinquent tax sale, February, 1915. Described Vol. XI, Copper Handbook.

SMOKY BULLION GROUP

IDAHO

E. A. Worswick, mgr., Lovelocks, Nev. Property: 3 claims, patented, 57 acres, on headwaters of Smoky river near Hailey, Blaine Co., Idaho, contains a big deposit of low-grade concentrating ore opened for 4,200' on a contact zone between granite and limestone. Ore carries galena, chalcopyrite and zinc. The sulphide shows on the surface.

Development: amounts to 2,000', mostly by tunnels, one 600' long, with 375' back. Property has been examined by Prof. Knutson and by J. M. Wilfley.

Property has milling plant erected by an eastern syndicate which spent \$100,000 on the property and allowed it to be sold for taxes. Regarded as a promising prospect.

SMUGGLER UNION MINING CO. (THE)

COLORADO

Telluride, Colo. **Officers:** Bulkeley Wells, pres.-gen. mgr., Telluride; H. L. Higginson, v. p., with R. L. Agassiz, T. L. Livermore, N. H. Stone, Q. A. Shaw and J. M. Crafts, directors. T. E. Sherwin, sec.-treas. Chas. N. Bell, supt.

Inc. 1891 in Colo. Cap., \$5,000,000; all outstanding; shares \$100 par. Bonds authorized \$250,000; outstanding \$67,500. Annual meeting in June. 14 Ashburton Place, Boston, transfer office. Financial reports not made public. No dividend reported since 1901. Company is controlled by The New England Exploration Co.

Property: 77 patented claims, 996 acres, in San Miguel and Ouray counties. Ore carries gold, silver, lead and iron, occurring in a true fissure quartz vein cutting andesite, tuff and rhyolite for a vertical distance of 2,000'. Vein strikes N. W.-S. E., dips 70°; average width 2½'. For geology of the Telluride district, see U. S. G. S. Geological Folio No. 57; also see Tomboy Gold Mines Co., Ltd., in this volume.

Development: by tunnels, with a 280' winze from lowest tunnel, 3,700'

long; main haulage level, 3,600' long; greatest depth of workings 2,300'. Total workings aggregate 30 miles.

Equipment: includes a 50-h. p. electric hoist, 2 compressors, pumps, hydro-electric power, one 60-stamp and one 80-stamp mill, 600-ton cyanide plant.

Production: 118,668 tons ore in 1912; 137,567 in 1913; 126,505 in 1914; 107,119 in 1915. Grade of ore and recovery not made public.

SNAKE RIVER CONSOLIDATED MINING CO. WYOMING

Mine P. O.: Columbine, Routt Co., Colo. **Officers:** L. A. Pease, pres., treas. and gen. mgr.; A. L. Arnold, sec.

Inc. July, 1906, in Wyoming. Cap., \$5,000,000; shares \$1 par; nonassessable; fully issued, with \$2,500,000 stock assigned to a trustee, for the benefit of the treasury. Annual meeting, second Wednesday in July.

Property: 9 lode claims, 2 patented, 180 acres, and 520 acres of placer claims, unpatented, in Three Forks district, 26 miles S. W. of Encampment, the nearest rail point. Claims show granite and diorite, reported by management to have veins carrying auriferous galena, with strike of N. 25° W., and cross veins carrying copper striking at nearly right angles. The management reports the galena vein system to have an extreme width of 120', with length of 4,500', the paystreak varying from 10" to 54" in width. The galena ore is said to average 10 to 20% lead, free from zinc, with silver and gold values. The copper veins are undeveloped, but show a variety of oxidized ores, at surface.

Development: by pits and shafts, and numerous short tunnels, from 30 to 500' in length, nearly all openings showing ore. The management estimates 5,000 tons of ore blocked out for stoping. Plans raising necessary funds for proper equipment and small concentrating plant in 1916.

SNOW CREEK MINING CO. OREGON

Baker, Baker Co., Ore. Officers: Henry B. Smith, pres., Bay City, Mich.; Fred. D. Smith, v. p., Ithaca, N. Y.; C. H. McCulloch, sec.; R. J. Davison, treas., with J. H. Boweley, directors. **Inc. June 25, 1914. Cap., \$200,000; shares \$1 par; outstanding 132,000 shares.**

Property: 5 claims, 85 acres, including the Snow Creek mine, formerly owned by Oregon Mines Exploration Co., near Greenhorn P. O. Ore carries gold, silver, lead in contact deposit, 3' to 8' wide; country rock is diorite and slate. Ore extracted in the past is said to have assayed \$12 per ton in gold and silver and 5% lead.

Development: 225' vertical shaft and tunnels, aggregating 1,315'. Claims 9,400 tons of ore blocked out.

Equipment: includes 10-stamp mill. Total output to date about \$40,000.

Title was obtained by present company under foreclosure of mortgage. Sinking shaft 100' deeper and developing is planned, 1916.

SNOWSHOE GOLD & COPPER MINES, LTD. BRITISH COLUMBIA

Property sold to Granby Cons. Mng., Sm. & Power Co., Ltd. and company dissolved. Fully described in Vol. XI, Copper Handbook.

SNOWSHOE MINING CO. IDAHO

Mullan, Shoshone Co., Idaho. Sadie Lucia, sec.; Paul Lucia, gen. mgr. Inc. Sept., 1903, in Idaho. Cap., \$1,000,000; shares \$1 par; assessable; fully issued; 11 assessments of 5 mills each levied to July, 1915. Shares are listed on the Spokane and Butte Exchanges. Annual report to Jan. 1, 1914, shows cash on hand, \$1,323.

Property: 7 claims, patented, adjoins the Snowstorm on the east and supposedly carries the extension of the Snowstorm fault, at the head of Gentle Annie gulch, near the top of Snowstorm mountain, in the Hunter district, 1 mile from railway. Claims show Renett quartzite, mineralized

for 30' in the Snowstorm fault, with some cuprite, azurite and chalcopyrite, giving assays up to 9% copper and 8 oz. silver per ton.

Development: by crosscut tunnels, longest 2,000', and drifts, a total of about 5,000' of underground workings, showing a mineralized zone of 30 to 40' width, carrying various copper ores sparsely disseminated. Drifting on the N.-S. fissure opened up a body of high-grade copper ore, 8'-2' wide, at 650' depth and about 1,600' from portal of No. 2 tunnel. The upper cross-cut tunnel, 700' long, intersected a vein up to 60' wide and running from 1-20% copper, at a vertical depth of 250'. A second crosscut, 696' vertically below No. 1, cut the vein 1,700' in without disclosing any values.

Equipment: includes an air compressor, power house and several buildings. Further development planned and necessary.

SNOWSTORM APEX MINING CO.

IDAHO

J. H. McIntyre, M. E. Delgrove and B. V. May of Spokane, trustees. Inc. 1908 in Wash. Cap., \$1,500,000; shares \$1 par.

Property: on Snowstorm mountain, east of Mullan, shows 2 veins opened by a shallow shaft and a 130' tunnel, with about 200' of workings.

SNOWSTORM EXTENSION COPPER MINING CO.

IDAHO

Address: A. J. Richardson, treas., 216 Wright & Callendar Bldg., Los Angeles, Calif. **Mine Address:** Mullan, Shoshone Co., Idaho. Inc. Oct., 1909, in California, as successor of Snowstorm Extension Mining Co., Ltd. Cap., \$1,000,000. Assessment of 2 mills per share, delinquent March 3, 1914.

Property: 9 claims, adjoining the Snowstorm on the east, supposedly carry the extension of the Snowstorm ore zone. Pits and trenches have shown ore of about 3% copper tenor, markedly similar to that of the Snowstorm. **Development:** by a drift tunnel, starting from North Fork creek, 2,000' long at last accounts, planned to be driven to secure an eventual back of 1,630', on the dip of the vein.

SNOWSTORM MINES CONSOLIDATED.

MONTANA

Officers: Leo Greenough, pres.-gen. mgr., Old Natl. Bank Bldg., Spokane, Wash.; J. B. Greenough, v. p.; W. J. Beaton, sec.-treas., with M. D. Hall, James Broad, E. H. Chaney, and R. E. Walters, asst. gen. mgr., directors.

Inc. in 1916. Cap., 2,500,000 shares; 25c par. Company organized to take over the Snowstorm Mining Co. and to acquire under bond and lease the Banner and Bangle claims, at Troy, Mont., which see. Of the capital stock, 1,500,000 shares will be issued to Snowstorm Mining Co. stockholders in full payment for the corporation's assets. Proceeds of sale of 1,000,000 shares stock not transferred to the former Snowstorm Co. stockholders, will be devoted to developing and equipping the Banner and Bangle property. Reports from the Banner and Bangle mine, in August, announced that 6 tunnels are all in ore and 300 men employed. The work blocks out 400,000 tons of ore averaging 7.5% lead; 8.5% zinc and 4 to 5 ounces silver per ton. It looks as if the Snowstorm stockholders had acquired an excellent property, which should soon put the stock on a dividend basis.

SNOWSTORM MINING CO.

IDAHO

Company being dissolved, July, 1916. Succeeded by Snowstorm Mines Consolidated, which see. **Office and mine:** Larson, Shoshone Co., Idaho. **Officers:** Leo Greenough, pres.-gen. mgr.; J. W. Greenough, v. p.; R. E. Walters, sec.-treas., preceding with J. B. Greenough, J. C. Broad, M. D. Hall and H. E. Chaney, directors.

Inc. July, 1900, in Idaho. Cap., \$1,500,000; shares \$1 par; non-assessable; issued 1,499,500 shares. For fiscal years ending June 30, earnings were \$5,677 net in 1905; \$144,322 in 1906; \$498,013 in 1907; \$243,262 in 1910; \$25,691 in 1911; \$15,787 in 1912; \$141,639 in 1913; \$152,904 in 1914 and in 1915 there was

a net deficit of \$57,891. Company reported a surplus of \$172,761 June 30, 1915.

Dividends: \$90,000 in 1906; \$360,000 in 1907; \$150,000 in 1908; \$202,000 in 1909; \$179,940 in 1910; \$44,985 in 1911, \$74,975 in 1912, \$142,452 in 1913 and 22,492 in 1914, a total of \$1,169,640 to end of fiscal year, 1914.

The property of this company was fully described in Vol. XI, Copper Handbook. By Sept., 1914, ore reserves had been exhausted and mining ceased, but development work was continued until June, 1915, at which time the mine had been thoroughly explored down to and including the 2,200' level. Exploration was fruitless.

In view of the fact that the company owned complete surface and underground mining equipment and had about \$160,000 cash on hand, the management deemed it desirable to continue in other mining activities rather than dissolve. Since then it has been searching for other properties. It had an option on 650,000 shares of the Missoula Copper Co. and did considerable development work on the property, but last reports state it had surrendered its option to the National Copper Co. for \$27,000.

Production: (for fiscal years ending June 30)

Year	Ore, tons	Copper, lbs.	Silver, oz.
1905		4,950,000	.....
1906		6,233,940	.....
1907	76,224	6,850,000	525,000
1908	87,503	8,000,000	596,000
1909	119,816	10,363,438	734,968
1910	91,368	7,125,105	605,075
1911	34,464	2,653,036	267,263
1912	29,964	2,074,447	204,870
1913		4,522,605	368,906
1914		4,632,943	286,695
1915		775,980	45,090

SOCORRO MINING & MILLING CO.

NEW MEXICO

Bought entire holdings of Mogollon Gold & Copper Co. for \$100,000 at public sale in Socorro, N. Mex., August, 1915. Sale ordered to satisfy judgment of \$416,626 obtained by Equitable Trust Co., New York, holders of bonds to that amount.

Property: 26 claims, partly patented, 480 acres, including the Cooney, Peacock, Little Charlie, Independence and Fluoride groups, sometimes known as the Silver Bar mine, in the Cooney district of the Mogollon mountains, 85 miles N. E. of Silver City, the nearest rail point. The property shows porphyry and andesite, carrying the Little Fanny fissure vein of 5 to 10' average width, with a paystreak of about 3' average and 30' claimed maximum width, having numerous narrow feeders, some of which carry high gold values. Ores include slightly auriferous and strongly argentiferous chalcopyrite, bornite and chalcocite, claimed to carry increasing silver values at depth, and the east vein has been said to show native copper at depth of 600'. The Cooney and Peacock mines are said to have produced \$1,250,000 worth of ore in the past.

Development: The Cooney group of 9 claims has a 780' two-compartment main shaft; the Peacock mine, 1,500' from the Cooney, has a 400' shaft and is connected with the Cooney by drifts on several levels; the Little Charlie mine has shafts of 350', 225' and 200', the main shaft being 250' below the tunnel. There are also various tunnels on the several groups.

The Pacific mine was optioned to Socorro M. & M. Co. by the Oaks Co., 1916.

Production reported for June, 1916, as 41 bars of gold and silver bullion; also several tons of high-grade concentrates.

Constructing an aerial tramway, 1916. Has a 230-ton mill.

SOFFE SILVER MINING CO.

UTAH

Directors: J. C. Soffe, pres.; W. R. Soffe, v. p.; J. W. McKinnig, sec.-treas.; W. J. Soffe, mgr.; A. J. Shulson. **Inc.** May 7, 1916, in Utah. **Cap.**, \$10,000; shares 1c par.

Property: 12 claims, unpatented, in Erickson mining district, Tooele Co., 30 miles west of Faust Station on Salt Lake route. Claims show high-grade silver-gold ore. Company plans immediate development.

SOMBRERETILLO MINING CO., S. A.

MEXICO

Was controlled by the Sonora Central Mines Co., now out of business.

SOMBRERO DEVELOPMENT CO.

ARIZONA

Office: Houghton National Bank Bldg., Houghton, Mich. **Mine office:** Globe, Gila Co., Ariz. **Dr.** Lucius L. Hubbard, gen. mgr. Company is a syndicate, not incorporated. **Property:** on Cherry creek, west of Sombrero Butte, and about 50 miles north of Globe, is slightly prospected by adits. The mine has a small water-driven plant. Inactive.

SONORA CENTRAL MINES CO.

MEXICO

Fully described Vol. XI, Copper Handbook. Passed away; foreclosure proceedings took place about 1913, but provided no cash for the bondholders, so they took the property. No reorganization of the Sonora Central was made, but a new company was formed, known as the Alamos Dev. Co.; E. M. Board, v. p., 1510 Dayton St., Chicago; Walter Strong, sec.-treas., 1638 So. Michigan Ave., Chicago, Ill.

SONORA CHIEF MINING CO.

MEXICO

Idle. Office at last accounts: 219 Argyle Bldg., Kansas City, Mo. Mine near Suaqui de Batuc, Sonora, Mex. **Officers:** Jas. E. Crosby, pres.; Dr. Moses T. Runnels, v. p.-treas.; R. A. Bruns, sec.; preceding with C. D. Stoll and I. D. Waggener, directors.

Inc. July 18, 1904, in Arizona. **Cap.**, \$1,500,000; \$1 par.

Property: the Phoenix and Lakeside groups, 464 acres. The flotation was, it is believed, a crooked one. The property has no such showing as reported and described. Such veins as exist are tiny streaks a few inches wide, which in places contained very high-grade ore, chalcocite and perhaps whitneyite. Its location, on the far side of the Yaqui river, is such that even a remarkably good showing would not have been worth development at the time the company was active. The property is totally devoid of merit. Idle several years.

SONORA COPPER MINING CO.

MEXICO

Idle. Office at last accounts: 895 So. Clarkson Ave., Denver, Colo. Edward J. Wilcox, pres.; H. L. Peebles, v. p.; Fred W. Webber, sec.; C. A. Parker, treas., and L. J. Stark, directors. **Inc.** May 17, 1910, in Colorado. **Cap.**, \$10,000, shares \$1 par.

Property: 10 claims, 4 miles from San Felipe, in the Arizpe district, Sonora, and 62 miles from Posa on the S. P. R. R., developed by 820' of underground workings, showing a 12' vein, with some complex silver-lead-zinc ore.

SONORA COPPER SMELTING CO.

MEXICO

Idle. Last address: 424 Scarritt Bldg., Kansas City, Mo. **Mine office:** Noria, Sonora, Mex. **Officers:** A. M. Conard, pres. and gen. mgr.; J. M. Lowe, v. p.; C. E. Kroh, sec.; W. R. Moore, treas.; preceding with J. G. Burnley, F. E. Reed, E. E. Axline, J. E. Kramer and Chas. L. Irons, directors. **Inc.** June 25, 1908, in Ariz. **Cap.**, \$3,000,000, shares \$10 par.

Company supposed to have been organized as successor of the Sonora

Copper Co., but apparently owns only a 50% stock interest in that company, and title to the Mexican property is held in the name of the International Copper Ore Corporation, which is controlled, in some manner, by this company, the corporate relations being neither clear nor satisfactory. Annual meeting, third Tuesday in December.

Property: about 500 acres, including the Cobre Grande, 123 acres, 5 miles east of Noria, the principal mine, is not considered worthy of the money spent upon it and the past history of the president is such that the company is regarded with much suspicion.

SONORA DEVELOPMENT CO.

MEXICO

Office: 601 New Ridge Bldg., Kansas City, Mo. **Mine office:** Nacozari, Sonora, Mex. Alfred Blaker, pres.; Chas. M. Williams, v. p.; Col. Geo. M. Bowie, v. p.; John W. Amerman, sec.; W. A. Rule, treas.; with A. A. Potter and A. D. Fetterold, directors; Chas. A. Hyder, cons. engr.

Inc. in Ariz. Cap., \$2,500,000. Company absorbed the Goodlander Mining & Milling Co.

Property: 198 hectares, including the Nacozari Copper Queen, Wostenholm, Goodlander, Don Genaro y Anexas, and La Madrugada groups, carrying auriferous and argentiferous copper and lead sulphides. The Nacozari Copper Queen mine, 65 acres, lying between the Pilaes de Nacozari and Belle Unión mines of the Moctezuma Copper Co., has given ore assaying up to 58% copper. The property is developed by shafts and tunnels, apparently somewhat at random. The Goodlander has a 10-stamp mill. The company has been idle for several years and will not resume operations until stable conditions prevail in Mexico.

SONORA EXPLORATION CO.

MEXICO

Estación Yzabal, Sonora, Mex. **Property:** formerly held by the Florida Copper Co., in the vicinity of the El Tigre mine, include El Temblor, Last Chance, Texas and other properties, carrying gold and silver-copper ore, developed by shaft. **Equipment:** includes steam power and an air compressor. Idle.

SONORA MINING & DEVELOPMENT CO.

MEXICO

Office: 207 Spitzer Bldg., Toledo, Ohio. **Works office:** Toledo, Sonora, Mex. **Officers:** A. E. Klauser, pres.; H. R. Klauser, v. p. and gen. mgr.; J. G. Meiljnk, sec.-treas.; and A. V. Baumann, directors.

Inc. 1904, in Arizona. Cap., \$5,000,000; shares \$1 par. Company operated in Mexico under the name of the Yaqui Smelting & Refining Co., S. A., which is incorporated in Mexico; **cap.,** 100,000 pesos. Company is exempt from the payment of property tax for 20 years, and also enjoys a 50% reduction on the state tax for 20 years. International Trust Co., Boston, registrar; Frederick R. Tibbetts, Boston, transfer agent.

Property: about 154 hectares of mineral property, and 1,000 acres miscellaneous lands, including a smelter site and town site. Mine is reached by a branch of the Southern Pacific Railway, and company has a government concession for construction of an aerial tram line of 40 kilometers length. Lands are in San Antonio de la Huerta, San Javier and San Onavos, about 80 miles east of Torres and about 60 miles below Campo Santo Niño. The principal property is the Veta Grande mine, about 10 miles from the smelter, said to show a gossan 40' wide, outcropping for a quarter mile. Property also includes the Almeda, Plomosa, Isabella, Moctezuma, San Francisco, Caballos, Ferruginosa, Independencia and Gerberina mines, carrying mainly gold-silver-copper ores, with some auriferous silver-lead ore.

Equipment: the reduction works include a sampler, smelter and power plant, with necessary adjuncts. The 150-ton smelter has a 36" circular Allis-Chalmers blast furnace, for use interchangeably on lead and copper ores.

and a smaller furnace for copper only. The power plant includes two 80-h. p. water-tube boilers, 2 engines, an Erie high-speed engine and a No. 7 Connersville blower, for furnace blast. The lead refinery building has a softening furnace, refining furnace and 2 desilverizing kettles, operating on the Parks process. The silver refining plant includes 2 cupel furnaces, with blast attachments, 1 bullion furnace, 1 muffle furnace, and necessary pots and moulds, with a bullion vault. Idle since 1910.

SONORA MINING & MILLING CO.

IDAHO

Dr. W. A. Smith, sec., White & Bender Bldg., Wallace, Idaho. Norman Ebbly, C. W. Gibbs, A. H. Featherstone, E. O. Hering, all of Wallace, are heavily interested. Funds are raised by occasional 2 mill assessments.

Property: 12 claims, patented, over the hill from the Marsh mine above Burke. Is an old mine on which work has been prosecuted since 1896, spending \$75,000 and doing 3,200' of work prior to 1908, when a 6' vein was cut at 1,400' from portal and at depth of 800'. In 1914, a contract with John Moffatt was made to "find" the vein for 100,000 shares of stock.

In 1914 a shaft and winze was sunk on the Cooney vein at 1,950' from the tunnel mouth, the ore-shoot proving elusive on the Sonora vein. In 1916, company let contract for 200' extension of the 1,500' tunnel, hoping to crosscut another vein.

SONORA-PACIFIC MINING CO.

MEXICO

Noria, Sonora, Mex. Ira E. Bowers, gen. mgr. Inc. 1911, as the successor of the Llano Copper Co.

Property: 10 groups, 526 hectares, on Caracahui mountain, 3 miles east of Noria, the nearest rail point, also 5,000 hectares of ranch lands. Lands show limestone cut by intrusions of diorite and porphyry, with a quartz vein of 3 to 50' estimated width, traceable 6,000' on the company's claims, which is reported to show bunches of ore carrying chalcocite, bornite and chalcopyrite, with a little native copper, that will average about 7% copper. 6 to 10 oz. silver and \$2 to \$5 gold per ton, as developed. **Development:** consists of the 105' No. 1 shaft, No. 4 shaft of 800', and No. 7 shaft of 600', with tunnels of 50', 200', 577' and 750'. Orebodies developed so far are too small and too few for commercial production.

Equipment: includes a 125-h. p. steam plant, with 2 hoists, and a 6-drill Ingersoll-Rand compressor. Presumably idle.

SOUTH AMERICAN DEVELOPMENT CO. EQUADOR & CALIF.

Office: 15 Broad St., New York. J. W. Mercer, gen. mgr. W. H. Knowles, supt., Poison Oak mine, Sonora, Calif. L. O. Kellog, supt., Ecuador property.

Property: company owns mines in Ecuador and has lease and bond on Poison Oak mine, Sonora, Calif., from the Yankee Hill Mining Co., of Santa Ana, Calif. **Development:** 300' shaft, with sulphide ore on 200' level, which was not free milling. Mine idle for 15 years, was reopened Jan., 1916. Company refuses to give out any information.

SOUTH BUTTE MINING CO.

MONTANA

Butte, Mont. John G. Williams, M. E. Riley and Arthur Howell, directors, at last accounts.

Inc. May 25, 1906, in Minnesota. **Cap.,** \$500,000; shares \$100 par. Company was organized by the Great Northern railway interests and has had much litigation, with various individuals and corporations, including the Butte Central Copper Co., East Butte Mining Co., P. D. Morgan and others, winning practically all of the suits. Property was leased to the Montana Consolidated Mining Co., but nothing of particular value was developed, and the latter-named company was liquidated.

Lands: include the Surprise placer claim, but company's chief asset con-

sists of mineral rights to a narrow strip along the Great Northern right-of-way. Idle.

SOUTH CARDIFF MINING CO.**UTAH**

George N. Lawrence, pres., 1021 Newhouse Bldg., Salt Lake City; W. H. King, v. p.; Allen Sanford, sec.-treas.; George A. Steiner and Thos. Marioneaux, directors.

Inc. April 9, 1916, in Utah. Cap., \$1,000,000; 385,000 shares in treasury.

Property: 5 claims, 87 acres in Cottonwood district, adjoining the Cardiff, Howell & Monte Cristo, and the Canton Mining Co. holdings, is supposed to carry extension of Cardiff fissure.

SOUTH EUREKA MINING & MILLING CO.**CALIFORNIA**

Office: San Francisco Nat'l Bank Bldg., San Francisco, Calif. Edward Fox, sec.-treas.; W. H. Schmal, supt.

Earnings in 1915 reported, \$582,762; with operating expense, \$448,013; construction and equipment, \$8,825; supplies \$570; dividends 38c per share, or \$125,354. Stock is listed in San Francisco.

Property: South Eureka mine and the Oneida, lying between South Eureka on the north, and the Kennedy mine on the south, one mile south of Sutter Creek, Amador county. **Ore:** is gold bearing quartz occurring in the Mother Lode, and is on a northern extension of the Kennedy and Argonaut lead. The enclosing rocks are Mariposa slate and greenstone schists. At the South Eureka mine three distinct veins have been developed; the hanging-wall, footwall and middle veins, with the two latter joining below the 2,000' level; most of the pay ore developed on lower levels is in this vein.

Development: by shafts. The north shaft, 2 compartments, on the South Eureka, is down 2,785' on a 67° incline; it cut the hanging-wall vein at 1,700' level, remained in the vein to the 2,000' level and is in the footwall below this. The south shaft, 880' S. E. of the main shaft, has a vertical depth of 600'. The Oneida has a 2,280' vertical shaft sunk in the hanging-wall; it cut the vein on the 1,900' level. Workings of Oneida are connected with South Eureka on the 1,800' level. The lower levels of the Oneida were flooded, but early in 1916 the mine was drained and work resumed.

Equipment: at South Eureka includes 2-ton skips, double-drum hoist driven by two 400-h. p. motors with 24-rope transmission drive and 2 Ingersoll-Rand compressors, each driven by 100-h. p. motor.

Mill: 80 stamps, weighing 1,150 lbs., dropping 6½", 100 drops per minute, crush 5 tons through 24-mesh screen. Each battery of 20 stamps is driven by a 50-h. p. motor. Pulp from amalgamating plates is treated on Frue vanners. Company employs 250 men.

Production: in 1915 totaled 145,124 tons of \$4.34 ore, with a recovered value of \$3.96 per ton, extraction 91%. Cost per ton of ore milled, \$3.09; average value of concentrate, \$68.99 per ton.

See State Mineralogist's Report Mines & Min. Res. of Amador Co., pp. 39, 45.

SOUTH HECLA EXTENSION MINING CO.**UTAH**

Office: 49 So. Main St., Salt Lake City, Utah. Officers the same as South Hecla Mng. Co. Inc. in Utah. Cap., \$500,000; shares \$1 par; assessable; outstanding \$400,000. Listed in Salt Lake City.

Property: 37 acres in the Little Cottonwood district, adjoining South Hecla Mining Co., said to show silver-lead-copper-gold ore. Development is being done through the Quincy tunnel level of the South Hecla mine. Is in the prospect class.

SOUTH HECLA MINING CO.**UTAH**

Office: 49 So. Main St., Salt Lake City, Utah. **Mine Office:** Alta, Salt

Lake Co., Utah. **Officers:** Geo. H. Watson, pres.-gen. mgr.; Herman Bamberger, v. p.; E. Storer, sec.-treas.; preceding with H. C. Edwards, Thos. Coughlin, V. M. Burman and D. W. Harcrow, directors. Matt Aho, mine superintendent.

Inc. Sept. 14, 1910, in Utah. **Cap.**, \$500,000; shares \$1 par; assessable; issued \$262,161. Company was organized as a merger of the South Columbus Consolidated Mining Co., and Alta-Hecla Mining Co., and holds properties formerly held by the Bingham-Centennial, Alta-Quincy, Columbus Wedge, Ivanhoe and Lilburn mining companies. Company exchanged stock on the basis of 1 share of South Hecla for 5 shares of South Columbus, and 1 share of South Hecla for 5 shares of Alta-Hecla. Shares are listed on the Salt Lake Stock Exchange. Annual meeting, second Wednesday in September.

Gross earnings in 1915 amounted to \$100,479, all from ore sales; operating expenses were \$70,834, leaving a credit balance of \$29,645. Initial dividend, 15 cts. per share, paid Aug. 10, 1916.

Property: 41 claims, partly patented, 550 acres, in the Little Cottonwood district. Claims carry 8 well defined ore bearing fissures in granodionite and limestone, running N. 70° E., dipping 70° N. and contact deposits between limestone and granite. The 3 orebodies under development, one in the Kate Hayes, the others in the Wedge fissure, are reported by the management to average 20' in width, and to carry malachite, azurite and tetraehdrite in the surface zone, succeeded by chalcopyrite, galena and sphalerite, estimated by the management to average 1% copper, 15% lead, .05 oz. gold and 35 oz. silver per ton. No. 1 shoot of the Kate Hayes is 940' long; No. 2 proven for 300' long.

Development: is by two main working tunnels, the Quincy and Dwyer; the Dwyer 2,000', Alta-Quincy 1,800', South Columbus 1,400', Rustler 1,200', Scott 1,700', Neversweat 150' and the White of 700'. The mine as a whole has about 7 miles of workings, lighted by electricity. Main development during 1915 was on the 250' level of the Wedge vein; 11 incline raises and 14 crosscuts were driven, all in ore.

Equipment: includes a 60-h. p. electric plant, with a 10-h. p. hoist good for 200', and a 2-stage Pneumatic compressor. Buildings include a shop building, housing smithy, machine and carpenter shops, with a 3-story boarding house and 5 dwellings.

Production: 1915 on company account was 6,957,244 lbs. ore, containing 129,268 oz. gold; 124,676 oz. silver; 668,659 lbs. lead; 384,979 lbs. zinc, 30,388 lbs. copper; 362,881 lbs. iron. Production from lessees, operations was 2,612,889 lbs. ore, containing 31,635 oz. gold, 19,390 oz. silver, 245,832 lbs. lead, 122,863 lbs. zinc, 2,763 lbs. copper and 37,024 lbs. iron. Shipping about 50 tons of ore daily, Aug., 1916, by four sets of lessees. Company employs 60 men. An extensive campaign of development is planned for 1917. Absorption of the Albion property, owning 12 claims at Alta, is reported Aug., 1916. With improved transportation facilities company should soon be a dividend payer.

SOUTH IRON BLOSSOM MINING CO.

UTAH

Robinson, Juab Co., Utah. George Jones, pres.; T. L. Schofield, sec.-treas. **Inc.** 1908 in Utah. **Cap.**, \$100,000; shares 10c par; assessable; outstanding \$241,000. Listed in Salt Lake City.

Property: 4 claims in the Tintic mining district, said to show silver-lead ore.

SOUTH LAKE MINING CO.

MICHIGAN

Office: 60 Congress St., Boston, Mass. **Mine Office:** Houghton, Mich.

Officers: R. M. Edwards, pres.-gen. mgr.; Arthur C. Paine, sec.-treas.; preceding with Thos. S. Woods, E. C. Robinson and Geo. E. Davis, directors.

Inc. Feb. 25, 1880, in Michigan as the Aztec Copper Co.; reincorporated Aug. 12, 1909, under present title and corporate existence extended for 30 years from Feb. 25, 1910. **Cap.**, \$1,000,000; shares \$25 par, increased to \$2,500,000; assessable: 90,000 shares issued; \$6.60 paid in. Last assessment, \$2, payable June 3, 1912. Of the issued stock 40,000 shares were given to the old stockholders share for share, 20,000 were offered the same stockholders of record May, 1913, at \$6.60, but were largely taken by the underwriters; 10,000 shares were offered in March, 1915 and 10,000 more in Oct., 1915, at \$5. The last two offerings were practically all taken by the shareholders. In April, 1916, the last installment of 10,000 shares was offered to the stockholders, at the rate of \$7.75 per share.

Balance of assets Dec. 31, 1915 was \$49,552, including \$36,089 cash on hand; liabilities were \$32,594, leaving a credit balance of \$16,958 as compared with a debit of \$3,790 in 1914. American Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in March.

Property: 334 acres of mineral lands, being the W. $\frac{1}{2}$ of Sec. 31, T. 51 N., R. 37 W., adjoining the Lake mine on the east, and the Adventure property on the west.

History: work was begun on the property in 1862, though the name Aztec was originally taken because the remains of extensive workings by a prehistoric race were thought, in those days, to have been the work of the Aztecs. A 16-lb. stone hammer was taken from the old workings.

The mine had a stamp mill in early days, and produced 756,853 lbs. fine copper, of which 100 tons was secured in a single mass. Exploratory work was done, 1905-06, on the Knowlton bed, of the Evergreen series, by the Aztec-Algomah Development Co., and diamond-drill borings were begun Sept., 1909, continuing until March, 1911, when suspended by reason of adverse financial conditions. Borings were begun at the base of Evergreen bluff, near the foot of the Evergreen belt, thence working southward toward the eastern sandstone. Eight drill holes were put down at various points on the property.

Exploratory drilling having shown copper rock in five holes, four of them at the corners of a 200' square, actual mine development work was determined upon. The holes showed that the beds run N. 70° W. and dip at about 56°. The drill cores and recent underground work were carefully studied by A. C. Lane in 1916, who reports that of the four lodes cut by this work, No. 2 lode, or possibly, a combination of No. 1 and No. 2 lodes, is the Lake lode, mined by the Lake Copper Co., and that the lodes dipping north in the 300' crosscut, north of the South Lake shaft, are identical with, and the same as those dipping south on the 600' crosscut south of the shaft. This means that the veins fold over, dipping both N. W. and S. E. and that a vertical shaft can reach both limbs of the \wedge shaped fold.

The vertical shaft, begun May, 1912, and now 1,000' deep, has opened up lodes Nos. 1 and 3, and the Butler lode, north of the shaft, in all of which ore is being mined, 1916. For 400' along the Butler lode, the rock is said to be spectacular in character. The South lodes will not be stoped until November, when a connection with the Lake mine by a drift on No. 3 lode on the sixth level will be completed, giving good ventilation. Drifting on an amygdaloid in the 600' South crosscut at 1958' to 1965' from the shaft is said to carry heavy copper. A north crosscut on this same level shows 51' of ore in No. 3 lode, 64' from the shaft.

On the 300' level the crosscut north is in 773' from the shaft and has passed through 4 lodes as follows:

Lode	Distance from shaft	Amt. of Drifting
No. 1 North.....	135'	847'
No. 2 North (a).....	213'	none
No. 3 North.....	270'	933'
No. 4 North.....	750'	

(a) Not commercial.

On the 600' level the crosscut south is in about 1,970' from the shaft and has passed through 5 lodes of commercial value as follows:

Lode	Distance from shaft	Width	Amt. of drifting
No. 1 South.....	1335'	51'	282'
No. 2 South.....	1431'	49'	224'
No. 3 South.....	1529'	41'	921'
No. 4 South.....	1654'	16'	64'
No. 5 South.....	1958'	10'	—

Production: during 1915, 3,993½ tons of rock were stamped at the Franklin mill and smelted at the Michigan smelter, giving net returns of 61,637 lbs. refined copper or 15.4 lbs. per ton. In Aug., 1916, 100 tons of rock were being hoisted daily, to be increased to 200 tons in the Autumn.

The South Lake installed all machinery, including a 15-drill air compressor in 1915, and completed its new steel shaft and rockhouse. Production commenced April, 1916. Company has a decidedly promising property upon which to work.

SOUTH PARK MINING & DEVELOPMENT CO.

UTAH

Office: 310 Kearns Bldg., Salt Lake City. O. A. Relf, pres.; J. Tracy Wootton, sec.-treas. **Inc.** May 24, 1916. **Cap.**, \$50,000; shares 5c par; assessable; \$3,000 issued. Listed in Salt Lake City.

Property: 13 patented claims in American Fork mining district, said to show iron carbonate containing silver-lead values.

SOUTH RANGE MINING CO.

MICHIGAN

Office: 199 Washington St., Boston, Mass. **Mine office:** Houghton, Houghton Co., Mich. **Officers:** John W. Belches, pres.; Irving J. Sturgis, v.-p.; Arthur E. Coe, sec.-treas.; preceding with Rufus R. Goodell, directors; F. W. Nichols, resident agt.

Inc. Nov. 12, 1899, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; fully paid; issued \$2,370,000. Annual meeting, first Wednesday in June.

Property: 7,000 acres of undeveloped mineral ground, lying mainly between the Globe and Lake mines, in Houghton and Ontonagon counties, Mich., and so effectually scattered that future mining companies acquiring territory in that district will need more or less land from the South Range Mining Co. to secure regular tracts.

SOUTH SIDE MINING CO.

MICHIGAN

Office: 68 Devonshire St., Boston, Mass. **Officers:** John C. Watson, pres.; Frederick Hoitt, sec.-treas.; preceding with Harry F. Fay, Ashley Watson and D. C. Forbes, directors.

Inc. 1859 in Michigan, and reincorporated Nov. 2, 1898; charter expires by limitation April 11, 1919. **Cap.**, \$1,000,000; shares \$25 par; fully issued; \$9.70 paid in. The company levied assessments of about \$90,000, to 1872, and April, 1912, paid a cash dividend of 25 cts. per share and 1,935/10,000 of a share of stock of the Naumkeag Copper Co., received in payment for lands sold to that company. Cash balance in treasury Jan. 1, 1916, \$2,000. Annual meeting first Monday in March.

Lands: were about 200 acres, lying west of the Dacotah and north of the old Naumkeag properties, immediately west of Houghton, sold, with the exception of about 31 acres of surface rights surrounding the water supply of the village of Houghton, for \$22,515 cash and 7,740 shares of stock of the Naumkeag Copper Co. Negotiations for the sale of remaining surface rights to the village of Houghton are in progress, and when completed, company can be liquidated.

SOUTH UTAH MINES & SMELTERS.

UTAH

Office: 165 Broadway, New York. Mine office: Newhouse, Beaver Co., Utah. **Officers:** Hugo Hoffstaedter, pres.; H. G. Robinson, sec.-treas.; with J. F. A. Clark, E. P. Earle and Samuel Newhouse, directors; W. L. Heidenreich, gen. mgr.; R. J. Tullock, mill supt.

Inc. Feb. 28, 1910, in Maine, as successor of Newhouse Mines & Smelters. **Cap.**, \$4,300,000; shares \$5 par; issued 645,800 shares. **Debentures:** \$1,071,000 of 6% 20-year income bonds, convertible into stock at par, remaining from a \$1,500,000 bond issue put out by the Newhouse Mines & Smelters. Interest on bonds is said to be payable annually, but only if and when earned, and then out of net profits of the year's operations. The old company defaulted in interest on its bonds, and the property was bought for \$500,000 under foreclosure, old shareholders being given stock, share for share, plus a payment of \$1 per share for new stock. The reorganization brought about \$600,000 into the treasury, of which all but about \$200,000 was required to liquidate the floating debt of the old company. The annual report for year ended June 30, 1912, showed an operating loss of \$31,113, increasing a former deficit to \$118,353, and gave current assets as \$179,500 and current liabilities as \$33,723. No report has since been issued. Listed on New York curb. Equitable Trust Co., New York, transfer agent; Windsor Trust Co., registrar. Annual meeting, third Monday in October. A dividend of 50 cts. per share, amounting to \$300,000, paid Aug. 31, 1907, by the Newhouse Mines & Smelters.

Property: 13 claims, patented, 201 acres, with miscellaneous holdings, including the Midvale placer, 168 acres, water rights at Wah Wah springs, mill, town sites and grazing lands, total holdings of 7,882 acres.

The mineral property carries about 1 mile of the strike of the Cactus vein. The Cactus mine shows monzonite-porphry country rock, near a limestone contact, and ore is essentially an irregular mass of brecciated monzonite, carrying copper impregnations, including some oxidized ores in the upper workings, but at depth mainly chalcopryrite, associated with pyrite, averaging about 1.15% copper and 25 cts. per ton in combined gold and silver values. Although the average grade of ore is very low, there is some high-grade sulphide ore, mainly chalcopryrite, assaying up to 15 and even 20% copper, but the quantity of such ore is very small.

The mine has practically no ore reserves, though there is an orebody between the 700' and 800' levels containing about 100,000 tons of 1.5% ore, with an additional 100,000 tons of probable ore. A new orebody opened on the 600' level for a short distance was said to show ore averaging about 1.8% copper.

Development: by two working shafts, of 600' and 900' depth, with levels at 100' intervals, and connected on the 600' level with a 6,300' main haulage tunnel, having a grade of 5%, laid with 30-lb. steel rails. Tramming is done by electric locomotives, hauling trains of 21 cars. The tunnel is electric-lighted throughout, and cuts several cupriferous veins before reaching the main orebody. The mine has upwards of 4 miles of workings. Principal developments are between the 300' and 700' levels, and the 600' level, giving the principal showing of ore, was said to have an orebody of

135' width and about 125' length, carrying ore of a little better than 1% copper.

Equipment: includes 200-h. p. steam plant, with a 150-h. p. hoist good for 600', and a 40-drill Ingersoll-Sergeant air compressor, both operated electrically. There also is an auxiliary electric hoist on the second level.

The mine and mill are connected with the San Pedro & Salt Lake railway.

Mill: the 1,000-ton mill is 100x400' in size, in two 500-ton duplicate sections, designed on the unit plan, to allow for future expansion. The western section, which is the concentrator proper, contains a 15-ton Whiting traveling crane, and the power plant. Equipment includes three 10x24" Blake crushers, 4 sets of rolls, 1 Huntington mill, 22 Hartz jigs, 48 Wilfley tables, 10 Johnston tables, 8 Wilfley slimers, 16 Callow tanks and Sherman settling tanks and classifiers. Ore is received in 1,000-ton steel bins, whence it is drawn by belt conveyors, equipped with plunger feed, and transferred to elevators, of which there are 2 for each section, 1 for dry and 1 for wet ore. Concentration is about 12.5 into 1. A flotation unit was added in 1914.

The power plant includes five 350-h. p. Babcock & Wilcox boilers, a Green fuel economizer and a 165' steel smokestack of 8' diameter. The steam plant is held in reserve, machinery being actuated by electric energy, brought 50 miles over the lines of the Telluride Power Co. There are two 500-h. p. Westinghouse-Parsons turbines, making 3,600 r.-p.-m. Water is brought 8½ miles from 6 large springs, at Wah Wah, having a flow of about 1,000 gals. per minute.

Production: for fiscal years ending June 30 was 5,670,993 lbs. fine copper, 53,862 oz. silver and 2,272 oz. gold in 1906; 7,244,179 lbs. copper, 48,595 oz. silver and 1,721 oz. gold in 1908; from Sept. 1, 1910, to June 30, 1912, 5,527,810 lbs. copper, 43,691 oz. silver and 2,450 oz. gold, secured from 426,703 tons of ore, of which 701 tons were smelting ore and 34,062 tons of concentrates, giving an actual net extraction of about 13 lbs. fine copper, 6 cts. silver and 11 cts. gold per ton. During 3 months ended Sept. 30, 1912, production totaled 674,987 lbs. copper. The mine was closed down owing to a strike from Sept., 1912, to April, 1913. From April, 1913, to June, 1914, production was 3,294,113 lbs. copper. Mine was again idle from June, 1914, to Oct., 1915.

Mining costs have been estimated at 90 cts. and milling costs at 50 cts. per ton. It is obvious that the Cactus is an exceedingly low-grade mine and will require careful handling to earn substantial profits.

SOUTH YUBA MINING & SMELTING CO. CALIFORNIA

French Corral, Nevada Co., Calif. Al. Elliger, pres.; C. D. Tregonning, supt. Cap., \$50,000.

Property: 10 claims, in process of patenting, including the Red Ledge mine, 10 miles N. W. of Nevada City, the nearest rail point. Mine shows granodiorite and diabase. There are 3 known veins, mainly copper-bearing, and 1 vein, originally worked for its gold ores, carries considerable quantities of this metal in the copper zone below.

Development: by 6 tunnels, longest 330', with total openings of about 2,000', showing malachite, chalcopyrite and good values in gold and silver. Principal tunnel, starting just above the South Yuba river, is expected to intersect 3 veins, including a 35' vein of cupriferous hematite, and give a back of about 1,500'.

Equipment: includes a 10-stamp mill, cyanide plant and water power. Reported bonded to a New York syndicate, 1916.

SOUTHERN ARIZONA MINING CO.**ARIZONA**

Office: 303 Midland Bldg., Kansas City, Mo. **Officers:** H. A. Sutermeier, pres.; F. D. Reasor, v.-p.; C. E. Sweet, sec.; Chas. L. Cookson, treas., with A. E. White, Emil Thielmann, H. J. Richards, E. P. Greenwood and R. W. Pierce, directors. C. A. Pierce, supt., Patagonia, Santa Cruz Co., Ariz.

Inc. 1912 in Ariz. **Cap.**, \$4,000,000; shares \$1 par; non-assessable; 1,409,079 shares outstanding. Authorized bond issue, \$400,000; \$84,160 outstanding. Annual meeting third Tuesday in January.

Property: the Sweet group, 23 claims, 3 patented, in Wrightson mining district, 10 miles N.W. of Patagonia, shows gold-bearing copper ore, occurring as contact deposit between granite and monzonite. Mine has 365' shaft equipped with steam hoist and air compressor. Not operating in 1915.

SOUTHERN ARIZONA SMELTING CO.**ARIZONA**

Bankrupt. Property bought in by preferred creditors at public auction, March, 1915, and reported leased, 1916, to the American Sm. & Ref. Co. Sascos smelter fully described in Vol. XI, Copper Handbook.

SOUTHERN EUREKA MINING CO.**CALIFORNIA**

Greenville, Plumas Co., Calif. **Inc.** in Washington by George D. Needy, E. F. Yeager, M. A. DeHuff, Hal J. Cole and H. R. Van Dreathen, all of Spokane. **Cap.**, \$2,000,000.

Property: the South Eureka, Hibernia, McClellan and Wardlaw mines, 12 claims, 450 acres, traversed by half a mile of the Crescent-Indian Valley and other lodes, near Greenville.

SOUTHERN EXPLORATION & MINING CO.**COLORADO**

F. B. Goudy, business mgr., 2379 Forest St., Denver, Colo. **Property:** a lease on the Congress mine, owned by the Congress Gold & Copper Co., which sec. Company had \$7,000 debts, mainly for labor and supplies, Dec., 1913, and operations were suspended.

SOUTHERN IDAHO DEVELOPMENT CO.**IDAHO**

D. J. Mahoney, supt., Pocatello, Idaho. U. B. Sollie and Dr. J. C. Arnout, directors.

Property: a group near Pocatello, showing a vein of copper ore, from which a carload shipped, 1916, returned 17.7% copper and 4 oz. silver per ton.

SOUTHERN PACIFIC GOLD & COPPER M. & M. CO.**UTAH**

Office: 39 North Capitol Ave., Salt Lake City, Utah. Mine near Ogden, Weber Co., Utah. **Officers:** T. S. Freney, pres.; Wm. Pough, v.-p.; J. W. Burnham, sec. and gen. mgr., at last accounts.

Inc., July 20, 1903, in Utah. **Cap.**, \$1,000,000; shares \$1 par; assessable; issued \$798,910. Shares are listed on the Salt Lake Stock Exchange.

Property: 12 claims, unpatented, 240 acres, 3 miles from a railway and about 8 miles north of Ogden, in the Sierra Madre district, reported to carry 25 orebodies, mainly contact deposits between quartzite and gneiss. The main vein, of about 50' width, shows some oxidized ores, but mainly auriferous sulphides, including covellite, bornite and chalcopyrite, with some molybdenite, in a 6' vein. **Development:** by 65' incline shaft on the Wizard claim, showing a 2' vein of high-grade copper ore and 8 tunnels, with about 1,000' of workings, said to show ore assaying up to 6% copper, 37 oz. silver and \$1.60 gold per ton. A strike of high-grade molybdenum ore was reported in 1914.

SOUTHERN SWANSEA MINING CO.**UTAH**

Office: 408 South State St., Salt Lake City, Utah. Mine office: Silver City, Juab Co., Utah. Geo. Jones, pres.; Geo. A. Shepard, v.-p.; Richard B. Shepard, treas.; Emma C. Shepard, sec.; R. E. Jones, supt.

Inc. July 31, 1907, in Utah. **Cap.**, \$10,000; shares 1 ct. par; issued,

\$8,500. An assessment of 1/30 of a cent a share is levied annually. Shares are listed on the Salt Lake Stock Exchange.

Property: 12 claims, unpatented, south of the Swansea mine and supposed to carry an extension of the Swansea vein, showing porphyry, quartzite and lime, with a fissure vein of 12' estimated average width, traceable 1 mile, carrying auriferous and argentiferous oxidized and sulphide ores of copper and lead, developed by a 200' shaft.

SOUTHERN ZINC & MINING CO., INC. TENNESSEE-VIRGINIA

Office: 115 Broadway, New York. **Officers:** E. L. Patton, pres.; Geo. F. Reynolds, v.-p.; J. E. Kingsland, sec.-treas., with John H. Banks, S. V. Fulkerson, Horace D. Fry, Kirby Thomas, and H. G. Peters, directors. John H. Banks, cons. engr. and metallurgist.

Inc. in Del. Cap., \$1,600,000 in \$600,000 7% cum. pfd., and \$1,000,000 common stock; shares \$10 par, full paid, non-assessable.

Property: owns mineral rights of Fall Branch and Arcadia mines, 1,125 acres; the Fall Branch property, 225 acres, is in the S.W. corner of Sullivan Co., Tenn., 7 miles S.W. of Fordtown; the Arcadia property is in Sullivan Co., Tenn., and Scott Co., Va., about 12 miles N. of the Fall Branch property.

Ore: carries zinc in Knox dolomitic limestone; said to be in the same ore-bearing zone as the Mascot and Bertha mines. Prospecting to date has shown 4 parallel veins. Development has been confined to the centrally located vein. No. 1 vein is opened by a system of open cuts and a 127' incline shaft that has exposed the ore for 300' along the strike. The greater part of this work was done under lease by the East Tennessee Min. & Dev. Co., which built a mill prematurely and exhausted its funds. Reported in July, 1915, "Not enough work has been done to block out any material quantity of ore. Therefore, it is too early to properly estimate ore in sight." A rough estimate of ore in No. 1 vein gives 188,000 tons of 4% zinc ore above the 100' level. Veins 4, 5 and 6 parallel No. 1, but have had no systematic development.

Mill: 100-ton capacity, is now equipped with "Clifford" dry process system. Company plans to remodel mill and build a 100-ton wet mill on the Scott county land. J. H. Banks states in his report: "I consider this a very promising zinc property and can unhesitatingly recommend its further development."

SOUTHWESTERN COPPER CO.

ARIZONA

See Arizona-Southwestern Copper Co.

SOUTHWESTERN LEASING & DEVELOPMENT CO.

ARIZONA

Has a lease on a part of the property of the Warrior Copper Co., which see.

SOUTHWESTERN MIAMI DEVELOPMENT CO.

ARIZONA

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Globe, Ariz. **Officers:** Geo. F. Ruez, pres.; F. Ward Paine, v.-p.; Robt. H. Gross, sec.-treas., with Thos. S. Dee, D. T. Kennedy, H. B. Hovland and Geo. J. Maas, directors. F. W. Hoar, gen. mgr.

Inc. June 24, 1911, in Arizona. Cap., \$500,000, increased Feb., 1912, from \$250,000; shares \$5 par; issued 15,000 fully paid shares and 85,000 assessable shares; \$2.25 paid in. Last assessment was 25 cts., payable Jan. 12, 1914. The first annual report as of date Dec. 31, 1912, gave receipts since organization as \$276,084 and disbursements as \$197,162 of which \$65,944 was payments on options, leaving a balance of \$78,922. Shares are listed on the Boston Curb. Boston Safe Deposit & Trust Co., registrar.

Property: 17 claims, 4 patented, adjoining the Inspiration Consolidated holdings, in the Miami district, 8 miles west of Globe, shows silicified schist,

mineralized at and near the contact with granite-porphry, the orebody being an extension of the porphyry deposit opened in the Inspiration and Miami properties. Ore occurs as chalcocite disseminated in schist.

Development: by churn drilling, along the same lines followed by its big neighbors, Miami and Inspiration. Eighteen holes have been drilled, averaging about 1,200' deep and the total footage amounting to about 20,000. Ore developed in this manner was estimated by Mr. Hoar, July, 1914, at about 981,000 tons of 1.5% copper, on which a recovery of about 65% is expected and probable total ore reserves of 4,294,000 tons of 1.2% ore. Development work to prove the extension of the orebody consisted of 7,940' in holes 10 and 18 in 1913. Idle during 1915. Property considered promising and management excellent. Mr. Hoar also estimates mining costs at \$1.15, milling costs at 65 cts. per ton, and cost of smelting, etc., at about 3 cts. per lb.

SOUTHWESTERN MINES CO.

NEVADA

Office: Goldfield. Mines at Hornsilver, Esmeralda Co., Nev. **Officers:** Thos. Thorkildsen, pres.; S. H. Brady, v.-p.-gen. mgr.; C. F. Stevens, sec.-treas.

Inc. in Nev. Cap., \$1,250,000; shares \$1 par, non-assessable.

Property: 9 claims, 135 acres, at Hornsilver, 28 miles S.W. of Goldfield, formerly known as the Great Western mine. Claims said to show silver-gold ore with silver predominating in the upper levels, occurring as chlorides and bromides, the gold being free milling. The veins occur in limestone and shales intruded by diorite dikes, the largest vein said to vary from 5' to 20' in width and to traverse the property for 4,000'.

Development: 300' shaft with winze to 445' depth; stoping above the 200' level said to have yielded 6,000 tons of \$25 ore a number of years ago. Reported in June, 1915, 4,000 tons of \$10 ore remaining in stopes; 8,300 tons of \$18 ore in west ore-shoot and 7,000 tons of \$8 ore on dump.

Reported in April, 1916, that examination was being made to determine advisability of erecting a mill.

SPARTA MINING CO.

NEVADA

Mina, Mineral Co., Nev. W. E. Bell, pres. **Cap.,** \$1,000,000; shares \$1 par. Listed in Salt Lake City.

Property: 19 unpatented claims in Gold Range mining district, with about 300' of development work, said to show 3,000 tons silver-lead ore. Is a prospect.

SPEARHEAD GOLD MINING CO.

NEVADA

Goldfield, Nev. **Officers:** Geo. A. Kernick, pres.; A. A. Codd, sec.-treas., Reno, Nev.; H. F. Bruce, supt. Reorganized in April, 1916. **Cap.,** 1,500,000, increased from 1,000,000, shares, \$1 par, and put upon an assessable basis. Listed in San Francisco and Salt Lake City.

Property: 2 claims, 30 acres, at Goldfield, adjoins the Kewanas, Jumbo Extension and Merger Mines Co. on the east. Several years ago lessees sunk 4 shafts, 80' to 100' in depth; since then the property has been idle most of the time. Reorganized Booth, which see, holds apex rights covering part of the property. Work was resumed in Oct., 1915, with the idea of continuing the 250' shaft to the shale-latite contact, presumably at 950' depth. In April, 1916, shaft had reached 620' depth. Property is a prospect.

SPECIE PAYMENT GOLD MINING CO.

COLORADO

John Owen, mgr., Idaho Springs, Clear Creek Co., Colo. **Property:** shows a vein with gold-silver-copper ore, developed by a 2,800' tunnel. The vein was intersected 2,800' from the portal of the tunnel and 1,000' of drifting has been done to the west. Reported in Nov., 1915, that mine

would be reopened. **Equipment:** includes electric driven air compressor and a 20-stamp mill.

SPENCE MINERAL CO.**CALIFORNIA**

Office: 1061 Mills Bldg., San Francisco, Cal. Mine near Spenceville, Nevada Co., Cal. D. M. Kent, sec. **Property:** an old mine, operated 1875-1903, the shaft caving in the latter year. Fully described Vol. XI, Copper Handbook.

SPIRAL LEAD & ZINC CO.**MISSOURI**

Chas. Dodley, supt., Joplin, Mo. J. S. Mullen, pres., Ardmore, Okla. **Property:** the Martha Ball mine, bought for about \$30,000; a sheetground mine W. of Chitwood, S.W. of Sparkler mine and E. of La Nora B mine, with ore 195' deep.

SPOKANE ROCHER DE BOULE MNG. CO.**B. C.**

Officers: P. J. Jennings, pres., 1314 Addison St., Spokane, Wash. P. A. Brady, v.-p.; John J. Jennings, sec.-treas.

Inc. April, 1916. **Cap.**, \$100,000; shares 10c par; 600,000 shares subscribed by incorporators, balance in treasury.

Property: 7 claims, including Spokane & Washington and has bond on Daly West group near New Hazelton, B. C. Ore so far developed said to carry 7% copper, \$2 gold and 15 oz. silver per ton.

Development planned is a 1,000' drift tunnel on vein giving 1,000' back at face and cutting beneath four ore-shoots. \$30,000 to be spent in 1916 installing compressor plant, power station on Mission creek, an aerial tram and wagon road, an ambitious program for this amount of money.

SPRING GULCH MINING & MILLING CO.**COLORADO**

W. R. Benzie, sec., Majestic Bldg., Denver, Colo. **Officers:** George M. Quigley, pres.; S. H. Dunlop, v.-p.; George Lopez, treas.

Property: the Star mine and mill at Ward, Boulder Co., Colo., with a record of \$2,000,000 production. Has a 10-stamp mill expected to be in operation in Fall of 1916.

SQUARE DEAL GOLD MINING CO.**COLORADO**

Central City, Colo. **Officers:** R. J. Foster, pres., 424 Wyoming St., Scranton, Pa.; Max Frank, v.-p.; E. H. Lawall, treas., with J. K. Griffith and L. F. Hueblein, directors. Harry J. Wolf, mgr., Golden, Colo. Thos. Martin, supt. Capitalization and financial statement not reported.

Property: 3 patented claims, near Central City, said to show gold, silver, copper and lead ore in quartz vein. Vein strikes E.-W., dips 65° N. **Development:** 850' incline shaft, with 4 miles of workings. Ore reserves and production not given.

Reported in Dec., 1915, that property is tied up in a law suit, but is being operated by a lessee who places his royalties in trust pending the outcome of the suit.

STANDARD AMALGAMATED EXPLORATION CORPORATION.**CALIFORNIA**

Office: 161 Sumner St., Boston, Mass. Mine near Esmeralda, Calaveras Co., Calif. **Officers:** Frank E. Bramhall, pres.; W. F. Dwyer, v.-p.; A. F. Riedel, sec.; H. H. Brown, treas.; with Alfred Grover, E. Kessler, E. F. Curtiss, Geo. Clark and J. L. Whitten, directors. Louis Robin, mgr.; Chas. Cuneo, supt., Esmeralda, Calif.

Inc. Jan. 2, 1909, in Nevada. **Cap.**, \$1,500,000; shares, \$1 par; non-assessable; outstanding April 23, 1916, 1,264,223 shares.

Bonds: authorized and outstanding, \$40,000. Company is successor of the Standard Amal. Exploration Corp. **Cap.**, \$2,500,000, promoted by Inter-Trust Security Co., alias Victor M. Weil, who came to grief with

the U. S. Postal authorities in 1910. Weil is reported to be at present indirectly connected with the company, which is a handicap.

Property: the Economic mine, 2 patented claims, 36 acres, near Esmeralda, is said to have a steeply dipping 6' quartz vein in slate. **Development:** by a 700' tunnel, with total workings of 5,000'. Management claims ore blocked out sufficient to run the mill 4 years; assay \$18 to \$46, regarded as excessive. **Equipment:** includes a 20-stamp mill, 100-h. p. compressor and electric power.

Company reports operating expenses, 1914-1915, as \$36,573; also that 20 stamps will be added to the mill and a cyanide plant built.

STANDARD CHEMICAL CO.

COLORADO-UTAH

A subsidiary of the American Vanadium Co. Operated in 1914 and 1915 in Colorado and Utah, mining radium and vanadium-bearing ores in Paradox Valley, Colo. Company gives out no information. See U. S. Bureau of Mines Bull. No. 1:25, p. 944.

STANDARD COPPER MINES CO.

ALASKA

Controlled by Galena Bay Mining Co.

Idle. **Office:** 68 Williams St., New York. Mine office: Landlock, S. E. Alaska. **Officers:** Morris B. Mead, pres.; John L. Steele, v.-p. and engr.; E. F. Bourke, sec.; J. O. Molander, treas.; Jas. A. Bourke, gen. mgr., with Thos. R. Manley and Chas. Williams, directors.

Inc. Feb. 2, 1906, in New Jersey. **Cap.**, \$300,000; shares \$100 par; issued, \$220,000. Bonds, \$300,000 issued. Is operated as a close corporation. Annual meeting, third Saturday in December.

Property: 13 claims, at Thorn Arm, on Landlock bay, in the Prince William Sound district. The lands, which are very precipitous, show country rock of greenstone, reported to carry 17 fissure veins, of which 4, under development, carry lenticular shoots of ore estimated to average 6% copper, 1 oz. silver and 90 cts. gold per ton. **Development:** by a shaft and tunnels of 290', 175', 85' and 660', with about 1,300' of workings, estimated to show 20,000 tons of ore with 12,000 tons blocked out for stoping.

The mine is connected with 500-ton ore bunkers on a wharf at tide-water by a 3,300' aerial tram, in 2 sections, 1 of 912' and 1 of 2,526' length.

STANDARD GOLD-COPPER MINING & MILLING CO. COLORADO

Officers: F. E. Groves, v.-p.-mgr., Salida, Colo. Hon. W. P. O'Brien, pres.; George L. Ramey, sec.; J. S. Ramey, treas.; Jas. Zoeter, John Millner, Dr. S. B. McFarland, directors.

Property: 8 claims, 144 acres, in Monarch district, Pass Creek, Chaffee Co., Colo., shows fissure veins in granite porphyry that carry copper-lead ores. Values run \$4-\$16 per ton.

Development: by 900' of tunnel work with 285' back. Company has a mill with flotation equipment and is expected to operate in 1916. Examinations have been made by Clyde H. Jay and J. H. Freeman.

STANDARD SILVER LEAD MINING CO.

BRITISH COLUMBIA

Offices: Empire Bldg., Spokane, Wash., 50 Broad St., New York and Silverton, B. C. **Officers:** W. J. C. Wakefield, pres.; J. C. Meyer, v.-p.; Chas. Hussey, sec.-treas.; Geo. H. Aylard, gen. mgr., Victoria, B. C., with John F. Clark and Henry White, directors.

Inc. Dec., 1910, in Wash. Operated under present management since 1911. Controlled by the Finch-Campbell-Clark estates of Spokane. **Cap.**, \$2,000,000; shares \$1 par; full paid; non-assessable; all issued. Annual meeting, 1st Tuesday in May. J. J. Stewart & Co., 50 Broad St., New York, transfer agent. Security Transfer & Registrar Co., New York, registrar. Listed in Spokane and on New York Curb.

Operating statement for 1915 shows total income of \$799,473, of which

\$752,153 was from ore sales. Expenses totaled \$289,042; dividends, \$250,000. Transferred to surplus, \$260,430, compared with a deficit of \$169,836 for 1914 operations. Shipments were suspended from Sept., 1914, to Sept., 1915, on account of the war. In Jan., 1916, due to adverse weather conditions, operations resulted in a loss of \$26,330 and of \$13,393 in Feb. Net earnings for March were \$136,943; for April, \$86,773, and \$38,436 in May, due to a smaller production of lead and concentrates. Surplus April 1, 1916, \$284,163.

Dividends: 1912, \$425,000; 1913, \$650,000; 1914, \$475,000; 1915, monthly at rate of 2½% commenced Sept. 10, total for the year, \$250,000; 1916 to Aug. 11, \$400,000; total to Aug. 11, 1916, \$2,200,000.

Under present Canadian taxation laws the company is taxable for 25% of earnings over the 7% allowance. With reported present earnings of \$1,000,000 yearly there would be available for dividends approximately \$785,000 against present dividend requirements of \$600,000.

Property: 10 full claims, 6 fractions, 600 acres, 2 miles N.E. of Silverton, located on Slocan Lake, B. C. The claims carry fissure veins in slate and graphitic schist. Ore carries silver, lead and zinc in a quartz-pyrite gangue. Silver occurs as gray copper and ruby. The orebodies occur in the form of lenticular masses along the vein, varying in width from 1' to 25'.

Development: tunnels numbered from 1 to 7, inclusive, develop the vein to a depth of 800'; tunnel No. 8, now being driven, gives an additional 400' depth. Work in 1915 amounted to 5,749', compared with 9,059' in 1914. Total work to April 1, 1916, aggregated 20,000' of drifts on the vein, raises and crosscuts. **Ore reserves:** not reported, but management claims that reserves guarantee many years of profitable operations.

Equipment: 150-ton concentrator, hydro-electric power plant on Four Mile Creek and an 8,000' tramway connecting mine and mill.

Production:	Ore, Tons	Silver, Oz.	Lead, Lbs.	Zinc, Lbs.
1915 (b).....	39,447	.....	.....	.....
1914 (a).....	49,720 (b)	1,050,000	10,000,000	5,000,000
1913.....	13,959	1,081,849	17,988,805	.....
1912.....	9,702	811,823	13,497,260	.....

(a) Approximate production. (b) Gross; tons milled, 44,806 in 1914; 35,920 in 1915.

In 1915 shipments totaled 12,762 tons, which included 3,557 tons crude lead ore averaging 54.7% lead and 93.4 oz. silver per ton; 4,804 tons lead concentrates averaging 59.8% lead and 98 oz. silver per ton; 4,401 tons zinc concentrates averaging 42.5% zinc and 23 oz. silver per ton.

Total cost per ton, exclusive of development, was \$4.33 per ton; development charges were \$1.10 per ton ore mined.

The vein contains ores which are readily concentrated and which constitute the bulk of the mine's output. There is, however, a large amount of material in the vein in which ruby silver and zincblende occur as streaks and coatings and in which galena is found in a very finely divided state in graphitic schist and slate. Such ores cannot be treated successfully by ordinary concentration. An experimental flotation plant installed in 1914 was unsuccessful, as the graphite floated off with the metallic particles. In 1916 the plant was rebuilt, using Wyman pneumatic flotation machines, which have given a total recovery of 93-95% of the values in the mill feed. The ore as sent to the mill averages 24% lead, 35 oz. silver and 14% zinc.

STANDARD TUNGSTEN CO.

CALIFORNIA

L. Porter, gen. mgr., Tungsten City, via Bishop, Inyo Co., Calif. A. J. Clark, pres.; J. L. Curtis and S. L. Carpenter, directors, Inc. in Nevada. Filed in Calif., Aug. 3, 1910. **Cap., \$200,000; shares \$1 par.**

Property: a group of claims at head of Deep Canyon, 7 miles west of Bishop, shows large bold croppings of scheelite-bearing garnet rock, close to granite contact. Part of company's holdings were sold 1915 to the Tungsten Mines Co. **Development:** by tunnels and an open quarry. Ore is quarried and will be carried to the mill over a 1,600' incline surface tramway. Company operates 100-ton mill, enlarged July, 1910, from 50 to 100 tons daily capacity. It has Dodge crusher, Davis rolls and Isbell tables. **Production:** 200 tons concentrates to July 15, 1916.

STANLEY MINES CO.**COLORADO**

Office: 1023 First National Bank Bldg., Denver, Colo. Mine office: Idaho Springs, Clear Creek Co., Colo. **Officers:** J. J. Fisher, v. p.; J. W. T. Gray, sec.; J. P. H. Cunningham, treas.; H. J. Wolf, mgr.; preceding officers are directors.

Inc. 1904 as successor of the Consolidated Stanley Mining & Milling Co. **Cap.**, \$750,000; shares \$5 par; 128,025 shares issued. Annual meeting in June.

Property: 89 claims showing gold and silver-bearing lead and copper ores. **Development:** by 641' main shaft and 3,300' adit. Has steam and water power. The reduction plant has 10 stamps. Property inactive in 1915. Development work necessary.

STANLEY MINING CO.**IDAHO**

Burke, Idaho. **Cap.**, \$1,500,000; shares \$1 par; treasury, 200,000 shares. Listed in Spokane. Controlled by Day family, principal owners of Hercules Mining Co.

Property: 12 patented claims, west of Benton and N. E. of Humming Bird, in George Gulch, N. of Burke, said to show antimony ore. Authentic information is scarce. The Humming Bird crosscut tunnel, run by the Hercules, passes through Stanley ground. Was developing in 1915. Shipments are said to have been made a number of years ago.

STAR ANTIMONY CO.**IDAHO**

Kellogg, Idaho. Burke McIntosh, mgr. **Inc.** March, 1916, in Idaho. **Cap.**, \$10,000; shares 1 ct. par. Has bond and lease on the Brown and Finnell old antimony claims, in the Pine Creek district, near Wallace. Ore carries antimony sulphide with quartz, occurring in a 5' vein. **Development:** by tunnels. Reported in Feb., 1916, that first shipment, 30 tons of 50% antimony ore, had been made.

STAR LAKE GOLD MINES, LTD.**CANADA**

Office: 449 Main St., Winnipeg, Manitoba, Can. Mine in Twp. 9, Ranges 16-17 E., 7 miles S. W. of Ingolf on the C. P. R. R. Provisional directors: W. R. Milton, J. W. Harris, John Smith, E. R. Potter and J. H. Hicks. G. J. Lovell and J. H. Hicks, fiscal agents.

Inc. Nov., 1915, to purchase the property of the Penniac Gold Reef Mines, Ltd. Terms of purchase were as follows: owners agreed to take 333,333 shares of stock and to set aside 33,333 shares for development purposes. Stockholders in the Penniac Mines to receive 200,000 shares and to pay to the Star Lake \$25,000 to liquidate liabilities of old company, amounting to \$15,000, and leave a surplus for development work. Star Lake Co. agreed to have \$100,000 in treasury within 6 months from Nov., 1915, otherwise vendors could cancel agreement. 125,000 shares offered to public at \$1 par.

Property: 3 full and 3 fractional claims, 210 acres, on Star Lake, eastern Manitoba. **Ore:** occurs in quartz vein, in a shear zone of Keewatin conglomerate near a contact between granite and schist. Vein minerals include quartz, gold-bearing pyrite and arsenopyrite. Samples cut for 10 to 15' across the vein carry \$3.50 to \$5.80 per ton. The Penniac company

is reported to have spent \$100,000 on development work, consisting solely of test pits and a 90' shaft, said to disclose two lodes. The main shear zone is said to be 200' wide, with two main and several lesser parallel quartz veins with strike N. 35-45° E. and dip N. W., all showing gold values in payable quantities. Property reported on by Prof. R. C. Wallace, University of Manitoba, and W. H. Jeffrey.

Equipment: includes a mill, office and several buildings. Management plans extensive development and equipping property with compressor and cyanide plant.

Is a new Curb promotion in Boston. Apparently a fair gamble.

STAR MINING & MILLING CO.

BRITISH COLUMBIA

See Slocan Star Mines, Ltd.

STARLESS MINE.

UTAH

Office: care Col. Enos A. Wall, owner, Salt Lake City, Utah. Mine office: Bingham Canyon, Utah.

Property: 8 claims, patented, 160 acres, lying N. E. of the holdings of the Utah Copper Co., is developed by an incline shaft and numerous tunnels, longest 2,000', with crosscuts and upraises, aggregating 10,000'. Development said to block out 800,000 tons of 1 to 2% copper ore. Equipment includes a hoist.

The 125-ton mill, enlarged and remodeled 1910, at a cost of \$50,000, is equipped throughout with machinery of Col. Wall's own design, comprising Wall corrugated rolls, Wall steel rolls for middlings, 3 sets of jigs, 2 tables for concentrates, 2 Wilfley tables, and washers, of trough form, with valves and sprayers, concentrates being discharged through the bottom and sands from the top. Reported in Sept., 1915, that operations would be resumed in 1916.

STECKNER GOLD MINING CO.

IDAHO

Care D. B. Cornell, sec.-treas., Great Barrington, Mass. Henry Tator, pres.; F. H. Cornell, v. p. Inc. Feb. 17, 1914, in Arizona. **Cap.**, \$2,000,000.

Property: the Gold Dollar group, 10 lode and 5 placer claims, near Orogrande, Idaho Co., Idaho, shows fissure veins in granite. The veins are 2'-4' thick and carry gold ore, shown by systematic sampling to carry \$3 to \$13 per ton.

Development: by 3,000' of work, all tunnels, 1,000' depth.

STEEPLE ROCK DEVELOPMENT CO.

NEW MEXICO

Steeple Rock, N. Mex. **Property:** the Carlisle and Jim Crow groups, 33 claims, was sold to George H. Utter, in 1914, who sold it 1915 to H. K. Welch and S. McKeever, of New York.

Mine shows big fissure vein, 20'-40' wide, developed to depth of 637'. Ore carries chalcopryrite, sphalerite and some galena. A \$150,000 Huff electrostatic plant is planned. Operating 1916.

STEIFER MINING CO., P. B.

CALIFORNIA

Coutolenc, Butte Co., Calif. P. B. Steifer, pres. Inc. Dec. 6, 1901, in Calif. Is a gold mine. Company was sued by Henry T. James and W. C. Pershbaker, alleging illegal issuance of stock, issuance of notes, and that company is a stock selling proposition.

STEPTOE VALLEY SMELTING & MINING CO.

NEVADA

Company dissolved 1914. Property owned and operated by Nevada Cons. Copper Co., which see.

STERLING COPPER CO.

ARIZONA

Address: care Judson A. Elliott, Phoenix, Ariz. Mine office: Dos Cabezas, Ariz. **Officers:** J. W. Thomas, pres.; L. C. Elliott, sec.; D. E. Nelson, treas.; with E. A. Congdon and J. A. Elliott, directors. C. H. Bean, supt.

Inc. 1906 in Arizona. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; issued, 482,600 shares.

Property: in the vicinity of Dos Cabezos, Cochise Co., Ariz., is developed by short tunnels and a shaft 125' deep, following a limestone porphyry contact, showing copper and lead ore which is said to average 5% copper. There has been about 1,000' of work done and \$3,000 spent in 1914-15 on development. Company plans driving a 4,000' tunnel. Property is a prospect.

STEVENS COPPER MINING CO.

ARIZONA

Office: No. 1 Broadway, New York. Mine office: Clifton, Greenlee Co., Ariz. **Officers:** Fred Enos, pres.; W. Rowland Cox, v. p.; Geo. H. Kent, sec.-treas.; D. D. Irwin, resident mgr.

Property: 39 claims, all patented, 780 acres, about 2 miles from Metcalf, Ariz., shows granite overlaid by Cambrian quartzite and Silurian limestone, with much faulting and intrusive porphyritic dikes, with orebodies near the fault lines. Some of the claims have been leased during the past two years and have produced copper ore, which was shipped to the Shannon smelter. Property being worked by lessees at present.

STEWART MINING CO.

IDAHO

Office: 61 Broadway, New York. Mine office: Kellogg, Idaho. **Officers:** H. C. Todd, pres.-treas.; C. W. Saacke, v. p.; C. T. Lark, sec.; J. L. Williams, asst. treas.; Wm. A. Beaudry, gen. mgr.; with Judge Nash Rockwood, directors.

Inc. Aug. 29, 1902, in Idaho. **Cap.**, \$1,250,000; shares \$1 par, increased July, 1916, to \$3,000,000; shares \$1 par; 1,238,362 outstanding. No bonded indebtedness. J. L. Williams, New York, transfer agent; Metropolitan Trust Co., New York, registrar. Annual meeting in August. Listed on New York Curb.

Balance sheet of June 30, 1915, shows: total assets, \$2,218,602, which includes plant and equipment, \$1,520,209; ore and concentrates, \$107,940; acct's receivable, \$17,380; demand loans secured by collateral, \$130,457; cash, \$318,916. Current liabilities: \$74,129.

Profit for fiscal year 1915 was \$654,694, almost \$200,000 less than dividend requirements. Earnings in 1914 were \$854,436. Company controls the Coeur d'Alene Development Co. through ownership of 562,498 shares out of 1,000,000 shares.

Dividends: paid at the rate of 10c quarterly from 1913 to Dec., 1915, with extra dividends amounting to 32½c in 1913; 62½c in 1914; 70c in 1915. Rate was reduced to 5c quarterly in 1916.

Property: the Stewart mine at Kellogg, 8 claims, partly patented, 150 acres, 2,000' along the outcrop of the contact, carries silver-lead ore averaging \$6.06 per ton. Country rock is soft Burke quartzite. Output during 1914 and 1915 averaged 500 tons daily, but has been reduced to 125 tons in 1916. The mine is practically worked out, and as extensive development work in 1915 failed to locate any new orebodies, management is considering the purchase of new properties at Lone Mountain and Tuscarora, Nevada, and development of the Coeur d'Alene Development Co. property, which adjoins the Stewart.

Mill: the Stewart mill at Wallace, 12 miles from the mine, has a daily capacity of 500 tons. **Equipment:** includes crusher, 4 sets of rolls, 2 Huntingtons, 12 Wilfley tables, 18 Frue vanners, 36 Harz jigs, 4 Deister slimers. A flotation unit was added in 1914. General Naval Stores flotation oil is used. Concentration ratio is 6 into 1, the product averaging 50% lead and 50 oz. silver per ton.

Production and Costs in 1915:

Tons extracted	189,615,148
Gross yield	\$ 2,140,363
Cost of extraction.....	612,796.01
Cost of transp. mine to mill.....	29,392.65
Cost of smelting.....	563,833.65
Cost of reduction.....	76,592.50
Cost of repairs.....	3,317.03

Management has been searching for new properties for some time, and various mines have been investigated and considered, including the Old Sport Group of the Quatsino Copper Co., comprising 26 patented claims, 2,000 acres, Vancouver, B. C., on which \$100,000 was spent before the option was relinquished.

Litigation with the Ontario Mining Co. was decided adversely, April, 1915, and the Ontario company granted \$48,000 for ore illegally extracted.

Notwithstanding the spectacular career of the Stewart Company under the Heinze regime, the mine made good, paying \$1,000,000 a year dividends for two years. It has a substantial surplus in the treasury, \$906,110 June 30, 1916, so that the present management is in position to develop new properties to replace the dwindling production of the Stewart proper.

Coeur d'Alene Development Co.

Property: 10 patented claims, developed to 400' level and equipped with a mill. Ten years ago a rich orebody produced about \$150,000 worth of ore, but property was abandoned when this vein was worked out. Extensive development work under way.

In 1916 company acquired the Lone Mountain mine, near Elko, Nevada, paying 1,000,000 shares of stock, exchanged at parity for those of the Lone Mountain Company. Property is a new mine of excellent promise, having a large vein of silver lead ore.

STOCKTON STANDARD MINING CO.**UTAH**

W. N. Gundy, sec., Stockton, Utah. **Officers:** A. P. Davidson, pres.; D. J. Lemmon, v. p.; H. Roy Allen and Hon. A. C. Smoot, directors.

Property: 8 claims, 5 patented, showing a 5' vein of silver-lead ore in a 70' shaft. **Development:** 200' shaft with levels and drifts being driven to cut the vein.

STODDARD MILLING CO.**ARIZONA**

Stoddard, Yavapai Co., Ariz. Is controlled through ownership of 51% of capital stock by Stoddard Mines Co., the Copper Queen Gold Mining Co. owning the remaining 49%. **Officers:** W. H. Reynolds, pres.; Louis Goldman, v. p.; C. M. Stoddard, treas-mgr.

Company is constructing a 125-ton flotation plant, designed by H. Kenyon Burch, to treat Stoddard Mines Co. and Copper Queen Gold Mng. Co. ore.

STODDARD MINES CO.**ARIZONA**

Office: 225 Fifth Ave., New York. Mine office: Stoddard, Yavapai Co., Ariz. **Officers:** W. H. Reynolds, pres.; C. M. Stoddard, v. p.; John H. Whyte, sec.

Inc. Jan., 1906, in Arizona, as successor of Stoddard Copper Co. Cap., \$500,000; shares, \$5 par; fully issued. Annual meeting, in January. Owns 51% of stock of Stoddard Milling Co., which see.

Property: 6 claims, patented, 105 acres, known as the Binghamton mine, some distance from a railway, shows fissure veins in schist, carrying gold, silver, copper. **Development:** by 1,000' tunnel and shafts of 500' and 190', with about 4,000' of workings. Mine was discovered 1882, and reopened June, 1906, by present company.

Equipment: includes double-drum electric hoist, a 10-drill compressor and pumps. Management estimated 200,000 tons of 4% copper ore. June, 1916. Ore will be treated at the new mill of the Stoddard Milling Co.

STOWELL MINE.**CALIFORNIA**

Owned by Mammoth C. Mining Co. and described thereunder.

STRATTON COPPER CO.**ARIZONA**

Address: P. O. Box 1116, Tucson, Ariz. **Officers:** Chas. N. Wilson, pres. and mgr.; A. W. Conduit, v. p.; with H. A. Walker, W. F. Milholland and C. P. Lesh, directors; W. H. Kershner, sec.-treas.; W. H. Scheerer, supt.

Inc. June, 1915, in Arizona. **Cap.,** \$2,500,000; shares \$1 par; outstanding, \$700,000. Annual meeting in June.

Property: 12 claims and 3 mill sites, 255 acres, in the Catalina Mts., Pima Co., said to show a contact deposit of copper ore in limestone, assaying 7% copper and 10 oz. silver. **Development:** surficial only, by shallow shafts and short tunnels. Claims 1,000 tons ore blocked out.

Equipment: includes gasoline hoists and air compressor. Steam power used. Property is a prospect.

STRATTON CRIPPLE CREEK MNG. & DEV. CO.**COLORADO**

(Stratton Estate.) **Property:** the American Eagle, Abe Lincoln and other mines on Bull Hill and Globe Hill at Cripple Creek, with the typical veins of the district. Company is operating the American Eagle mine and has 30 sets of lessees at work on other properties, total production being 2,000 tons of ore a month.

Matoa Gold Mng. Co. is a subsidiary, and there are a half dozen or more incorporated leasing companies working on Stratton ground.

STRATTON'S INDEPENDENCE, LTD.**COLORADO**

Secretary and offices: H. P. Smith, 3 Lothbury, London, E. C., Eng. **Directors:** C. F. Rowsell, Ch., F. W. Baker and F. S. E. Drury. Philip Argall & Sons, Denver, cons. engrs.

Inc. Sept. 8, 1908, as a reorganization of a company of same name, inc. April 29, 1899. **Cap.,** £62,500 in 1,000,000 shares of 1s 3d each, all issued; was originally £125,000. Under reorganization plan stockholders were offered one share credited as 1s 6d paid for every old fully-paid £1 share held. On sale of the property it was decided to reduce the capital to present amount, by canceling 9d per share and returning to stockholders 6d per share, thus reducing the shares to 1s 3d each. Plan was approved by the Court, Dec. 14, 1915, and warrants were posted for the return of capital, Jan. 7, 1916.

Dividends: by present company, 1908-9, 5%; 1909-10, 15%; 1910-11, 10%; 1911-12, 20%; 1912-13, 20%; 1913-14, 5%; 1914-15, 13 $\frac{1}{2}$ %, paid January 31, 1916.

Company formerly operated the Independence Gold mine and mill at Cripple Creek, Colo., sold, June, 1915, to the Portland Gold Mining Co. for £68,027. Out of the cash received stockholders had returned to them 6d per share, the balance being retained with a view to acquiring a new property. Up to date of sale mine produced ore with a gross value of \$23,621,728, yielding \$8,116,778 in earnings. Present company paid \$455,625 in dividends and had \$510,000 cash on hand after selling the property for \$372,000. Company has closed its business at Cripple Creek and is looking for a new property.

STRONG GOLD MINING CO.**COLORADO**

Victor, Colo. Is a close corporation, owned in Colorado Springs.

Property: the Jolly Tar claim, 7 $\frac{1}{2}$ acres near Victor, in the Cripple Creek camp, shows a cluster of veins in granite, carrying large shoots of

ore. The yield of gold per acre is said to be the richest of any mine in the camp.

Development: by 1,350' shaft with extensive levels and drifts. Has 20-drill compressor.

STURDY GOLD MINING CO.

ARIZONA

Montgomery, Maricopa Co., Ariz. **Officers:** John Sturdy, pres.; F. H. Lerch, v. p.; N. Sturdy, sec.-treas. and mgr., Montgomery; with Wm. H. Sturdy and Albert Martin, directors.

Inc. June 16, 1915, in Arizona. **Cap.**, \$750,000; shares \$1 par; outstanding, \$500,000. Annual meeting, second Thursday in January.

Property: 4 claims, 65 acres, in the Winifred mining district, formerly owned by Fortuna Gold & Copper Co., described in Copper Handbook, Vol. XI. Was acquired by present management at sheriff's sale. Claims are said to show six parallel quartz veins in granite, averaging 4' in width and carrying gold and silver ore. **Development:** 125' vertical shaft, with 1,000' of workings. Claims to have 6,000 tons ore blocked out, average grade \$10 per ton.

Equipment: includes a 6-h. p. Fairbanks-Morse gasoline hoist. New management raised \$7,900 to build a small mill and develop. At last accounts, shaft was being sunk to 600' level.

SUCCESS MINING CO.

IDAHO

Office: Wallace, Idaho. **Officers:** P. J. Gearon, pres. and gen. mgr.; Jas. Gearon, v. p. and supt.; L. C. Wilson, sec.-treas.; with E. H. Becker and C. M. Carroll, directors. **Cap.**, \$1,500,000, all outstanding; shares \$1 par. Stock listed in Spokane and Butte; traded in on New York curb.

Balance sheet: Dec. 31, 1915, showed: assets, \$1,791,435, which included: property, \$1,503,763; cash, \$246,103; ore in transit, \$27,408; other current assets, \$14,160. Liabilities included: surplus, \$251,110; current, \$40,324.

Profit and loss statement: total income, 1915, \$1,225,802; operating expenses, \$356,866; net profits for year, \$898,936; deduct dividends Nos. 24-36, inclusive, \$555,000, and deficit, Dec. 31, 1914; surplus Dec. 31, 1915, \$251,110.

For quarter ending March 31, 1916, company earned \$137,994 net from a total income of \$248,568. Dividends absorbed \$135,000. Cash in banks, March 31, 1916, reported as \$259,480. April earnings reported as about \$90,000.

Dividends: suspended April 20, 1913, totaled \$345,000 to that date; resumed April 30, 1915, and \$550,000 paid in 1915; \$345,000 to July 26, 1916. Present rate is 3 cts. per month with extra payments of 2 cts. quarterly.

Property: is one of the oldest located properties in the Wallace district; first operated by the Granite Mining Co., taken over in 1905 by H. F. Samuels, who organized the Success Mining Co., continued under his management until 1915, when control passed to "practical" mining men and brokers, and large blocks of stock, aggregating over 1,000,000 shares, were worked out through the New York, Duluth, Spokane and Butte exchanges.

The company has had considerable publicity during the past year, due to stock manipulation, said to be aided by the management, and to friction between the management and several publications on mining news. This has been aggravated by the seeming aversion of the directors to take stockholders into their confidence, especially in connection with the new smelter contract with the Grasselli Chemical Co., effective May 1, 1916. The distrust of the management culminated, April, 1916, in the Success officials being summoned to court to show why stockholders should not know the terms of contract.

Litigation with the adjoining Alameda company, which claimed pay-

ment for ore said to have been extracted from its ground by Success; was decided in favor of Alameda Co., but the Success Co. has appealed.

Property: 8 claims on Nine Mile Creek, 2 miles N. W. of Wallace.

Ore: zinc with lead-silver content. According to U. S. G. S. Prof. Paper, No. 62, there is no vein, the ore occurring in masses of irregular form and size, which are chiefly replacements of quartzite in places where it has been most thoroughly fissured. The ore is strictly confined to the sedimentary rock; surrounding country rock is monzonite.

Development: by tunnels to 700' level, and by shaft from 700' to 1,300' level, the latter recently opened. New York in 1915, 1,575', included 200' of shaft sinking. Considerable time and trouble were required to locate the ore on the 1,200' level.

Ore reserves: under date of Jan. 24, 1916, the president reported "tonnage now in sight is better than at any time during the past year, and is estimated sufficient to run the mill at the present rate for about 18 months." Grade of ore not given. Examination made in March, 1916, said to show 21,500 tons ore, blocked out above the 1,200' level, and in addition 87,200 tons of probable ore, no grade given.

Equipment: includes a 250-ton mill. Flotation is used.

Production: in 1915, 21,867 tons concentrates, dry weight, with a gross value of \$1,255,801; cost of extraction, transportation and reduction, \$356,865. Actual tonnage of ore produced not reported.

The nature of the ore occurrence almost necessitates having but small reserves. Present conditions indicate the possibility of opening up new ore at depth. In June, 1916, it was reported that the orebody had been cut on the 1,300' level, and also that a new orebody had been found on the 700' level.

The reticence of the management regarding operations and costs, its connection with the stock promotion, and the many conflicting reports issued, are all poor policy and have tended toward giving a feeling of uncertainty to stockholders and the investing public. If the management is sincere, a little frankness would do no harm.

SULLIVAN COPPER DEVELOPMENT CO.

ARIZONA

Office: care P. H. Nelson, pres., 610 Lonsdale Bldg., Duluth, Minn. **Mine office:** Paradise, Cochise Co., Ariz. Geo. H. Crosby, sec.-treas.

Property: 14 claims, 6 patented, 4 miles west of San Simon, Chiricahua Mts., has opencuts, showing leached copper ore and a little very rich ore, and has a 60' tunnel showing lead ore. Management considered good and property promising. Idle, except for annual assessment work.

SULLIVAN ZINC MINING CO.

MISSOURI

Inc. by Harry Kingsbury, Allen Dorsey and R. D. Talmadge, Jan., 1916, to take over a 20-acre lease at Joplin, Mo., on sheet lead ground. The workings are 180-205' deep. Company has a new 150-ton mill.

SULPHUR MINING & RAILROAD CO.

VIRGINIA

Office: 11 S. 12th St., Richmond, Va. P. H. Haskell, supt., Mineral, Louisa Co., Va. **Property:** a pyrite mine whose ore carries low copper values. Has 600' shaft with steam power, compressor, etc. Ore handled in 500-ton concentration mill. Company makes cement copper from its mine and seepage waters, but is primarily a producer of pyrite for sulphuric acid plants. Is controlled by Virginia-Carolina Chemical Co.

SULTANA-ARIZONA COPPER CO.

ARIZONA

See Kelvin-Sultana Copper Co.

SULTANA MINE.

NEVADA

Under lease and bond to Henry Robbins, Good Springs, Nev. Mine contains a 10' vein of silver-lead-zinc ore, which is smelted in a 40-ton

concentrating mill, making 12 tons of zinc concentrate per day. Forty men are employed.

SUMMIT GOLD MINING CO.**MONTANA**

Office: 520 Lyceum Bldg., Duluth, Minn. **Mine office:** Radersburg, Broadwater Co., Mont. **Officers:** W. A. Eaton, pres.; T. M. B. Hicks, v. p.; A. O. Rabideau, sec.; G. L. Maycroft, treas.

Inc. Jan. 22, 1912, in Minn. **Cap.**, \$400,000; shares \$1 par; nonassessable; issued, \$298,000. Annual meeting, third Tuesday in January. Company is virtually successor of Summit Copper Co., shares of which were convertible into stock of this company at the ratio of 2½ old shares for 1 new share.

The company, inactive at present, had a bond and lease on 8 partly developed claims, 4 miles S. W. of Radersburg, described in Vol. XI, Copper Handbook. Reports in 1916 state that management is in quest of a gold property.

SUMPTER SMELTER.**OREGON**

See Northwest Smelting & Refining Co., Sumpter, Baker Co., Ore.

SUN DIAL GOLD MINING CO.**ARIZONA**

A. F. Carper, supt., Oatman, Ariz. Is one of the big crop of wildcats that have been born at Oatman since the strike in the United Eastern.

SUN TUNGSTEN CO.**COLORADO**

Address: J. N. Caldwell, sec., 325 Foster Bldg., Denver, Colo. **Officers:** A. E. Blakesley, pres., Denver Cons. Stock Ex.; Valdo F. Wilson, v. p.; Paul Hardy, directors; Mr. Von Kueren, supt., Boulder, Colo. **Cap.**, \$3,000,000; \$1 par; 2,800,000 in treasury.

Property: 2 claims, the Lucille group of tungsten mines, Sunshine district, near Boulder, Colo., held under bond and lease, and similar lease on O. D. mine at Cripple Creek.

Development: at Boulder, an old tunnel reopened 1916, said to show a 6' vein. Stock offered at 5c a share, March, 1916. Is a G. R. Q. proposition.

SUNNYSIDE GOLD MINES CO.**COLORADO**

Wm. L. Terry, supt., Eureka, San Juan Co., Colo. **Property:** shows a deposit of complex silver-lead-copper-zinc ore, developed by 400' shaft and 200' tunnel. **Equipment:** includes electric power, air compressor, a 150-ton concentrator with 40 stamps, tube mills, flotation unit and a Huff electrostatic zinc separating plant.

SUNNYSIDE MINING CO.**ARIZONA**

Oatman, Mohave Co., Ariz. **Officers:** P. Mullen, pres.; M. Sullivan, v. p.; J. F. Flannagan, treas.; C. W. Herndon, sec.; with A. H. Woollacott, directors.

Inc. in Ariz. **Cap.**, \$1,000,000; shares, \$1 par; treasury, 550,000 shares. Listed in Los Angeles.

Property: Sunnyside group of 3 claims, 2 miles S. E. of Oatman, said to have a vein with assay values from \$2 to \$8 gold per ton. In April, 1916, a shaft was being sunk from 120' depth. Property is in the development stage.

SUNSET COPPER CO.**NEW MEXICO**

L. M. Stiles, pres. and mgr., Box 393, El Paso, Tex.; W. P. Stiles, v. p.; S. F. Johnson, sec.; L. B. Wilcox, treas.

Property: includes the old King mine, 7 miles N. W. of Hachita, developed by 400' shaft with workings on a vein said to show gold-silver-copper ores. Is a prospect.

SUNSET MINING & DEVELOPMENT CO.**NEVADA**

Office: 265 Russ Bldg., San Francisco, Calif. **Mine office:** Rhyolite,

Nye Co., Nev. **Officers:** Edw. S. Van Dyck, pres.-treas.; O. A. Newcomer, v. p.; Chas. D. Olney, sec.

Inc. Dec. 9, 1912, in Nevada as a reorganization of the Tramps Consolidated Mining Co., Bullfrog Sunset Mining Co. and Denver Bullfrog Annex Mining Co. **Cap.**, \$5,000,000; shares \$1 par; issued, \$1,750,000. Listed on New York Curb as a prospect. Security Transfer & Registrar Co., New York, transfer agent and registrar. Balance sheet Oct. 1, 1915, shows cash \$18,000.

Property: 20 acres, patented, in the Bullfrog district, said to show ore occurring in fissure veins in rhyolite, with dip of 30°. Veins vary from 6' to 20' in width. **Development:** by 5,000' of tunnels; total underground work about 18,000'.

Equipment: includes an electric hoist, 6-drill compressor and a 100-ton cyanide plant, making an extraction of 93% on a consumption of 0.6 lb. of cyanide per ton of ore treated. Company claims to have treated 12,000 tons in 1915, averaging \$4.40 per ton. Mine barely paid expenses the first year, but having now doubled the milling equipment it should show better results. Total cost for mining and milling in 1915 on a 50-ton per day basis was \$3.74.

SUPERIOR BONANZA MINING CO.

MEXICO

Controlled through stock ownership of 60,000 shares by Greene Cananea Copper Co. **Office:** Cheyenne, Wyo. Head office: Cananea, Sonora, Mex. **Officers:** George Kingdon, pres.; John Cuddihy, v. p.; C. Sites, v. p.-sec.; J. V. Montague, treas.-asst. sec.; J. F. Carmichael, asst. treas.; with A. E. Peterman, A. S. Cox, A. C. Cole and W. L. Thomas, directors

Inc. in Wyoming, Aug. 31, 1907. **Cap.**, \$1,250,000; shares \$10 par; 74,923 issued. Owns the entire capital stock of Bonanza Mining Co., S. A.

SUPERIOR & BOSTON COPPER CO.

ARIZONA

Office: Houghton, Mich. Mine office: Globe, Gila Co., Ariz. **Officers:** Wm. G. Rice, pres.; John H. Rice, v. p.; John R. Pimlott, sec.-treas.; preceding, with Hon. Norman W. Haire, Jas. W. Harrington and Geo. Kingdon, directors; A. L. Graham, supt.

Inc. Nov. 23, 1906, in Arizona. **Cap.**, \$6,500,000; was originally \$1,500,000, increased Sept. 5, 1908, to \$2,000,000; April 22, 1909, to \$2,500,000; July 25, 1911, to \$3,000,000; Sept. 30, 1911, to present amount; shares \$10 par; \$7 paid in; issued, 283,827. Company has levied 7 assessments, last one of \$1 Feb. 7, 1916. Listed on Boston Stock Exchange. State Street Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, first Monday in December.

Comparative Financial Statement: fiscal year ending Sept. 30—

	Ore Sales	Calls & Sundries	Balance Oct. 1	Balance Prev. Total	Total	Total Balance
					Expend.	Oct. 1
1915.....	\$ 54,530 (a)	\$ 19,108	\$59,285	\$132,923	\$103,394	\$29,529
1914.....	291,515	1,720	75,268	368,503	309,218	59,285
1913.....	153,436	268,503	81,382	503,321	428,052	75,269

(a) Lessees produced \$42,164 additional.

Property: 51 claims, 785 acres, 28 claims, 388 acres, patented. The Globe & Arizona tract of 22 claims was bought for \$320,000, an adjoining group of 21 claims was bought for \$46,000, and the Collins-Doyle group of 5 claims was bought for \$150,416.35, giving a total cost of \$516,416.35 for lands. The Collins-Doyle group, added 1909, adjoins the former holdings on the north, carrying the extension of the Old Dominion fault, and being well located with respect to the Great Eastern vein. The property is a compact tract next east of the Arizona Commercial, and east of the Old Dominion. Lands are about 4,200' above sea level, and about 800' above

Pinal creek, at Globe. The property carries both limestone and iron ore for fluxes. It is reached by the Arizona Commercial and Arizona Eastern railways, both connecting with the main line at Globe.

Geology: the property shows diabase cutting through about 600' of quartzite with interbedded shale and Globe limestone. Copper ore occurs in veins filling fault fissures. There are 2 dominant fault-belts, one series including from north to south, the Old Dominion, Great Eastern or Black Hawk, Limestone, Quo Vadis, Black Oxide and Iron King fault veins, intersected at nearly right angles, by other faults of later age, apparently but slightly mineralized. Three of the veins named show ore in commercial quantities. Later development may show the Quo Vadis to be the faulted continuation of the Great Eastern; there is a possibility that both are merely the eastern extension of the Old Dominion vein. The average strike of the faults is N. 70° E., with average dip of 60° N. The oxidized zone is deep, ore opened on the 8th level including cuprite, native copper, as well as chalcocite. Malachite is found in the workings above.

Development: by 4 shafts, the McGaw, Great Eastern, Limestone and Gardner, and 1 tunnel. Underground workings total about 30,000'. New work during year ending Sept. 30, 1915, amounted to 2,094'. The Great Eastern 444' vertical shaft being poorly located, was replaced by the McGaw shaft, to the north.

The McGaw shaft is 1,185' deep, with 3 compartments. The 10th level opened at 970' corresponds with the 10th level of the Arizona Commercial mine, next west. This shaft lies 900' north of the old shaft and is sunk between the Old Dominion fault on the north and the Great Eastern vein on the south, and is planned to intersect the Great Eastern vein at depth. This is the main working shaft of the mine and does the ore hoisting for the entire property.

The Great Eastern vein on the 6th level in the McGaw shaft, showed an ore-shoot 10 to 30' wide, proven for a distance of over 800'. The 8th level exposed this vein for over 400' and also showed the zone of oxidation to continue to this depth. The 10th level discloses the first sulphide ore encountered in the McGaw workings of the mine, but the 12th level shows little or no copper in this vein, as far as developed. The vein matter is heavily stained with iron, highly silicious and, when commercial, carries about 7% copper.

The Old Dominion vein is tapped by crosscuts from the McGaw shaft, on the 4th, 6th and 10th levels, where it shows only oxidized material, quite thoroughly leached, carrying slight silver values, but with promise of copper ore at greater depth.

The 318' Limestone shaft showed a 4' footwall paystreak of commercial ore on the 300' level; has not been operated for several years.

The Gardner 3-compartment vertical shaft at the southern end of the property, on the Black Oxide vein, is 435' deep; mine is now idle. The Black Oxide vein apparently is a continuation of the Buckeye fault, on which the Old Dominion has opened mines on the Buckeye, Carrie and True Blue claims.

The 1,054' Black Oxide tunnel has its portal about 1,000' S. W. of the Limestone shaft, and cut the Black Oxide vein at 670', giving a 400' back drifts on this level showing a vein carrying micaceous hematite, with small quantities of copper, and a little shoot of smelting ore. Indications are favorable to the existence of good bodies of high-grade sulphide ore at greater depth. The Black Oxide is 280' east of the True Blue mine of the Old Dominion, from which lessees shipped small quantities of high-grade ore for several years.

The Iron King vein, parallel with the other 4 faults of the property,

shows a good gossan, and has an old 70' shaft, in leached vein material similar to that in the other faults, at similar depth.

Equipment: includes hoists at each shaft, aggregating 1,260-h. p. The main plant, at the McGaw shaft, has four 250-h. p. Stirling water-tube boilers, a 5-ton hoist good for 1,600', and a 1,200-cu. ft. Nordberg cross-compound air compressor, with an auxiliary compressor at another shaft. The mine has two 1,000-gal. Prescott pumps.

The company owns 38 buildings, including machine shop, smithy, carpenter shop, office and warehouse, with a number of dwellings for employees. The shops are well equipped and the smithy has a Word drill sharpener. The changing house at the McGaw shaft has steam-heated lockers, shower baths and drying racks. Buildings are lighted by electricity. Fuel is mainly petroleum, with 5,000-gal. and 12,000-gal. storage tanks.

Production: was begun Feb., 1908, and to end of 1910 amounted to 27,126 tons ore, yielding 3,846,402 lbs. copper and 94,698 oz. silver, all from the Great Eastern vein above the 6th level with the exception of about 681 tons extracted by lessees from the Black Oxide workings. Known ore reserves being exhausted, production was suspended Aug., 1910, to March, 1913, when shipments were again resumed, curtailed in 1914 and resumed March 15, 1915.

Development work will be resumed below the 12th level, with funds provided by the last assessment. After awaiting developments at the Arizona Commercial property below its 1,200' level, which have proved satisfactory, Superior & Boston can now enter upon this new work with considerable encouragement. The management hopes to open up reserves of sulphide ore, which, if done, should make the company a steady and profitable producer.

SUPERIOR COPPER CO.

MICHIGAN

Controlled through ownership of 50,100 shares, bought 1906, by the Calumet & Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. Operating office: Calumet, Mich. Mine address: Houghton, Mich. Rodolphe L. Agassiz, pres.; J. F. Perkins, sec.-treas.; A. J. Garceau, asst. treas. and asst. sec.; G. G. Endicott, aud.; Jas. MacNaughton, v. p. and gen. mgr.; R. E. Agassiz, Chas. F. Ayer, Benj. Joy, Jas. MacNaughton and Francis L. Higginson, directors; Ocha Potter, supt.

Inc. July 23, 1904, in Michigan. **Cap.,** \$2,500,000; shares \$25 par; fully issued and \$1 paid.

Report for 1915 showed a net profit from mining operations of \$245,017, and balance of assets of \$216,274. In 1915 the company acquired 18,836 shares of the Lake Milling, Sm. & Ref. Co.'s stock for \$240,000. Shares are listed on the Boston Stock Exchange. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in April.

Property: 400 acres, carries about 6,000' of the strike of the Baltic amygdaloidal bed, between the Isle Royale and Atlantic mines. It embraces Sec. 15, of T. 54 N., and R. 34 W. The tract has room for 3 or 4 shafts, and has a light overburden, the bed being proven by trenches at intervals of 1,000', showing an amygdaloid of 35 to 40' average width, with extensive carbonate stains, due to weathering, and a little fine copper near surface. The property has been trenched to the eastern sandstone.

The mine has 2 workable copper lodes, the Baltic, locally known as the Superior, and the West lode, discovered in 1911, a formation independent of the Superior, 14 to 30' thick, which, however, cannot be stopped until the Superior lode is mined.

Development: by 2 shafts, sunk in the footwall of the lode, insuring solid ground, but necessitating crosscuts at each level. Owing to the great width of the copper-bearing stratum, it is necessary to crosscut along the bed at 100' intervals. The Superior mine is opened on the northern extension of the Baltic amygdaloidal bed, though some call this the Superior lode, not being satisfied that the correlation is correct. The Baltic bed, in the Superior mine, carries copper impregnations in the footwall, always an evidence of strong mineralization, and there is a conglomerate bed under the foot that carries a small amount of copper. The stamp rock is remarkably deceptive in appearance, as the copper oxidizes readily, and when it has been broken a few weeks, appears lean, unless a fresh fracture shows its true nature. As a triangular tract of land intervening between shafts Nos. 1 and 2 is owned by others, they cannot be connected above the 12th level. The mine had about 9 miles of workings at the end of 1915. Underground work for 1915 totaled 4,199', compared with 2,654' in 1914, and 5,835' in 1913.

No. 1 shaft, about 1,200' south of the northern boundary of the property, is 2,469' deep and develops the Superior and West lodes, the first opened on all levels, and the second lode from the 12th to 26th inclusive. Both lodes carry copper in exceptional quantity. Improved values have been encountered with depth, and the workings of No. 1 shaft give a good showing. The ground, especially in the upper levels, is very treacherous, and requires careful attention and close timbering.

No. 1 shaft has a frame shaft rock house, of the Calumet & Hecla type, equipped with Westinghouse engine and two 23x36" crushers. The hoist is good for 4,000'.

The equipment at No. 1 shaft includes a combination boiler and engine house, with 90" Belpaire boilers, a hoist, and 10-drill and 18-drill air compressors. No. 1 shaft is connected with the main line of the Atlantic railway by a 7,000' spur, and also with the Isle Royale railway.

No. 2 shaft, 2,540' S. W. of No. 1, and 2,400' from the southern boundary, sunk 40' in the footwall, at an angle of 53°, is 1,628' deep. Equipment at No. 2 includes a steam hoist, formerly used at No. 1, and a shaft rock house having 2 crushers and a Westinghouse engine, with rated capacity of 1,000 tons daily.

Buildings include an office, warehouse, smithy, change house, and a number of dwellings for employees at a small town site lying between the shafts.

Production: (begun Jan., 1909)

	Tons R'k Stpd.	Lbs. Cu. p. Ton	Cost p. T. (b)	Lbs. Cu. Prod.	Cost per Lb.	Rec'd per Lb.
1915.....	212,051	18.23	\$1.88	3,866,484	12.29c	18.125c
1914.....	191,628	16.79	1.75	3,217,635	12.43c	12.645c
1913.....	130,826	22.87 (a)	2.36	2,992,765	12.86c	15.387c
1912.....	172,322	22.76 (a)	2.33	3,921,974	12.75c	16.45c
1911.....	162,599	19.90	2.39	3,236,233	15.31c	12.70c
1910.....	140,514	22.64	2.69	3,181,041	14.29c	12.63c
1908-09....	16,835	22.22	....	374,077	.....	.....

(a) An excellent return, and materially above the average secured from the good amygdaloidal mines of the Lake Superior district. (b) The high cost of mining is largely accounted for by the comparative newness of the mine; costs include mining, transportation, stamping and taxes.

Production was lessened in 1913 and 1914 by the strike of the Western Federation of Miners, lasting from July 23, 1913, to April 12, 1914, and from Sept. 1, 1914, to Feb. 1, 1915, the mine operated on a three-quarter time basis

on account of the condition of the copper market following the outbreak of the European war. Superior has thus far been a disappointment; the copper yield per ton rock is lower than originally calculated, and production remains below the 4,000,000-lb. mark. It cannot reasonably be expected to do much better.

SUPERIOR COPPER CO., LTD.

ONTARIO

Idle. Office: Sault Ste. Marie, Ont. Mine office: Superior Mine, via Algoma Central Railway, Algoma, Ont. Officers: G. R. Nicholson, pres.; C. H. L. Jones, v. p.; Emory W. Clark, sec. and treas.; with E. L. Fisher, Capt. John Mitchell, Geo. T. Arnold, J. W. Staley, Geo. Kemp and Capt. Benj. Boutell, directors.

Inc. Sept. 13, 1901, in Ontario. Cap., \$3,000,000; originally \$1,500,000; increased 1903, to \$2,000,000, and again July 29, 1907; shares \$10 par; issued, \$2,402,160. The company was organized with nonassessable stock, but a special act of the provincial parliament of Ontario rendered the stock assessable. Total assessments to Dec. 31, 1910, were \$132,080.52. Security Trust Co., Detroit, registrar and transfer agent. Annual meeting, second Thursday in June.

Property: 11 claims, crown granted, 800 acres, in an unorganized mining district of Algoma, shows granite and chloritic schist carrying fissure veins of 10' and 70' estimated average widths, traceable 7,000'. The quartz veins carry chalcopyrite with a little chalcocite, estimated by the management to average 4% copper, 1 oz. silver and 40 cts. gold per ton. **Development:** amounting to 1,233' includes a 400' shaft and 949' tunnel with 5 shallow shafts, a 189' tunnel and many surface cuts.

Mine is reported to show 4,000' tons of ore on the dump, with 140,000 blocked out, apparently a serious over-estimate.

Equipment: includes a 150-h. p. steam plant, 12-drill compressor engine house, changing house, boarding house, machine shop, smithy, office, store and dwellings, and a 50-ton concentrator.

The mine has been idle since Dec., 1908.

SUPERIOR & GLOBE COPPER CO.

ARIZONA

Idle for several years. Office: 3 Calumet State Bank, Calumet, Mich. Officers: John Daniell, pres.; Fred Smith, v. p.; Chas. Chynoweth, sec.; Joseph W. Selden, treas., and Hon. Norman W. Haire, directors.

Inc. Dec., 1908, in Arizona. Cap., \$3,000,000; shares \$10 par; issued, \$2,450,000, in 15,000 shares of full paid stock and 230,000 shares of stock \$1 paid. Property is fully paid for; lands were bought for \$75,000 cash and 15,000 shares of full paid stock. First National Bank, Calumet, registrar. Annual meeting, third Monday in November.

Property: 13 claims, 250 acres, include the Magnet group of 12 claims, adjoining the Mineral Farm group of the Globe Mining Co., and 1 fractional claim, of several acres. The property, 2 miles N. E. of Globe, is in the eastern portion of the Globe district, lying N. of the Arizona & Michigan and N. E. of and adjoining the Globe Mining Co. and the Yuma mine of the Old Dominion, latter carrying the Yuma-Big Johnnie-O'Dougherty fault. The outcrop of the Yuma fault, on the Superior & Globe lands, shows an iron gossan carrying copper stains for about 3,000'.

Development: by several old shafts of 50 to 60' depth, said to have been sunk for gold ore. Present owner has sunk a 680' vertical shaft in the hanging of the Yuma fault, on Copper Trust No. 2 claim, about $\frac{3}{4}$ mile from the Superior and Boston mine. The shaft cuts a 5' vein carrying iron with copper stains and has about 1,100' of workings on the 650' level, the N. crosscut 522' long showing 2 veins. The Yuma vein, cut at 235' from the shaft, has 320' of drifting, with an 85' winze and a 17' crosscut

to the vein from the bottom of the winze. The vein shows merely iron and manganese, with copper stains and small silver contents. In the N. crosscut, 487' from the shaft, a second vein was cut showing a width of 20' and a 38' drift thereon showed material similar to that in the other vein, neither carrying commercial values. The S. crosscut on the 650' level was driven 233' in hard diabase, developing nothing of value.

Diamond drilling was begun in June, 1910, a 350' horizontal and a 957' vertical hole being bored from the bottom of the shaft. This work was continued until early 1912, but developed nothing of importance.

Equipment: includes a 100-h. p. gasoline plant having a 60-h. p. Fairbanks-Morse hoist good for 1,000' and a 3-drill gasoline air compressor. There are 5 buildings, including carpenter shop, engine house, office and dwelling.

SUPERIOR & PITTSBURGH COPPER CO.

ARIZONA

Sold Dec. 31, 1915, to Calumet & Arizona Mining Co., which see.

SUPERSTITION CONSOLIDATED MINING CO.

ARIZONA

General office: 44 Broad St., New York. **Mine office:** Phoenix, Ariz.

Officers: J. P. Bickell, pres.; Louis Ford, v. p.; A. W. Scott, sec., treas.-mgr.

Inc. Jan. 7, 1915, in Ariz. Cap., \$2,000,000; shares \$1 par; outstanding \$500,000. Security Transfer & Registrar Co., New York, transfer office and registrar. Listed on New York Curb as a prospect. Liabilities in Feb., 1915, a 2-year 6% note of \$10,000, dated Jan. 20, 1915.

Property: 7 claims, Arizona King group and 2 adjoining claims in the Pioneer mining district, Pinal Co., 60 miles E. of Phoenix and 7 miles from a railroad. Said to show schist and intrusive porphyry with a vein outcropping for 3,000', from 5 to 40' in width; strike N. W., dip 65° E. The ore is gold claimed to assay from \$3 to \$48 per ton, with very little copper present.

Development: a 400' shaft with several hundred feet of workings. Ore reserves not given. A 50-ton flotation mill was built in 1915; no returns available.

SURF INLET GOLD MINES

BRITISH COLUMBIA

Surf Inlet, Princess Royal Island, B. C. F. W. Holler, supt. Controlled by Tonopah Belmont Mining Co. and operated by Belmont Canadian Mines, Ltd., which see.

SURPRISE MINE

BRITISH COLUMBIA

Owned by Wm. Kent, 1410 Borland Bldg., Chicago, Ill. H. L. Hollis, mgr., 1025 Peoples Gas Bldg., Chicago; J. P. McFadden, supt., Sandon, B. C.

Property: 3 crown granted claims, 93 acres, 2 miles N. E. of Sandon, in Slocan mining district, said to show silver, lead and zinc ore in a fissure vein in slate with N. E. strike and dip of 65°. Crude lead ore averages 148 oz. silver per ton, 65% lead, and 7% zinc. Mill feed averages 28 oz. silver per ton, 9% lead, and 16% zinc. Ore reserves not estimated.

Development: by tunnels; main tunnel 3,000' long is 1,000' below outcrop; underground workings total 12,000'. **Equipment:** includes an aerial tram.

Shipments: in 1915 totaled 2,550 tons lead concentrate, 2,740 tons zinc concentrate and 375 tons crude lead ore.

SUSQUEHANNA MINING CO.

NEW MEXICO

Address: C. J. Plankenhorn, sec., Williamsport, Pa. Company succeeded North American Copper Co., described in Copper Handbook, Vol. XI. In 1915, part of the property was worked by lessees. In 1916, B. W. Randall operated the Nellie Bly mine under lease and bond.

Property: near Lordsburg, 14 claims, unpatented, in the Pyramid and Virginia districts, including the Nellie Bly and Cobre Negra groups. Claims show andesite, diorite and trachite, having 8 orebodies, reported as fissures running parallel with porphyry dikes.

Development: the Nellie Bly mine, in the Pyramid district, 8 miles S. W. of Lordsburg, has shafts of 450', 125', 65', 33' and 40', with about 6,000' of workings. The 400' level shows a vein of 12' estimated width, with bornite-chalcopryrite ore, said to average 5.8% copper and 5.5 oz. silver per ton.

The Cobre Negra mine, in the Virginia district, 6 miles S. W. of Lordsburg, is reported to carry melaconite, malachite, azurite and chalcopryrite, and is developed by shafts of 332', 180', 60', 85' and 85'. Idle since 1906.

Equipment; includes a 40-h. p. hoist, good for 600', at the Nellie Bly mine, and several mine buildings and 4 dwellings. There is said to be a 50-ton concentrator, but this is not in commission.

Production: 1916, about 6 cars a month, of ore averaging 4.5% copper, and 4 oz. silver per ton, with 50% to 60% silica, 5% to 6% iron, and 8% to 10% lime.

SUTTER CREEK MINING CO.

CALIFORNIA

Alex Rennie, supt., Sutter Creek, Amador Co., Calif. Cap., \$300,000.

Property: the East Eureka mine, also called the Rose, or Poundstone, a mile east of Sutter Creek. Shaft was reopened 1916 and 10-stamp mill repaired.

SUTTON CONSOLIDATED MINING CO.

NEW MEXICO

Former properties at Lordsburg, N. M., sold and company out of business. See Vol. XI, Copper Handbook.

SWANSEA CONS. GOLD & COPPER MINING CO.

ARIZONA

Bankrupt. O. M. Souden, trustee, c/o U. S. Nat'l Bank, Los Angeles, Calif. Property at Swansea, Yuma Co., Ariz., leased to Judge W. J. Thomas of Los Angeles, early in 1915; operated, 1916, by the Thomas Estate.

Property: reported as 132 claims, 3,300 acres, about 10 miles from Planet, includes the Signal mine, erroneously called the Clara, and the Moro and Clara groups.

Geology: the Signal orebody is a replacement deposit formed in a limestone bed 15 to 100' thick, associated with overlying shales and amphibolitic schist and resting on granite gneiss, all of pre-Cambrian age. The outcrop is an irregular replacement, 30' wide, of copper-stained hematite, dipping at 52° N. This orebody extends 150' downward in the mine, is 20 to 30' wide, 90' long and contains boulders of unreplaced limestone. The orebody is encased in soft chloritic schist derived from amphibolite and appears to rest on a strong fault plane that separates the granitic gneiss from the sedimentary series. Two parallel, smaller, but similar orebodies occur in the hanging wall of the deposit. The ore consists of soft, red hematite with manganese-oxide and chlorite, holding grains and nodules of chalcopryrite and pyrite. The ore as a whole averages perhaps 2.5% copper, though 4% ore is obtained for smelting by rough sorting. See U. S. G. S. Bull. 451, pp. 59-67.

Development: by 2 main shafts with extensive underground workings along the main fault or lode, and by stopes on 3 orebodies. The mine has 4 vertical and 2 inclined shafts. No. 1 shaft, 400' deep, vertical, has a 15-h. p. Fairbanks & Morse gasoline hoist, raising ore with a bucket. No. 2 shaft, 325' deep, is an incline, and has a 50-h. p. Western gasoline hoist, operating a 2-ton skip. No. 3 shaft, also inclined, is 200' deep. No. 4

shaft, the largest and deepest, 3 compartments, is 500' deep, with a hoist. No. 5 shaft, 373' deep, has a 75-h. p. steam hoist, and No. 6 shaft, 250' deep, has a 25-h. p. steam hoist. Some drilling done 1908, with a Keystone churn drill, showed another orebody.

Equipment: the power plant has two 250-h. p. boilers, a 300-k. w. d. c. Westinghouse motor, and a 150-k. w. belt-driven Ideal motor, latter operating pumps at the Bill Williams Fork river, supplying water to the mine and works through 3" and 6" pipe lines. Buildings include a machine shop, sawmill and other structures.

The smelter has a Mitchell water-jacket blast furnace of 750 tons rated daily capacity. A reverberatory furnace was partly completed when the mine closed down in 1913.

The power house has a 15,000 cu. ft. Nordberg air compressor, and a Connersville blower direct-connected to a Hamilton Corliss compound engine. Slags are handled by a Jeffrey electric locomotive. The smelter building is of structural steel. The converter department has 2 stands and 9 shells, rotated electrically, with a 40-ton electric crane, having 2 auxiliary hoists, and a silica mill, with electric motor, for linings.

The mines and works are connected with the Santa Fé, Prescott & Phoenix railway by a 21-mile line, known as the Arizona & Swansea railroad, operated, but not owned by the company. The property is an example of enthusiasm run wild, coupled with reckless stock selling and the foolish construction of surface works before the development of enough ore to keep them busy.

Lessees are reported to have made shipments regularly during 1915 and in 1916 to date. Profits for March said to be \$22,000, with daily shipments of 3 cars of 4% ore during April. The ore is shipped to Arizona Smelting Co., at Humboldt, Ariz. Twenty men employed.

SWANSEA CONSOLIDATED MINING CO.

UTAH

Office: Knight Bldg., Provo, Utah. **Officers:** Jesse Knight, pres.; R. E. Allen, sec.-treas. **Inc.** in Utah. **Cap.**, \$100,000; shares 10 cts. par; 999,798 outstanding; assessable. Listed in Salt Lake City.

Owens 145 acres in Tintic Mining district, said to show silver-lead ore.

SWANSEA EXTENSION MINING CO.

UTAH

Officers: Arthur L. Thomas, pres.; Heber M. Wells, sec. and treas. **Inc.** June 12, 1908. **Cap.**, \$100,000; issued \$2,245; shares 10 cts. par. Listed in Salt Lake City.

Owens 3 claims in Tintic mining district. No information available.

SWARTHMORE CONSOLIDATED MINING CO.

COLORADO

Idle. Mine near Cardinal, Boulder Co., Colo. **Officers:** Chas. B. Galbreath, pres.; Harvey Hanes, v. p.; J. E. Carpenter, sec.; Paul Barriclow, treas.

Inc. July, 1907, in Colorado, as a merger of the Swarthmore Copper Co. and Enterprise Mining Co. **Cap.**, \$3,500,000; shares \$1 par.

Property: 17 claims, 11 patented, 60 acres, about 2 miles west of Cardinal and the D. B. & W. R. R., in the Grand Island mining district of Boulder county. Property includes the Golden Fleece mine, having fissure veins in pre-Cambrian gneiss cut by dikes. The vein thus far developed said to average 8' wide and to carry a paystreak of 3 to 5% copper ore with occasional telluride of gold. **Development:** by 5 shafts, deepest 403', and by tunnels of 800', 1,000' and 2,000'.

Equipment: includes 2 small steam plants, one having a 60-h. p. hoist and a 12-drill air compressor. There is a small concentrator with a 50-ton chlorination plant, and 4 new mine buildings.

SWASTIKA DEVELOPMENT CO.

CALIFORNIA

F. W. Woods, mgr., 1832 E. 16th St., Los Angeles, Calif. Property

leased during 1915 to F. W. Giroux, Prescott, Ariz. Mine is a small producer of silver-lead ore, but is now operated for copper.

SWASTIKA MINING CO.**MONTANA**

Philipsburg, Granite Co., Mont. W. W. Williams, mgr. **Officers:** W. I. Power, pres.; F. R. Andrus, v. p.; C. E. Hansen, sec.; W. W. Kroger, treas.; the officers are the directors.

Inc. April, 1913, in Montana. **Cap.**, \$500,000; shares \$1 par; 407,043 outstanding.

Property: 3 claims, 1 patented, known as the old Basin mine, and held under long term option, shows a 4' vein of argentiferous copper ore, oxidized to carbonates near the surface, exposed for 100' on the 150' level. **Development:** consists of a 190' shaft, and 200' of drifts. Ore averages 4% in copper, 1½ oz. silver, 50 cts. gold per ton.

Equipment: includes electric hoist good for 500', compressor and Cameron pump.

Mine was closed down in 1914, but efforts being made in 1916 to increase capitalization and resume operations.

SYLVANITE GOLD MINES, LTD.**ONTARIO**

Subsidiary of Kirkland Lake Proprietary. Chas. A. O'Connell, mgr., Kirkland Lake, Ont. **Inc.** June, 1913, in Ont. **Cap.**, \$2,000,000. Owns the Wright and Robbins claims adjoining the Tough-Oaks gold mine, Kirkland Lake. Work to date has been chiefly surface exploration.

SYNCLINE GOLD-SILVER-COPPER MINING CO.**NEVADA**

Lida, Esmeralda Co., Nev. **Officers:** L. Kershaw, Tacoma, Wash., pres.; H. C. Peet, v. p.; L. E. Campbell, sec.-treas.-gen. mgr.; with F. A. Campbell, B. A. Howes, E. P. O'Leary, E. B. Campbell, E. C. Peet, directors.

Inc. June 4, 1910, in Nevada, as successor of Washington-Nevada Mining & Milling Co. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; issued \$799,420. Annual meeting, first Monday in January.

Property: 11 claims, 3 patented, 57 acres, with 120 acres mill and smelter sites, 30 miles S. W. of Goldfield and 10 miles from a railway, in the Lida district. District shows Cambrian limestone and shale, cut by quartz monzonite, capped by volcanic rocks. The ores occur as impregnations and veins. The claims are reported by the management to carry 12 deposits, 4 under development of 4 to 20' average width, traceable 5,000', carrying a sulphide ore, said to give assays of 8.7% copper, 17 to 19% lead, 11% zinc, 11 oz. silver and \$1.90 gold per ton. **Development:** by 9 shafts, of 31 to 120' depth, and by 6 tunnels, of 12 to 140' length; the tunnels are not being used. Owing to lack of rail transportation and complex nature of the ore, company is devoting attention mainly to the development of lead carbonate ores.

Equipment: includes a 15-h. p. gasoline hoist and 5 mine buildings. The management plans deepening the main shaft to 200'.

SYNDICATE MINING CO.**UTAH**

Santaquin, Utah Co., Utah. B. H. Bullock, pres.-mgr.; Nora A. Bullock, sec.-treas. **Inc.** Jan. 7, 1911, in Utah. **Cap.**, 1,250,000 shares; 2 cts. par. Listed in Salt Lake City.

Property: 10 unpatented claims, near Santaquin, said to show a 20' vein containing ore with gold, silver and copper values. The vein fissures are in limestone and orebodies are expected at vein intersections. Development by 725' tunnel. Property is a prospect, in which ore in commercial amount has not yet been found, though surface croppings are very promising.

TABLE MOUNTAIN COPPER CO.**ARIZONA**

Was controlled by Arimex Consolidated Copper Co., now defunct; a Thos. W. Lawson promotion. Fully described Vol. XI, Copper Handbook.

TACOMA SMELTING CO.**WASHINGTON**

Office: 165 Broadway, New York. **Works office:** Tacoma, Pierce Co., Wash. **Officers:** G. H. Brownell, pres.; Edw. Brush, v. p.; F. W. Clark, treas.; L. D. Craig, sec.; H. Y. Walker, gen. mgr., and L. C. Beyer, directors. R. F. McElvenny, supt.; T. R. Wilkinson, refinery supt.; Roger Taylor, asst. supt.

Inc. in Nevada. Cap., \$500,000; shares \$1 par. Is a subsidiary of the American Smelters Securities Co.

Property: a smelting plant with a 52-acre site, 6 miles from Tacoma, on Puget Sound, whose tidal flats are being reclaimed by filling in with slag. Property is well located for receipt and dispatch of materials, and has extensive wharves, with ore bunkers and automatic devices for unloading cargoes, connected with all departments of the works by an electric tram line.

The smelter, originally of 300 tons capacity, built for lead ores only, has been increased to 1,650 tons daily capacity, and now treats lead matte, copper, lead, silver and gold ores and concentrates, from the entire western coast of North America, and a considerable tonnage of South American ores.

Equipment: includes three 60-ton mechanical roasters and two 10-ton hand-roasters. There are 6 blast furnaces, including four 100-ton stacks for lead ores, and a 400-ton water-jacket blast furnace for copper. A 36" cupola resmelting furnace, with outside settler, can treat 75 tons of 50% matte daily. There is a circular slag-casting machine, having 144 tilting molds. The reverberatory furnaces are of 350 tons daily capacity. The 1,000' dust flues of the blast and reverberatory furnaces lead to a 306' stack of reinforced concrete.

The converter department, equipped with a 30-ton electric traveling crane, has 2 stands and six 72x100" shells, of barrel type.

The electrolytic plant, increased from 35 to 50 tons daily capacity, has a 20-ton electric traveling crane for handling anodes and cathodes.

Electric power is received at 40,000 volts and stepped down to 100 volts for use, the works requiring about 2,000 h. p. There are 3 Connorsville blowers, driven by a 200-h. p. Westinghouse induction motor, furnishing blast for the lead furnaces. Fuel is petroleum, brought in tank steamers from the oil fields of southern California.

The Tacoma smelter is one of the most important custom plants on the Pacific coast, the management is progressive, and the metallurgical practice excellent.

TACOMA STEEL CO.**BRITISH COLUMBIA & WASHINGTON**

Office: Provident Bldg., Tacoma, Wash. **Mine offices:** Van Anda Island, B. C., and Darrington, Snohomish Co., Wash. **Officers:** Joshua Pierce, pres.; E. M. Shelton, v. p.; A. Y. Eastman, sec.-treas. and gen. mgr.; Alex Grant, supt.

Inc. with cap. \$5,000,000, reduced later to \$3,000,000. Paid a \$35,000 dividend April 2, 1907.

Property: a mine at Darrington carrying gold-copper ore, idle for some years, 4,000 acres of lands carrying coke and coal in Washington, 208 acres of iron ore lands on Redonda Island, B. C., and the Marble Bay mine, 640 acres, crown-granted, near Marble Bay harbor, at the northern end of Texada Island.

The Marble Bay mine, about one-fourth mile from the Cornell and

Copper Queen mines, has ore of similar nature occurring as lenticular shoots, carrying argentiferous chalcopyrite, with bornite, in a garnetiferous marble near a contact between diorite and limestone. The mine is developed by a 1,350' three-compartment shaft, showing, on the lower levels, a vein of 18' width, with copper values unchanged and gold values gaining with depth. Recent development work mainly between the 1,200' and 1,300' levels.

Equipment: includes steam and electric power, with 5 Lidgerwood hoists, 5-drill Ingersoll-Rand, small Canadian-Rand and 10-drill Allis-Chalmers-Bullock air compressors. Buildings include a power house, machine shop and there is a wharf, on Marble Bay, having large ore bunkers, connected with the mine by a ground tram. In connection with the mine there is a limestone quarry and 4 kilns, with daily capacity of 300 bbls. of lime.

Production: shipped mainly to the Tacoma smelter, was 6,237 tons of ore, yielding 293,269 lbs. fine copper in 1907; 11,438 tons of ore, estimated to have yielded 1,250,000 lbs. fine copper, in 1909; 22,500 tons averaging 5% copper in 1911; 17,870 tons in 1912; 12,600 tons in 1913, containing 2,216 oz. gold; 22,400 oz. silver; 1,031,009 lbs. copper.

Mine considered valuable and management good.

TAHOE COPPER MINE

CALIFORNIA

Title to property is held through the Sacramento Valley Copper Co., which see.

TAJO; MINAS DEL

MEXICO

George Kislingsbury, supt., Rosario, Sinaloa, Mex. Owned by the Bradbury Estate, Bradbury Bldg., Los Angeles, Calif. Is one of the great gold-silver mines of Mexico, showing a big fissure vein in andesite, developed to 1,000' in depth. Working \$8 ore from old fills and pillars, above 600' level, 1916. Has a very complete equipment with 1,000-k. w. gas producer-electric plant.

The mill is handling about 250 tons per day, 1916.

TAKILMA SMELTING CO.

OREGON

Office: P. O. Box 64, Colorado Springs, Colo. **Works office:** Takilma, Josephine Co., Ore. Chas. L. Tutt, pres.; Wm. T. Tutt, v. p.; J. A. Hull, sec.-treas.; Roy H. Clarke, mgr.

Inc. in Colorado. Cap., \$250,000; shares \$10 par. Owns a controlling interest in the Waldo Smelting & Mining Co.

Management reports gross earnings of \$55,000 in 1914-15, with operating expenses of \$7,500.

Property: 175 acres, and a 160-acre smelter site, total holdings 335 acres 320 patented, in the Waldo district, including the Queen of Bronze mine, showing diorite and serpentine, carrying several veins, with N.-S. strike, of which 3 are more or less developed.

The Queen of Bronze mine carries lenticular orebodies in diorite and serpentine occurring along vein fractures. The ore contains bornite and chalcopyrite, and the ore shipped in 1915 is reported to have averaged 10% copper with \$5.15 in gold. **Development:** includes a 150' shaft and tunnels of 1100', 300' and 400' length, with 20,000 feet of workings.

Smelter: at Takilma, has a 125-ton water-jacket blast furnace, making matte, when in blast averaging 45% copper, 2.5 oz. silver and \$2.50 gold per ton, which is shipped to the Tacoma smelter for conversion. Owing to heavy rains in fall and winter, causing impassable roads, the smelter can be worked only in summer. The nearest rail point is Grant's Pass, 42 miles distant. Equipment includes a sawmill.

Production: 7,543 tons of ore smelted yielding 1,563 tons of matte of

about 45% copper tenor, indicating an average return of 8% copper from ore smelted, with production of about 1,350,000 lbs. fine copper in 1905, and 499,662 lbs. fine copper in 1907; the works have been idle since Jan., 1908. Early in 1915 the Queen of Bronze mine was leased and about 15 tons of ore daily are shipped to Tacoma Smelting Co. Smelter returns for 1,542 tons said to be \$53,104. Ore is hauled 27 miles by auto truck to Waters Creek.

TAMARACK & CUSTER CONSOLIDATED MINING CO. IDAHO

Wallace, Idaho. **Officers:** J. J. Day, pres., gen. mgr. and treas.; E. R. Day, v. p.; H. L. Day, sec.; R. M. Walker, E. H. Knight, F. M. Rothrock, E. Boyce, directors.

Inc. in Nevada, 1913. **Cap.**, \$2,000,000; \$1 par; unissued \$223,500.

Financial statement for 1915 shows: 26,146 tons shipping ore of gross value, \$1,238,754; mining cost, \$449,041; treatment and transportation, \$439,156; improvements, \$3,760; net profits, \$346,796; profits for 1914, \$187,063. First dividend of 2 cts. per share was paid May, 1916.

Property: about 40 claims and fractions, acquired from the old Tamarack & Chesapeake and Custer companies, on Nine Mile Creek, Coeur d'Alene district, Shoshone Co., Idaho. The Hercules mine nearby is controlled by the same interests.

Ore: contains silver and lead values, part direct smelting and part concentrating. In 1915, shipments of lead ores and concentrates amounted to 1,700 tons monthly. Mill recovery is reported to be about 83% without flotation. The management is considering the erection of a new 600-ton mill to cost about \$150,000.

The company with the Hercules interests built and is operating the new lead smelter at Northport, which is to be enlarged to handle custom products. The management has been criticised for its policy of secrecy. Direct information is not available but it is said that the gross ore reserves are about \$9,000,000. One ore-shoot on the Leonard tunnel level is reported to have been proved for 1,500' with ore on both faces.

TAMARACK MINING CO.

MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. Mine office: Calumet, Mich. Works office: Hubbell, Houghton Co., Mich. **Officers:** E. V. R. Thayer, pres.; Jas. MacNaughton, gen. mgr.; other directors, R. S. Bradley, F. L. Whitcomb, Geo. S. Mumford, E. B. Dane, W. D. Calverley, and E. C. Lewis; Geo. A. Flagg, sec.-treas.; Clarence H. Bissell, asst. sec.-treas.; John T. Been, supt.; Chas. D. Hohl, chief engr.; John T. Reeder, gen. clerk and purch. agt.; A. Lincoln Burgan, mill supt.; E. J. Waters, chief mng. capt.; John Rowe and Wm. Rosevear, mng. capt.

Inc. 1882, in Michigan. **Cap.**, \$1,500,000; shares \$25 par. State Street Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agt. Annual meeting, 1st Wednesday in April. **Dividends:** begun 1888, were 43 in number, aggregating \$9,420,000 to end of 1915, last dividend having been \$4, July 23, 1907.

The company sold its Cliff lands, 1910, for \$680,000 to the Cliff Mining Co., using the proceeds to liquidate the floating debt, interest on which was equivalent to 85 cts. per share, 1909.

Balance sheet of Dec. 31, 1915, gave assets, exclusive of mining equipment, of \$1,589,111 with liabilities of \$384,130, leaving a balance of assets of \$1,204,981. Operations 1907-11 have given net annual losses, amounting to \$249,277 in 1907; \$172,246 in 1910; \$193,198 in 1911, resulted in a profit of \$271,625 in 1912, a loss of \$49,923 in 1913, and of \$174,945 in 1914; a profit of \$308,987 or \$1.31 per share in 1915.

Was controlled, through ownership of 19,400 shares of outstanding

stock, by Calumet & Hecla Mining Co. In April, 1916, stockholders of the Tamarack Mining Co. voted to accept the offer made by Calumet & Hecla, of \$3,563,486, or \$59.39 per share, for all the property and assets, except the Mineral Range R. R., of the company. Transfer was to have been made between June and July 1, but suit was filed early in June by G. M. Hymans to restrain the sale. He charges Calumet & Hecla is acting as both vendor and purchaser which renders the sale void, also that the price offered "is grossly inadequate." To date no settlement has been made and it seems certain the sale will not materialize.

Property: 1,120 acres, in Secs. 10, 11, 14 and 15, T. 56 N., R. 33 W., with a mill site on Torch Lake, miscellaneous timber lands and other realty giving total of 8,746 acres, from which the Cliff mine was sold, 1910.

The Tamarack mine proper is a tract of very irregular outline, bounded on all sides by lands of the Calumet & Hecla, and opened on the underlays of the Calumet conglomerate and Osceola amygdaloidal beds. The mine was planned by Capt. John Daniell, who conceived the idea of opening the underlay of the conglomerate by a deep vertical shaft. The actual work of sinking No. 1 shaft began 1882, and the conglomerate was cut $3\frac{1}{2}$ years later, in 1885, at a depth only 10' greater than the estimate of Capt. Daniell made before the work was started.

Development: Tamarack No. 1 shaft, 3,409' deep, cuts the Calumet conglomerate at 2,270' beneath the surface and the Osceola amygdaloid about 1,000' deeper. This shaft is used exclusively for hoisting water, raising approximately 11,500,000 gals. per month, all the water of the mine being diverted to this shaft, since at greater depth the amount of seepage is trivial. There are 2 Nordberg direct-connected duplex pumps on the 6th and 9th levels, each lifting 600 gals. per minute from the 9th level. Equipment at No. 1 includes a powerful hoist.

The Tamarack No. 2 shaft, N. E. of No. 1, is 4,355' deep. The conglomerate ground tributary to No. 2 shaft has been worked out, down to and including the 26th level, leaving the 27th to 30th levels, inclusive, still to be stoped. The pressure on the conglomerate is very great, requiring the installation of timber pillars in order to keep the drifts open.

The mine has 5 shafts, 2 at the South Tamarack, two at the North Tamarack, with No. 5 shaft about midway between. The 16th level of No. 3 and the 38th in No. 5 are the same depth and are connected. The shafts are all connected for ventilation.

New openings have been 6,221' in 1907, 5,501' in 1910, 8,912' in 1911, 2,646' in 1912, 1,113' in 1913; none in 1914; 880' in 1915. Ore is mined from both the Calumet conglomerate and the Osceola amygdaloid.

As the Tamarack lands do not carry the outcrop of the copper lodes worked, but cover the "underlay," or downward continuation of the veins below the Calumet & Hecla workings, the Tamarack shafts are vertical and all levels must be opened by crosscuts, some of them at great depth, having a length of nearly one-third of a mile.

The mine is dry, though there was an increase in the inflow of water after the earthquake of 1905. A concrete dam has been built on the 34th level, to increase the storage capacity for water underground. The lowest level of the mine shows only a slight seepage of water, extremely bitter to the taste, shown by analysis to carry sodium and magnesium chlorides and bromides.

Tamarack No. 3 shaft, nearly a mile north of No. 1, is the principal shaft of the mine. It is 5,253' deep, and below this depth, only 27' less than 1 mile, is continued for 500' further as a blind shaft, sunk on the dip of the bed at the end of an 800' crosscut. This was done to save deepening

of main shaft and the cost of crosscuts, constantly increasing in length. The incline blind shaft has a single track with stations on the 19th, 20th and 21st levels, and a compressed air hoist, on the 18th level, which raises all rock to that point. The 18th level has shown only fair copper values. No. 3 shaft cuts the Calumet conglomerate at a vertical depth of 4,835' where the bed is 20 to 25' wide, but carrying irregularly-distributed copper, though payable as a rule. The shaft is connected with the Calumet & Hecla mine on the 17th level south and 39th level north. The mine has endless rope haulage on the 15th, 16th, 17th, 31st, 32nd and 35th levels. The normal output of No. 3 shaft is about 1,000 tons daily.

No. 3 shaft has an Allis-Chalmers hoist having a semi-conical drum with 18' maximum diam. There is a Nordberg auxiliary hoist used for lowering and raising men and timber in No. 4. Equipment at No. 3 shaft includes a 60-h. p. fan, 10' in diam., capable of supplying 192,000 cu. ft. of free air per minute, to the depth of the shaft, both ventilating and cooling the mine, which otherwise would be 90° F. in the bottom levels.

No. 4 shaft, 4,450' deep and about 600' N. E. of No. 3 is connected with No. 3 for ventilation and safety. While occasional payable ground is shown, the section of the lode about the mine is as a whole poor.

No. 5 shaft, sunk about 3,300' S. W. of No. 4, and midway between the old Tamarack and North Tamarack workings, is the deepest and largest shaft of the mine, and is the only shaft that has been deepened for several years; it has a vertical depth of 5,308', or a mile and 28'. Though No. 3 mine of the Tamarack has deeper openings, No. 5 is the deepest shaft sunk anywhere in the earth's crust. Sinking was begun Aug. 2, 1895, and the conglomerate was cut Dec. 20, 1901, at a vertical depth of 4,062', the late Capt. Wm. E. Parnall having foretold the depth within 12', and the time required within 11 days, more than 6 years previously. No. 5 is connected underground with the workings of No. 2 and No. 3 shafts and is bottomed just below the footwall of the Osceola amygdaloidal bed.

In sinking this shaft, 83 separate trap, amygdaloidal and conglomerate strata, all barren, were cut, before the Calumet conglomerate was reached. The north drifts on the 35th, 36th and 37th levels have been carried to the Calumet & Hecla boundary and the 41st is the bottom level. Openings on the 40th level are in good copper ground though the showing on the 39th level is rather poor. The Osceola amygdaloidal bed shows no copper values except in a small streak along the hanging wall. The ground on the conglomerate bed tributary to this shaft is limited and though the conglomerate is of good width it is low in grade and shows constantly decreasing copper contents with depth.

As Tamarack No. 5 is the deepest mine shaft in the world the particulars concerning it are worthy of notice. The shaft is 7x29', inside measurement, with 5 compartments in a row. The 3 central compartments, 5'x7' 2" each, are used for cages. One of the end compartments is 7' 2"x5' 4", the extra 4" being allowed for timber strain, while on the other side of the shaft there is a 3'x7' 2" compartment for ladders, pipes and wires. The 10x14" wall plates of this shaft are 29' 2" long, and the 5x7" runners, serving as guides for the cages, are 16 to 22' in length. Instead of lag screws being countersunk, the runners have a central groove 2" wide and 1½" deep running from top to bottom on both sides of each of the 4 hoisting compartments, these grooves providing for the escape of loosened lag screws, without damage to cages or runners. The shaft openings have automatic covers that lift for passage of the cages.

Equipment: surface equipment at No. 5 is the most extensive at any shaft of the property. The engine house has 2 duplicate 6,500-h. p. Nord-

berg hoists, each with four 36" high-pressure cylinders, having 72" stroke. The drums were 24' in diam. in the center tapering to 16' at the ends, each half carrying 6,500' of 1½" steel cable, the hoists, operating in counter-balance, being capable of raising from 6,000' depth a net load of 6 tons of rock, this having a gross weight, with cage and cable of about 12 tons. The hoists cost \$60,000 and \$90,000 respectively, and 1 hoist was made over, 1910, and given a 36' Nordberg drum, weighing upwards of 30 tons. The boiler house has six 200-h. p. Burt boilers, with 84" shells, and two 115' brick-lined self-supporting steel smokestacks.

The compressor house at this shaft has a 35-drill Ingersoll-Sergeant and a 100-drill triple-expansion Nordberg compressor. The electric plant at No. 5 shaft has a 150-k. w. generator supplying current to all branches of the mine.

The pumping station on the shore of Lake Superior, nearly 5 miles N. W. of the mine, has two 1,250,000-gal. pumps, that take water from a 40' well, connecting with a tunnel driven 425' under the bed of the lake, the intake being about 35' below water level. These pumps raise water against a static and frictional head of nearly 700', delivering it into steel tanks of 42' and 65' diam., with combined storage capacity of 200,000 gals., standing on the highest ground at the mine. Water is distributed from these tanks to the Tamarack and Osceola locations.

The Tamarack has 2 stamp mills on Torch Lake, a little more than a mile S. of the Calumet & Hecla mills, each with 5 compound heads and 2 simple heads. The mills have a combined daily capacity of about 3,500 tons of conglomerate rock, which is materially greater than any possible productive capacity of the mine. The stamp heads are fitted with 8" mortar grates, opening into ¼" mesh revolving screens, with Parnall-Krause hydraulic discharges. The stamps have accessory Nordberg crushing rolls, to care for raggings from the mortars, the rolls having rigid journals, with independent wash for each set. Mineral is dressed to about 50% copper.

A regrinding plant, 99'x240', and a leaching plant, both similar to those of the Calumet & Hecla Mining Co., are being built. The regrinding plant will contain 32 Hardinge mills and 92 Wilfley tables and will treat the accumulated tailing in the lake, which is an important factor in Tamarack's assets. The management figures the new process of regrinding and leaching the tailing will result in a total profit therefrom of \$5,000,000.

The joint pump house of the Tamarack and Osceola mills has two 40-, 000,000-gal. pumps and one 15,000,000-gal. pump. The 2 larger pumps, which are duplicates, have triple-expansion steam ends, with 22", 40" and 60" cylinders of 52" stroke, and the water end of each has three 30" plungers and a 42" discharge pipe.

The Tamarack and Osceola companies have joint wharves, and steel coal sheds, with 2 steel unloading towers, at Dollar Bay, on Portage Lake, these being among the most extensive in the district.

Recent production:

	Mine				Total		
	Tons R'k Treated	Lbs. Min. Prod.	Lbs. Cu. Per Ton R'k Stpd.	Cost Per Ton (a)	Lbs. Cu. Prod.	Cost Per Lb.	Rec'd Per Lb.
1916*	.....	.....	.....	.....	3,446,425	14.5c	22.5c
1915.....	217,027	6,139,824	17.9	\$2.52	3,888,150	17.07c	19.10c
1914.....	57,410	1,743,145	18.7	4.49	1,074,808	29.08c	12.80c
1913.....	227,563	6,206,295	18.3	2.81	4,168,743	16.60c	15.45c
1912.....	421,385	12,118,038	18.8	2.23	7,908,745	13.15c	16.56c
1911.....	392,338	12,793,430	19.1	2.69	7,494,077	15.56c	.....
1910.....	525,554	22,053,480	21.1	2.67	11,063,606	14.70c	.....
1903-1909—average for seven years				2.72	13,331,795	13.94c	.....

(a) Includes mining, trans., stamping and taxes. *First 6 mos.

Maximum production was 20,222,529 lbs. fine copper in 1897.

During the labor strike from July, 1913, to April, 1914, the mines were closed down. Operations were resumed in May only to be suspended again in Aug., 1914, due to the depression in the copper market caused by the European war. Production was resumed in April, 1915.

The Tamarack always has been an expensive mine to work, and with expenses increasing by reason of depth and decreased mineral values, it can be worked at only a small profit, under ordinary metal conditions. The company has reached the point where with 12 ct. copper it would either have to close down the mine or expend a large sum in developing possible orebodies at greater depth. It would seem that for the best interests of all concerned it should dispose of its property to the Calumet & Hecla, which company operating it in conjunction with its own ground, could make a respectable working profit.

In August, 1916, this sale to the C. & H. is reported abandoned on account of threatened litigation. As company's quick assets are equivalent to about \$25 per share (May 31), any additional amount represents the value of the plant, tailings pile and lands.

TAMARACK-OSCEOLA COPPER MFG. CO.

MICHIGAN

Liquidated. Assets sold, 1912, to John A. Roebling's Sons Co., for \$180,000.

TANK PASS CONSOLIDATED MINING CO.

ARIZONA

Address: A. Tennyson Pryor, pres. and gen. mgr., 933 Dime Bank Bldg., Detroit, Mich. Ward Smith, v. p.; Wm. D. Calverley, sec.-treas.

Inc. Nov., 1909. Cap., \$3,000,000; shares \$10 par. Company controls the Alvin Development Co. through stock ownership, and took over the property of the Cobralla Copper Co., March, 1910.

Property: known as the Ultimatum or Cobralla group, adjoins the Alvin, near Tank Pass in the Harcuvar mountains, Ellsworth mining district, about 10 miles from Wenden. The mine carries about 4,500' of the strike of various fractures in a contact zone following granite intrusive in quartzite, amphibolite and limestone, the ores carrying bornite and chalcocopyrite, and estimated to average 3 to 5% copper, 5 to 6 oz. silver and \$1 to \$8 gold per ton, with occasional paystreaks and masses of high-grade ore.

Development: by the 150' Carbonate Hill shaft and a 200' tunnel. **Equipment:** includes gasoline hoist. Is a prospect.

TAOS MINING CO.

NEW MEXICO

Idle. **Mine office:** Twining, N. Mex. **Officers:** A. Clarence Probert, pres.-mgr., P. O. Box 56, Taos, N. Mex.; John B. Bidwell, v. p.; J. Wight Giddings, sec.; H. F. Probert, treas.; with Harry W. Davis, directors.

Inc. Nov. 11, 1914, in Delaware. Cap., \$2,000,000; shares \$10 par; \$1,173,090 outstanding. Annual meeting, last Monday in January.

Property: 15 claims, 4 patented, 333 acres in Rio Hondo mining district, near Twining, said to carry copper-gold-silver ore in schist and gneiss, averaging 2½% copper, \$4.17 gold and 5 oz. silver per ton. Developed by 1,800' vertical tunnel and several shorter tunnels. **Equipment:** includes air compressor and concentrator.

TAR BABY MINING CO.

UTAH

Office: 702 McIntyre Bldg., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake Co., Utah. **Officers:** C. R. Greene, pres. and gen. mgr.; R. E. Savage, v. p.; C. F. Greene, sec.-treas.; H. E. Moon and J. W. Brewer, directors; H. D. Greene, supt.

Inc. 1911, in Utah. **Cap.**, 500,000 shares, increased June, 1916, from 400,000; 25 cts. par; outstanding, 350,000 shares. Listed on Salt Lake City Exchange.

Property: 6 claims, in South Fork of Big Cottonwood. The purpose of the enterprise is to cut extensions of orebodies in adjoining mines by a tunnel, 2,200' long, July, 1916, with depth of 1,300' at face. The tunnel follows the porphyry dike and is planned to reach the schist-limestone contact which has surface ore. New equipment includes 2-drill air compressor and machine drills.

TARBOX MINING CO.

MONTANA

Office: 426 High St., Wallace, Idaho. Mine office: Saltese, Mont. Richard Daxon, pres., mgr., treas. W. J. Smith, v. p.; R. E. Seysler, sec.; preceding with Dennis Reardon and T. H. Cotton, directors. **Cap.**, 1,500,000 shares; \$1 par; assessable; 500,000 shares in treasury. Listed on Butte Exchange.

Property: 12 claims on Packer Creek, 3 miles N. of Saltese, Missoula Co., Mont. Ore carries silver-lead, mostly concentrating grade. Vein at surface is 10' to 30' wide and filling is quartz and siderite. Machinery has recently been added for deepening the shaft and a concentrating mill is planned.

TASSOO MINING & SMELTING CO., LTD. BRITISH COLUMBIA

Jedway, Queen Charlotte Islands, B. C. Robt. R. Hedley, pres., Vancouver, B. C. **Property:** 12 claims, 850 acres, including a town site on the S. W. side of Tassoo harbor, W. side of Moresby Island. The mine is accessible by steamer direct, or by 5-mile trail from Sewell. Property shows granite cutting limestone, with diabase and trap dikes in both rocks. The ore deposits, in limestone, consist of magnetite containing 62% iron, 2% copper, \$1 gold-silver, 1% lime and 3% silica. The orebody is 107' wide, with 56' of 2.5% ore, balance 1.55% and 23' more of 1%. A 280' adit tunnel, at 1,130' elevation, cuts the orebody.

Shipment to Tacoma smelter totaled 750 tons in 1914. Nothing reported since. A 2,300' aerial tramway connects mine with harbor.

TAUNTON-NEW BEDFORD COPPER CO.

MASSACHUSETTS

Taunton, Mass. Henry F. Bassett, sec.-treas. Absorbed Revere Copper Co. Inc. Jan. 15, 1831. **Cap.**, \$800,000; shares \$100. Corporation does a copper manufacturing business, making sheet brass, copper print rollers, etc.

TAYLOR MOUNTAIN MINING CO.

COLORADO

Office: 609 New York Life Bldg., Omaha, Neb. Operating office: Salida, Colo. Mine office: Garfield, Chaffee Co., Colo. W. F. Norway, pres.; C. S. Montgomery, sec.; Geo. H. Purmort, supt.

Inc. Oct., 1905, in Colorado. **Cap.**, \$600,000; shares \$1 par. Annual meeting, in November.

Property: the Lily mine, 7 claims, 65 acres, in the Monarch district, 1½ miles from Garfield and 19 miles from Salida. The property has a nearly vertical N.-S. contact vein, between granite and limestone, carrying lead and copper ores. The mine shows a little lead carbonate ore assaying 20% lead, 75 to 180 oz. silver and \$6 gold per ton, besides copper ore which the management estimates will average 8% copper, 8 oz. silver and \$1 gold per ton. **Development:** by a 280' main shaft, with 4,000' of workings.

Equipment: includes electric power with 16-h. p. hoist and 35-h. p. General Electric air compressor. Buildings include an engine house, smithy, carpenter shop. Was shipping about 120 tons per month in 1914. Nothing reported since.

TECOLOTE COPPER CO.**MEXICO**

See West Coast Smelting & Refining Co.

TECK-HUGHES GOLD MINES, LTD.**ONTARIO**

Controlled by Buffalo Mines, Ltd. Office: 14 Wall St., New York. Mine office: Swastika, Kirkland Lake district, Ont., Canada. Officers: C. L. Denison, pres. and gen. mgr.; R. W. Pomeroy, v. p.; H. D. Crooks, sec.; H. Clark, treas.; L. W. Ledyard, supt. Cap., 2,000,000 shares; 15 cts. par.

Buffalo Mines, Ltd., acquired $\frac{2}{3}$ of the issued stock in 1915. A bond issue of \$150,000 was made to furnish working capital to continue development and build a mill. The mill has been completed and according to last reports was waiting for connections with the electric power line of the Northern Ontario Light & Power Co.

Property: 4 miles from Swastika, is developed by a 265' shaft; 3,000' of drifting has been done and ore said to be worth \$350,000 has been blocked out.

TECOPA CONSOLIDATED MINING CO.**CALIFORNIA**

Operated on old property near Tecopa, Inyo Co., Calif., worked 40 years ago for silver alone and later for silver, gold and lead. Cap., \$3,000,000; shares \$1 par. In 1910, shipped 300 tons daily to smelter. Passed into hands of Graves Bros., Philadelphia, who added to equipment. In 1915 all Graves' holdings were sold at auction for \$98,000.

Property: 575 acres, 4 miles W. of Tecopa. Report for 1914 shows that the Gunsite mine produced 10,000 tons of ore, worth \$128,000, at a profit of \$52,000. The Noon Day produced 1,000 tons yielding \$1,499 profit. Mining costs, \$1.66 to \$3.62 per ton.

Mine being worked according to latest reports.

TEDDY MINING & MILLING CO., LTD.**IDAHO**

Kellogg, Shoshone Co., Idaho. J. B. Cox, sec. Cap., \$1,000,000; shares \$1 par. **Property:** 7 claims and a mill site, 1 mile E. of Kellogg, shows 2 veins, 1 of about 15' width, carrying copper ore with quartz gangue, and 1 of about 12 to 35' width carrying silver-lead ore giving assays up to 12% lead and 30 oz. silver per ton. **Development:** by crosscut tunnels of 100' and 550'. There are several mine buildings.

Mine is being operated under 2-year lease from March, 1916, by C. W. Brown, Dr. T. R. Mason and J. W. McCrea, of Kellogg. The lease covers only the ground above the intermediate tunnel, which is to be extended 40' to intercept the main vein.

TEJON MINING CO.**ARIZONA**

Office: Bakersfield, Calif. L. I. Thiers, supt., Gleeson, Cochise, Ariz. Inc. in Arizona. Cap., \$1,000,000; shares \$1 par.

Property: 8 patented claims, 150 acres, at Gleeson, in the Turquoise or Courtland district, Arizona, adjoining the Copper Belle mine of the Leonard Copper Co. mine, shows heavy bedded limestone dipping steeply eastward into the mountain ridge and cut by intrusive bodies of monzonite and later quartz porphyry. Ore occurs as a contact deposit. Average assays reported at 5% copper, 6 oz. silver, 0.07 oz. gold per ton.

Development: by the 500' Tejon shaft, and by several old tunnels with extensive drifts and stopes in oxidized ore. **Equipment:** modern and complete, includes electric and steam power, compressor, etc. Railway is close at hand. Property appears meritorious and management good.

TEK MINING, MILLING & LEASING CO.**COLORADO**

Address: care J. B. Arthur, Kansas City, Mo. Mine near Idaho Springs, Colo. **Property:** an old mine with dumps estimated to contain 150,000 tons of complex gold-silver-lead ore averaging \$4 per ton.

TELLURIDE CHIEF MINING CO.

ARIZONA

A. F. Hannon, mgr., Kingman, Ariz. S. F. Kelly, v. p., San Bernardino, Calif.

Property: a group of claims in Maynard district, 15 miles east of Kingman, said to contain the Garnier and Big Swede veins, the latter 8' thick and said to average \$22 per ton in gold and copper in surface cuts.

Development: by 45' shaft on Garnier vein; sinking to 150'. Has gasoline hoist. Is a likely prospect.

TELLURIDE M., M. & DEV. CO.

ARIZONA

Offices: Bagdad and Needles, Calif. Mine office: Oatman, Ariz. **Officers:** J. E. Rose, pres.; W. Matthie, v. p.; N. E. Scott, sec.-treas.

Inc. 1915, in Ariz. **Cap.**, 1,100,000 shares; \$1 par; treasury shares, 675,000.

Property: 10 claims, 200 acres, at Oatman, Mohave Co., said to carry gold ore of milling grade. **Development:** by 500' main working shaft with crosscutting and drifting on 200' and 400' levels. **Equipment:** includes 40-h. p. White & Middleton engine, double-friction hoist, Fairbanks-Morse compressor, mine buildings, etc. A double-compartment shaft, to be sunk 600' has been started.

TEMISKAMING & HUDSON BAY MINING CO., LTD. ONTARIO

Address: New Liskeard, Ont., Can. **Officers:** Geo. Taylor, pres.; A. A. McKelvie, v. p., with T. McCamus, D. M. Ferguson, S. S. Ritchie, John Dunkin and Chas. L. Sherrill, directors. F. L. Hutchinson, sec.-treas.

Inc. July 29, 1903, in Ontario. **Cap.**, \$25,000; shares \$1 par; outstanding \$7,761. Annual meeting, last Tuesday in October. Company is a holding corporation, operating property is the Hudson Bay Mines, Ltd., which in turn controls Dome Lake Mining & Milling Co., Ltd.

Balance sheet for year ending Aug. 31, 1915, shows: assets, \$2,953,183, which includes, stock of Hudson Bay Mines, Ltd., 580,000 shares, \$2,900,000; cash, \$10,360; Hudson Bay Mines, Ltd., account receivable, \$37,975; Gowanda claims, \$4,500; furniture, \$348. Liabilities include: outstanding capital stock, \$7,761; balance, loss and gain account, \$2,945,422.

Dividends: during the year one 300% dividend was paid, bringing total dividends paid since incorporation in 1903 to 25,000%, or \$1,940,250. Operations are described under titles of the subsidiary companies.

TEMISKAMING MINING CO., LTD.

ONTARIO

Office: 810 Lumsden Bldg., Toronto. Mine office: Cobalt, Ont., Can. **Officers:** F. L. Culver, pres.-gen. mgr.; W. T. Mason, v. p.; R. Graham, sec.; H. E. Tremain, treas.; C. C. James, W. E. Stevenson, F. L. Lovelace, directors; J. W. Moffitt, supt.

Inc. 1906 in Ontario. **Cap.**, \$2,500,000; shares \$1 par; nonassessable; all issued. Company office, Toronto, transfer office. Union Trust Co., Ltd., Toronto, registrar. Annual meeting in March. Listed on Standard Stock Exchange, Toronto.

Dividends: 15% in 1908; 6% in 1909; 11% in 1910; 9% in 1911; 12% in 1912; 3% in 1913; none 1914; 3% in 1915; 3% in March, 1916.

Owing to the low price of silver in last half of 1914, most of the bullion was stored for future sale. June 30, 1914, company had 311,922 oz. silver in storage, 90,276 oz. at smelters and 100,089 bagged at mine, a total of 502,287 oz. with \$170,219 cash on hand.

Comparative General Balance Sheet:

Assets—

	Current	Property	Constr'n	No. Dome	Hospital	Total
1915....	\$462,488	\$2,581,884	\$105,192	\$320,408	\$2,120	\$3,472,091
1914....	83,501	2,560,658	104,616	317,908	2,120	3,070,923

Liabilities—

	Capital Stock	Depreciation	Profit & Loss	Current	Total
1915.....	\$2,500,000	\$49,674	\$896,860	\$25,556	\$3,472,091
1914.....	2,500,000	23,747	527,996	17,059	3,068,802

Comparative Operating Account:

	Receipts	Expenses	Profits	Cash Assets
1915.....	\$732,263	\$262,471	\$469,731	\$462,487
1914.....	146,649	228,071	*81,422	85,621
1913.....	438,455	320,881	117,574	196,920

* Deficit.

Properties: in which the company is directly or indirectly interested: Daigle claim, 20 acres; Gans property; McDonald claims, 40 acres in North Cobalt; Peterson claim, 40 acres; Osland claim, 40 acres; also 40 acres each in McCool, Cook and Barnet townships; the Morrison claims, commonly called the Red Jacket and the North Dome property in the Porcupine Mining Division. The Red Jacket claim was leased 1916 to a syndicate which is now unwatering it.

Ore: high-grade silver, containing arsenic and smaltite. Assays on shipments average from 500 to 6,000 oz. silver per ton. Deposits occur at contact of the Keewatin formation with a diabase sill. Pay ore is found in shoots.

Development: by vertical shaft. Greatest depth is 1,180' and total extent of workings about 2½ miles. Reserves include 10,000 tons broken ore on stulls.

In the first half of 1916, new development aggregated 3,080', including 307' of shaft sinking. Surface trenching was done on the Gans lot and on the McDonald claim, but nothing new was done at the North Dome mine at Porcupine.

Diamond drilling has proved that another contact occurs below the diabase sill at a depth of about 2,000'. Sinking to strike this lower contact is in progress. **Equipment:** includes a compressor for 20 drills, a Nordberg hoist with 6' drums and capacity of 2,500'. Electric power is hydraulically generated.

The 150-ton, 40-stamp mill is equipped with concentrating machinery and handles low-grade material. Concentrates average 1,302 oz. silver per ton; shipping ore averaged 6,400 oz. per ton during 1915. Low-grade reserves average 20 oz. silver per ton.

Total cost of production, 1915, was 16 cts. per oz. silver.

TENABO MINING & SMELTING CO.**NEVADA**

Office: 105 Mercantile Blk., Salt Lake City, Utah. Mine address: care A. E. Raleigh, supt., Tenabo, Lander Co., Nev. **Officers:** W. Mont Ferry, pres.; John Pingree, v. p.; John Janney, sec.; E. O. Howard, treas., and Benner X. Smith, directors; Duncan MacVichie, cons. engr.

Inc. 1909 in Nevada. **Cap.**, \$3,000,000; shares \$2 par; issued \$1,922,156. Annual meeting, second Monday in February. Union Trust Co., New York, registrar; Windsor Trust Co., New York, transfer agent; Walker Bros. Bank, Salt Lake City, depository. Stock is listed on the unqualified department of the Boston curb.

Company bought, 1909, the property of the Gem Cons. Mining Co., at Tenabo, which in turn had taken over the property of the Reliance M. & M. Co., the Tenabo Mng. & Sm. Co. giving 450,000 shares of stock to the Gem Consolidated for the lands. Company also bought the property of the Tenabo Cons. Mines Co., comprising the Copper Hill and Widows mines, for 300,000 shares of stock.

Property: 223 acres of mineral lands and an 80-acre mill and smelter

site, in 4 groups, all with more or less development work. The principal group shows a deposit of low-grade copper ore, stated by company to average 300' in width, outcropping for nearly a mile. The management estimates the ore on this group to run about 3% copper, with small gold and silver values.

The Little Gem mine, about 1 mile from Tenabo, has a contact deposit between rhyolite and sedimentary rocks, carrying copper carbonates and chalcopyrite, with quartz gangue, a 450' shaft, sunk at the very flat angle of 22°, showing an orebody ranging from 2' to 14' in width, reported to have 24,884 tons blocked out, that will average \$18 per ton.

The mine was acquired upon a report by Duncan MacVichie that it contained 7,783 tons of \$13.38 smelting ore and 17,257 tons of \$3.88 concentrating ore and that \$25,000 spent on the property would bring reserves up to 100,000 tons.

Another property has a 150' incline shaft, in a vein, apparently widening in depth with 5 parallel veins in a cross-section of about 600'. The property as a whole has about 3,000' of workings, and about \$100,000 has been expended in development and equipment. Twenty-three cars of ore, from the Little Gem mine, gave net smelter returns of \$17,640.

TENAS MINING CO.

WASHINGTON

Idle. Office: 320 California Bldg., Tacoma, Pierce Co., Wash. Mine near Keller, Ferry Co., Wash. **Officers:** J. R. Turner, pres.; P. J. Sweener, v. p.; C. E. Peterson, sec.; D. McPherson, treas.; preceding, with Otto B. Roeder and F. W. Heide, directors, all of Tacoma, Wash.

Inc. Sept., 1910, in Washington, succeeding the Iconoclast Consolidated Mines Co., whose property was sold for debt. Cap., \$10,000; shares \$1 par; fully paid and assessable up to 25% per year; issued, 3,448. Assessments to 1916, 71 cents per share.

Property: 5 claims, 95 acres, relocated 1912, 2 miles N. of Keller, shows 3 contact deposits with an orebody 30' in maximum width, giving average assays of 3.6% copper and 2 oz. silver per ton with some gold. **Development:** by a 325' main shaft and 3 tunnels with claimed total length of 514'. Annual assessment work only has been done since 1908. Company is a holding corporation, awaiting an opportunity to sell or bond the property.

TENDERFOOT HILL CONSOLIDATED MINING CO.

COLORADO-SOUTH DAKOTA

Office: 516 Exchange Nat'l Bank Bldg., Colorado Springs. **Officers:** W. A. Otis, pres.; L. L. Aitken, v. p.; A. D. Aitken, sec.; T. A. Dines, treas. **Cap., \$1,500,000; shares \$1 par; all issued. Listed on Colorado Springs Stock Exchange. Last stockholders' meeting held 1911. No liabilities and no production. Cash in treasury, Jan. 1, 1916, \$14,210.**

Property: 61 acres on Tenderfoot Hill, Cripple Creek district, and 93 acres in the Black Hills, South Dakota.

Development: main shaft on Cripple Creek property, 511' deep with 600' of drifting. Black Hills property has drifts, tunnels and crosscuts totaling about 1,350'.

TENNESSEE COPPER CO.

TENNESSEE

Office: 2 Rector St., New York. Mine at Copperhill, Polk Co., Tenn. **Officers:** Utley Wedge, pres.; L. D. Vorce, v. p.; B. G. Slaughter, v. p.; preceding, with W. B. Joyce, Martin Vogel, W. A. Neereamer, S. J. Jennings, Jos. Walker, Jr., Richard Sutro and H. M. Kilborn, directors. Frank H. Rude, sec.-treas.; N. H. Emmons, 2nd, gen. mgr.; Arthur L. Tuttle, asst. gen. mgr.; M. A. Caine, mine supt.; A. J. Bone, smelter supt.; D. F. Dryden, acid plant supt.; Utley Wedge, cons. eng.; A. M. Faillie, assayer; Chas. A. Magnell, purch. agt.

Inc. April 26, 1899, in New Jersey. Cap., \$6,875,000; shares \$25 par; \$5,000,000 issued. State Street Trust Co., Boston, and Equitable Trust Co., New York, registrars; Old Colony Trust Co., Boston, and National City Bank of New York, transfer agents. Stock listed on New York, Boston and London Exchanges. Annual meeting, fourth Thursday in April.

Authorized bond issue, 1915, \$3,000,000; 1st mortgage 6% 10-year convertible sinking fund gold bonds; \$2,000,000 outstanding. This issue enabled the company to retire the \$800,000 outstanding bonds of the first issue. Dec. 1, 1915.

	Profit	Dividend		Profit	Dividend
1903.....	\$417,565	\$218,750	1910.....	\$ 445,387	.....
1904.....	186,966	218,750	1911.....	.....	\$300,000
1905.....	452,106	218,750	1912.....	1,095,875	500,000
1906.....	824,231	250,000	1913.....	1,087,503	750,000
1907.....	800,634	650,000	1914.....	751,892	450,000
1908.....	324,768	500,000	1915.....	1,242,693	600,000
1909.....	339,406	250,000	1916*.....	.....	300,000

* \$1.50 to April, 1916.

Net surplus, Dec. 31, 1915, was \$2,375,100. The 1915 profits show an increase of but \$400,000 in net income over 1914, in part due to increased copper prices and not to sulphuric acid alone. Allowing for increased capitalization, earnings for 1915 were less than \$3.50 per share.

Property: 2,080 acres of mineral land and 11,000 acres of miscellaneous lands, in the Ducktown district. Ore was discovered and mining first begun in 1850, and the mines were operated regularly by a New York company previous to the Civil War, and, during the earlier part of the war, under compulsion by the Confederate Government to supply copper for munitions of war. Company owns the Burra Burra, London, Polk County, Eureka and Tennessee mines. The Eureka was formerly operated under lease for iron ore by the Virginia Iron, Coal & Coke Co.

Geology: property shows pre-Cambrian metamorphosed mica-schist carrying several lines of mineralization with lenticular orebodies. Four deposits, under development, show extensive gossans, originally having a little rich sooty glance ore under the gossan, which was mined out many years ago. The lenses range 30 to 150' in width, 500 to 2,000' in length, and are of unknown depth. The ore consists of a massive mixture of pyrite and pyrrhotite, with a little chalcopyrite, in a gangue of various metamorphic minerals and quartz, ore ranging from 2 to 4% copper, 40% iron, 27% sulphur and 15% silica, with minute quantities of gold and silver. As zinc and other refractory elements are lacking the ore is excellently adapted to smelting, giving very clean slags.

Development: the mines are extensively developed; new work in 1915 totaled 1,042' of diamond-drill holes and 1,904' of winze and raise work.

Ore reserves: Mch. 15, 1916, estimated at 3,707,421 tons of copper ore and 2,500,000 tons sulphur ore, not including ore indicated by diamond drilling.

The **Burra Burra mine**, which is the principal property, is operated through a 1,000' main central shaft, sunk at 75° in the footwall, having its first level 170' below the collar, with succeeding levels at 100' intervals, the mine ending 1915 with 8 producing levels, the 9th level under development and the shaft sinking for the 10th level. The method of back stoping adopted in 1910 met expectations. The entire output in 1915 came from back stopes in the mine and over 250,000 tons of broken ore was in the stopes Jan. 1, 1916.

The main orebody of the Burra Burra is 1,200' long and averages 60'

wide on the 3rd level. There also is the north, or McPherson orebody, developed by a drift from the 3rd level of the main shaft; connecting with the McPherson shaft, now down to the 6th level. This shaft is 2,200' N. E. of the main shaft and facilitates working the McPherson orebody, which is about 900' long with an average width of 25'. The Hiwassee shaft, 900' S. W. of the main Burra Burra shaft, is sunk to the 8th level, showing a comparatively small orebody, of about 200' length and 12' average width. During 1915 a total of 1,132' of underground development work was done. Diamond-drill holes put down from the 8th level for 400' showed continuity of the orebody. Burra Burra produced 367,291 tons of ore in 1915.

The London mine has a 750' shaft, sunk at an incline of 75°, with 6 levels opened, developing an orebody of 25 to 75' width and about 600' length, ranging 2 to 4% in copper tenor. A total of 193' of underground work was done in 1915, consisting mainly of raises and drifts. The London produced 101,405 tons of ore in 1915.

The Polk County mine has a 485' vertical shaft, with 5 levels opened, developing an orebody of very irregular shape, up to 120' maximum width, of about 2% average copper tenor. The Polk mine is held under lease and development work was resumed in May, 1915. To Jan. 1, 1916, about 575' of drifting had been done, and a south drift on the 2nd level is now being driven. Production of the Polk County mine was 43,244 tons of ore in 1915.

The Eureka mine, idle since 1912, has a shaft 165' deep, at which point the first level will be opened. Diamond-drill borings have shown an orebody of 20 to 165' width, about 1,000' length, and it is estimated that this mine has 2,500,000 tons of ore developed that average 44% iron, 30% sulphur and about 1% copper. This ore is to be treated for its iron and sulphur, as experiments indicate that it will make a good non-phosphorous iron ore. An initial unit to try out the process is planned.

Equipment: at the Burra Burra includes a Nordberg electric hoist, 3 Ragler type electrically driven 2,500-cu. ft. compressors, a combination shaft house and crusher building. Crushing plant includes 18x36" Blake crusher, feeding to a 36"x33' Robins belt conveyor, used as a picking belt, which discharges into storage bins of about 2,500 tons capacity; as far as possible all barren rock is removed from the crushed ore by hand picking, plant having a daily crushing and assorting capacity of 1,500 tons, ore being reduced to 4" size. There are similar shaft rock houses at the London and Polk County mines.

The brick power plant at the Burra Burra includes four 150-h. p. Babcock & Wilcox boilers, having Murphy automatic stokers. There are 2 Nordberg 2-stage air compressors, each capable of reducing 2,000 cu. ft. of free air per minute to 70 lbs. initial pressure. A small plant furnishes electric light for the Burra Burra and London mines.

The company's private railway connects the mines with the works and has connection at Copperhill with the Louisville & Nashville railway. The track is of standard gauge, with 7½ miles of main line and 4½ miles of sidings and spurs. Equipment includes four 105,000-lb. Schenectady locomotives, eighty-five 50-ton and two 40-ton steel tank cars, 40 standard gauge gondolas and 10 flat cars. The company has a repair shop for locomotives and cars, equipped for making all repairs and capable of completely rebuilding when necessary.

The smelter: at Copperhill, a little N. of the Tennessee mine and 1 to 5 miles from the other mines of the company, was designed and built by J. Parke Channing. On the upper level are the ore bins, having storage

capacity for 10,000 tons of ore, 800 tons of coke, and necessary fluxes and furnace products requiring retreatment. Charges are drawn from the bins into cars of 44 cu. ft. capacity, hauled by electric locomotives, there being scales for weighing charges, and 4 tracks that run under the bins and circle around the furnaces, so that a train loaded on any track may go to any furnace and return to the bins.

Dust is removed from the chamber by two 12" conveyor belts running in the tunnel underneath and treated in a sintering plant. This plant has two 42x264" Dwight-Lloyd machines, producing over 1,000 tons of sinter coke monthly; part of the flue dust is spread over the beds and covered with low-grade first-fusion matte, the product being a light porous material in excellent condition for resmelting.

The furnace building of steel has 7 blast furnaces, each having a 16' circular settler lined with low-grade silicious copper ore. Slags skim into pots of 105 cu. ft. capacity, which are hauled by electric locomotives, considerable slag being used for railway ballast.

The converter department has two 40-ton electric traveling cranes taking matte from the settlers to the converters. Two 12' basic lined converters of the Great Falls type were installed in 1916 to replace the old ones.

Hot converter slag is poured into the blast furnace settlers, by reason of which the only converter slags requiring resmelting are the skulls forming in the ladles. Converter bars average about 99.4% in copper tenor. Copper is cast in 210-lb. pigs and sent to the Baltimore Copper Smelting & Rolling Co. for electrolytic refining, which effects the saving of the very small gold and silver values contained. The finished electrolytic copper is marketed through the American Smelting & Refining Co.

The smelter power house includes two 250-k. w. 500-volt d. c. Westinghouse generators, direct-connected to 2 Nordberg tandem-compound Corliss engines, and one 400-k. w. 500-volt d. c. Crocker-Wheeler generator, driven by a Bates tandem-compound Corliss engine, all 3 engines running non-condensing, with exhaust steam going to a feedwater heater. Furnace blast is supplied by 3 Nordberg piston blowing engines, each of 20,000 cu. ft. capacity per minute, and 3 Nordberg duplex cross-compound piston blowing engines, each of 30,000 cu. ft. capacity per minute, supplying blast at 50 oz. pressure to a common blast-main, above the charge floor. Converter blast is furnished by 2 Nordberg duplex cross-compound air compressors, supplying 10,000 cu. ft. per minute each, at 12 lbs. initial pressure. An Ingersoll-Rand air compressor furnishes air at 100 lbs. pressure for operating the charging doors and sundry pneumatic tools. The electric plant includes a 110-k. w. 250-volt Keystone generator, direct-connected to a Ball tandem-compound engine furnishing current for electric light, and there is a motor-generator set for transforming a 500-volt current to 220-volt current for electric lighting outside of the power plant.

The smelter boiler house has four 512-h. p. Altman & Taylor water-tube boilers, with Murphy automatic stokers and Foster superheaters, delivering steam at 175 lbs. pressure, with 150° superheat. Coal and ashes are handled mechanically by a bucket and chain conveyor, an 800-ton steel coal bunker being located to feed automatically to the boilers. A brick transformer house was added to the plant in 1915.

The smelter treated 424,197 tons of company ore in 1910; 436,285 tons in 1911; 444,289 tons in 1912; 470,135 tons in 1913; 485,051 tons in 1914; 475,301 tons in 1915.

Water is pumped from the Ocoee river by three 10" 2-stage Worthington pumps, belt-driven by motors, each with capacity of 2,800 gals. per

minute, to large storage tanks above the smelter, and a large reservoir at the McPherson shaft. A 4,000,000-gal. reservoir at about the level of the furnace floor received the flow from the water-jackets, which passes over a Worthington water-cooling tower.

The company operates a quartz quarry at Austral, Tenn., 35 miles N. of Copperhill, on the Louisville & Nashville railway. Equipment of the quarry consists of a boiler, air compressor, rock drills and a Bucyrus steam shovel.

The mines and smelter employ a total of 1,315 men.

The smoke damage situation is complicated by the location of the works, which are in the extreme S. E. corner of Tennessee, winds carrying the bulk of the fumes into the State of Georgia, by reason of which the state authorities of Georgia brought suit against the Tennessee Copper Co. and the Ducktown Sulphur Copper & Iron Co. in the Federal courts, and the latter decided that the smelters must cease operations or stop the fumes by using them for a sulphuric acid plant. This undertaking proved much more difficult than was anticipated by reason of the intermittent and varying nature of the gas supply from the blast furnace tops.

The acid plant cost about \$1,600,000 and was put into full operation early 1908, with a rated capacity of 120,000 tons yearly of 60° Beaumé chamber acid; the plant has been enlarged since to a nominal capacity of 200,000 tons yearly, with somewhat greater actual output.

As the furnace gases contain sulphur dioxide, sulphur trioxide, carbon dioxide, oxygen and nitrogen in considerably varying percentages, new methods of control were found necessary to maintain the volume of sulphurous gases suitable for making sulphuric acid by the chamber process. After some experimentation the problem was solved by equipping 1 of the smaller and 3 of the larger blast furnaces with tight tops, above the charge floor, to exclude atmospheric air, these being connected with a dust chamber, where most of the solid matter is precipitated from the gas, the dust chamber being so constructed as to conserve the heat of the gases sufficiently to concentrate the acid in the Glover towers. There are 2 octagonal Glover towers of 30' diameter and 50' height with suitable nitre plants at the foot of each. After passing through the towers the gases are conducted through very large lead flues of 200 sq. ft. sectional area, which deliver the fumes to the chamber system containing 4,600,000 cu. ft. of chamber space. In a general way the chamber plant is of conventional design, yet the enormous quantities of fumes received and acid produced have brought about developments that are quite new to the industry, among the most notable being the size of gas connections, acid lines, acid coolers and fans, which are all on a scale never before known. The discharge from the chamber plant is conducted into 12 Gay-Lussac towers, which are of a gigantic size, the 3 latest and largest being octagonal of 36' diameter and 65' height. The estimated capacity of 180,000 tons per year of 60° Beaumé chamber acid is now demonstrated to be low. The company has contracted for the sale of its entire production of sulphuric acid and for an even larger output of acid than 200,000 tons yearly, for a period of 10 years, to the International Agricultural Corporation, at a price understood to be \$4.81 per ton. This acid plant, the largest and most complete in existence, requires a force of only about 30 men for its operation. During 1915 a concentrating plant, nitrating plant, nitric acid plant and storage building were erected. A large addition to the sulphuric acid plant will be put in operation in 1916.

Recent Production:

	Lbs. Cu.		Oper. Cost	—Production—		Cost p. Lb.	Rec. p. Lb.
	Tons Ore Smelt.	p. Ton Ore		Acid Tons	Copper Lbs.		
1915.....	475,301	26.83	\$2.82	210,666	12,750,418	10.53c	16.274c
1914.....	485,051	26.54	3.14	210,163	12,871,113	11.84c	13.706c
1913.....	470,135	28.70	3.25	197,713	13,493,140	11.34c	15.748c
1912.....	444,289	29.80	3.27	192,084	13,252,634	11.00c	.....
1911.....	436,285	31.65	3.44	.....	13,808,940	10.88c	.....

Silver produced in 1915 amounted to 60,953 oz.; gold, 276 oz.

The big acid plant giving continual trouble, it was shut down and overhauled for two months early in 1916, but after ten weeks' operation broke down again, and the company's chief customer, the International Agricultural Co., a fertilizer manufacturer, has been seriously hampered. Company's phenol plant at Ridgefield, N. J., closed down for several months, resumed operations Aug. 3, 1916.

Low-grade copper ores are treated profitably at other points, but in nearly all other cases there are considerable gold and silver values, which are lacking in the case of the Tennessee. This company has shown both courage and ability in changing the old method of semi-pyritic smelting, and has shown equal ability and greater courage in the installation of its acid plant, by virtue of which a very serious handicap has been turned into a permanent source of large revenue.

This progressiveness received a setback in March, 1916, when the trinitrotoluol plant, built with \$1,500,000 advanced by the Russian government, was burned down and suit for recovery of the money begun by lender. The quarterly dividend was omitted on this account.

As property has large ore reserves, is well equipped and operating continuously with splendid earnings, the future is assured despite this loss.

TENNESSEE MINE.**ARIZONA**

Chloride, Ariz. N. S. Churchill, supt. Described under Needles Mng. & Sm. Co.

TENNESSEE MINING & MILLING CO.**COLORADO**

Office: care J. W. Thayer, sec., 677 Roscoe St., Chicago, Ill. Mine office: Empire, Clear Creek Co., Colo. **Officers:** J. W. Loofbourrow, pres.; S. B. Anderson, v. p.; J. F. Kidnell, treas., and H. J. Fersdick, directors; Abel Guion, supt. **Inc.** Feb. 11, 1911, in Colorado. **Cap.**, \$400,000; shares \$1 par; nonassessable; issued 260,000. Annual meeting, Aug. 13. Company is a reorganization of the Gold Bug Mining Co.

Property: 6 claims, 2 deeded, in the Colorado district $1\frac{1}{4}$ miles from Colorado Southern railroad. Claims have veins which show gold and silver ore with traces of copper. Property has been leased and development work is planned for 1916. **Development:** by 1,300' of tunnels, a shaft and several drifts.

TEPEE MINING & DEVELOPING CO.**COLORADO**

Alamosa, Colo. **Officers:** J. F. Reynolds, pres.-mgr.; C. L. Cunningham, v. p.; W. W. Platt, sec.; B. P. Middleton, treas.; with J. F. Reynolds. W. W. Platt, T. L. Connolly, directors.

Inc. 1914 in Colorado. **Cap.**, 1,000,000 shares; \$1 par; nonassessable; in treasury, 95,000 shares.

Property: 21 claims, about 400 acres, at Alamosa Forest Station, Forest Reserve, Conejos Co., Colo. Pay ore occurs in shoots in veins in diorite. Veins vary from vertical to 45° dip, and from 8" to 2' in width, with strike N. E.-S. W. Ores are both oxidized and sulphide and contain gold-silver values.

There is one 90' shaft worked by windlass. It is proposed to cut vein by tunnel 1,500' long. Operating expenses for 1915 were \$3,000; development mostly confined to annual work.

TERRA NOVA PROPERTIES, LTD. NEWFOUNDLAND

Secretary and office: E. A. Swisham, Fleetway House, Farrington St., London, Eng. Mine address: Millertown, Newfoundland. Mayson M. Beeton, chairman; William Scott, supt., at Grand Falls, Newfoundland. Is a subsidiary of the Anglo-Newfoundland Development Co.

Company owns rights over about 2,500 sq. miles, held by 99-year lease, in the central part of Newfoundland, surrounding Long lake. The principal property is Buchan's River mine, about 5 miles W. of the lake on the N. shore. Ore occurs in sericitic schists formed of volcanic grits, the vein having strike of N. 51° E. and dipping about 30°.

Development: consists of a 370' shaft with several levels, having long drifts on the vein. The one orebody thus far found varies from 5 to 10' in thickness, is 350' long, horizontally, and 370' in downward extension. The ore is a complex sulphide carrying 2.36% copper, 8.14% lead, 20.38% zinc, 6.70 oz. silver and \$2.72 gold per ton.

Property promising.

TERRIBLE EDITH MINE. IDAHO

A group of claims in the Eureka district, near Murray, under lease to C. and W. H. Conn, of Butte, Mont. In 1915 a 1,300' crosscut and 600' of drifting developed zinc ore of shipping grade. Several shipments of 50% ore were made and 150 tons monthly contracted for. The mine is also said to show promising bodies of galena with silver and gold.

TERRIBLE DUNDERBERG MINING & POWER CO. COLORADO

Office: c/o H. F. Wells, 60 Congress St., Boston, Mass. **Mine office:** Silver Plume, Colo. **Officers:** W. Rotch, pres.; C. C. Ramsay, v. p.-sec.; H. F. Wells, treas.; L. Williams, A. L. Carnahan and P. R. Eaton, directors; W. Marshall, supt.

Inc. 1913 in Colo. **Cap.,** 100,000 shares; \$5 par; nonassessable; outstanding, 79,300 shares. Authorized bonds, \$60,000, unsold. Annual meeting in May.

Property: a consolidation in 1913 of two old properties worked for 40 years, comprising 43 patented claims, about 300 acres, at Silver Plume, Clear Creek county. The company controls a number of old-time producing mines, and the dump from the Seven-Thirty, Mammoth, Brown and Dunderberg workings, known as the "Big Slide in Brown gulch." **Ore:** carries gold, silver, lead and zinc occurring in a fissure vein in granite and schist. Vein dips 70° N. and strikes N. E. The sulphide pay ore occurs in shoots and streaks of varying size.

Development: by a working tunnel with 7 levels above it and 7 below it, reached by a 70° shaft, 480' deep. Method of working, stulls and stope filling. Total extent of workings, about 5 miles. A winze 70' below deepest working is in \$50 ore the entire length.

Equipment: includes hoist, compressor and pumps. Both water power and steam are used. The 100-ton mill contains crushers, rolls, jigs and tables.

Present operations consist in remodeling and enlarging the mill, and introducing flotation treatment to handle the low-grade and zinc ores left in the old stopes or on the dump piles. Development to lower levels is also in progress, this work in 1915 having yielded an income of \$3,000.

Owners claim that the mine has a production record of \$10,000,000, all from high-grade ore, and that the property now has 100,000 tons of \$10

ore left. This includes 200,000 tons in the Big Slide, a great pile of ore carried down-hill by a snow slide, whose net value is figured at \$300,000.

Management will expend \$50,000 to enlarge mill to 300-ton capacity, so as to handle 200 tons per day of low-grade ore from the dumps. The Big Slide ore is said to average 40c gold, 3.7 oz. silver per ton with 0.45% lead and 1.22% zinc.

H. C. Bonnevie has reported on both the mine and the treatment of the Big Slide ore. Property has attractive possibilities in depth and in virgin ground, if funds are provided for the plans outlined above.

TETER-STONE AZURITE MINING CO.

ARIZONA

Dr. D. W. Teter, pres. **Property:** 3 miles south of Dragoon, Cochise Co., Ariz., has a 4 to 10' contact deposit, between limestone and granite, showing outcrops of azurite and malachite, with some sulphide ore in a tunnel. Operations were suspended, 1913, owing to a heavy inflow of water.

TEXAN MINING CO.

UTAH

Office: 400 W. 7th South St., Salt Lake City, Utah. Chas. Tyng, pres.; Frank Nelson, sec. **Inc.** in Utah. **Cap.**, \$1,000,000; shares \$1 par; outstanding, \$825,000. Listed in Salt Lake City.

Property: 200 acres in American Fork district, said to show silver-lead-copper-gold ore.

TEZIUTLAN COPPER CO.

MEXICO

Inc. in New Jersey. **Cap.**, \$1,000,000; shares \$100 par. Is controlled, through ownership of entire stock issue, by Teziutlán Copper Mining & Smelting Co. Fully described Vol. V, Copper Handbook.

TEZIUTLAN COPPER MINING & SMELTING CO.

MEXICO

Office: R. E. Safford, sec., 82 Beaver St., New York. **Mine office:** La Aurora, via Teziutlán, Puebla, Mex., and Ejutla, Oaxaca, Mex. **Officers:** Stephen W. Reynolds, v. p.; Chas. J. Peabody, v. p.; preceding, with E. W. Gould, Jr., D. C. Brown, R. H. Cromwell, W. F. Gillesby and R. M. Carter, directors; Donald C. Brown, asst. gen. mgr.

Inc. April, 1905, in New Jersey. **Cap.**, \$10,000,000; shares \$100 par. Controls, through entire stock ownership, the Teziutlán Copper Co., and has a close working agreement with the Compañía Metalúrgica Mexicana. State Street Trust Co., Boston, transfer agent. Annual meeting, first Thursday in June.

Regular dividend rate is 6% per annum, and dividends were \$100,000 in 1903; \$350,000 in 1904; \$495,216 in 1905; \$800,000 in 1906; \$800,000 in 1907; \$300,000 in 1908; none in 1909-10; \$400,000 in 1911; \$400,000 in 1912 and \$300,000 in 1913.

Property: La Aurora and Ocote mines, the former with 4,500 acres, 10 miles from Teziutlán, and about 130 miles E. of the City of Mexico, with a 16-acre smelter site, and 2,500 acres of miscellaneous lands, including La Chignautla limestone quarry, about 3 miles from the smelter. The climate is equable, and the mines are surrounded by fine arable lands, with an adequate supply of good labor.

Los Ocotes group, 240 hectares, bought Oct., 1905, is 2½ miles N. of San Martin. Ejutla, Oaxaca, Mex., and includes the San Juan mine, which is one of the few copper properties that has paid for development from production, since inception, and in addition, has given a profit, the mine having been a steady producer since 1900. This property shows 4 fissure veins, in porphyry. The one worked in the San Juan mine varies from 2 to 30' in width and has lenticular shoots of quartzose-chalcopyrite ore without zinc, antimony, arsenic or bismuth. The ore averages 4 to 5% copper, and 15 oz. silver per metric ton, with a trace of gold, and the mine has produced considerable ore carrying up to 11% copper and 4 kgs. silver per metric ton.

Development: by 4 shafts, 1 for ventilation. The San Juan or main shaft is 830' deep, and is connected on the 7th level with the Dolores shaft, 200 meters to the N., of 164 meters depth, having 9 levels. The San Francisco shaft, 475 meters S. of the San Juan, is not yet connected with the main workings. The mine is quite dry, making only about 25,000 gals. of water daily. Ore reserves were estimated March, 1912, at 1,000,000 tons.

Equipment: at the San Juan mine of Los Ocotes group includes steam, gas and electric power, with steam hoists good for 500 meters depth, at the San Juan and Dolores shafts, and a 6-drill Rand air compressor. There also is an old mill erected by the former owners near the San Juan shaft.

The company owns a private narrow-gauge railway, of 10.7 miles length, from La Aurora mine to Teziutlán, where connection is had with the Interoceanic Railway of Mexico. This line has 2 Shay mountain-climbing locomotives, with a Rogers switch engine at the works. A railway is projected from Teziutlán to the port of Nautla, on the Gulf of Mexico, a distance of 100 miles, which would give a direct outlet, and reduce transportation charges, which are very high at present.

The company has 2 aerial tram lines, the lower of 50 metric tons hourly capacity, carrying ore and limestone, and the upper, of 15 metric tons hourly capacity, with automatic loading and dumping devices, carrying limestone only.

A new 500-ton concentrating mill at Aire Libre, Puebla, Mex., electrically operated, and of the most modern and complete equipment, was practically completed at end of 1913, when all work had to be suspended on account of revolutionary conditions.

Smelter: 17 kilometers from Teziutlán, was remodeled and blown in April 8, 1910. Buildings are of concrete and steel and the flow of material is by gravity throughout. Ore is brought from the mine in trains of 4 cars each, passing over a gravity tramway equipped with scales and dumped in two rows of six 250-ton ore and flux bins, having pneumatic gates. There are two 500-ton blast furnaces, doing semi-pyritic smelting, requiring about 7½% charges of Connellsville coke, charged by cars taking current from a third rail, with motors mounted on the axles, ore being dumped into 65-ton charge hoppers above each furnace. Each hopper is divided into 6 vertical sections, for half the height, each section having 2 gates, operated hydraulically by banks of levers in front of the furnace, permitting charging to any part of each furnace desired, as charging can be done at 10 different points independently. The discharge of the water-jacket piping is visible. The furnaces have 11' circular settlers, of 4' 6" height, with 18" linings, provided with cooling pipes. Under the furnace floor is a 4x7' concrete-lined slag tunnel, which also cares for drainage, slags being granulated and washed out by a jet of water into the river, the launder having a 45' fall. A 10' steel balloon flue leads from the furnaces to the 150' steel stack, of 14' diameter, set on a 30' concrete base.

The converter department, occupying an extension of the furnace building, has a 30-ton electric crane, of 40' span. There are 2 stands and six shells, with fusible disks, tilted electrically. Blister copper is cast into 110-kg. pigs, in tilting moulds carried on trucks, and converter bars, averaging 98.6% in copper tenor, are exported through Vera Cruz for refining at the Perth Amboy works, and electrolytic copper is marketed by L. Vogelstein & Co.

The power plant at the smelter has 5 Connorsville blowers of 10,000 cu. ft. capacity each, driven by 100-h. p. individual motors, for furnace blast, and a 40x42" Nordberg double blower, rope-driven by a 350-h. p. motor, for converter blast. There are 2 hydro-electric power plants and the cost of

electric power is figured at \$14 per h. p. year, exclusive of interest and insurance. The 1,000-h. p. hydro-electric installation at the smelter takes water from the Totoyoc or Xolat river, through a 3,600' flume, under a head of 150', the company having a government concession for 2,500 liters of water per second from that stream. The second hydro-electric power plant, on the Atexcaco river, 9 kilometers from the smelter, has about 3,000 h. p. available, partially developed by a 1,500-k. w. hydro-electric plant of 4 units, driven by Pelton wheels under a head of 1,340', delivering current at 6,000 volts, which is carried by double transmission lines, each of capacity adequate for the entire load, and stepped down to 440 volts in a transformer station at the smelter.

Production: 6,788,404 lbs. fine copper in 1902; 6,786,488 lbs. in 1903; 7,512,252 lbs. copper, 286,012 oz. silver and 3,057 oz. gold in 1905. The plant has a capacity of about 12,000,000 lbs. fine copper yearly, and was producing early 1911, at the rate of nearly or quite 1,000,000 lbs. fine copper monthly. Employs 2,500 men when working at capacity. The Teziutlán is the most promising and successful copper mine in southern Mexico, and management is considered good. Closed down since 1913, owing to Mexican troubles.

THARSIS-YORK CO.

MEXICO

Office: 178 Devonshire St., Boston, Mass. **Mine office:** Nacozari, Sonora, Mex. **Officers:** Herbert E. Young, v. p.; Thomas L. Pryor, sec.; Willard T. Carleton, treas.; preceding, with R. C. Heath, E. C. Williams, W. R. Sparrell and Wm. J. Maloney, directors.

Inc. April 29, 1909, in Delaware. **Cap.**, \$1,000,000; shares \$5 par; fully paid and nonassessable; issued 145,761. Boston Safe Deposit & Trust Co., registrar; State Street Trust Co., transfer agent, Boston, Mass. Annual meeting, second Wednesday in April.

Property: 12 claims, 1,015 acres, in 6 groups, 1 known as the Esquina, the main group, adjoining and lying between the Nacozari Consolidated Copper Co. and the Pilares mine of the Moctezuma Copper Co., with 1 shaft near the boundary of the latter. There are several attractive orebodies on the property, 3 partly developed.

The Esquina claims carry a dike-like mass of red-stained mineralized porphyry, similar to the outcrop of the Pilares orebody and on the same line of fracturing. This outcrop is 600' wide and extends across the claims. Like the Pilares it has a footwall of white rhyolitic breccia, a hanging wall of andesitic breccia, and the lode filling is an altered, sericitized, silicified and mineralized rhyolite, supposedly with copper and iron sulphides below water level.

Development: includes considerable prospect work, with shafts of 168' and 170', latter planned to be sunk to 300' with tunnels of 330', 107', 268' and 485', the mine having about 1,500' of workings. The company was driving a crosscut tunnel to cut the lode at 800' in and to drain the bottom of the 168' shaft and continue across the ore zone. This mineralized belt has thus far shown only bunches of ore, but is expected to develop ore similar to that of the Pilares mine.

Equipment: includes an 80-h. p. electric plant, with a 25-h. p. hoist and a 3-drill air compressor, and the company has the use of the shops of the Moctezuma Copper Co. Was forced to close down in 1914, owing to revolutionary disturbances, and has been idle since then. Property considered promising and development well planned.

THIRD VENTURE MINING CO.

COLORADO

W. A. Palmer, pres.-mgr., Leadville, Lake Co., Colo. Company owns a lease on the St. Louis mine which has a vein with complex sulphide ores

carrying copper-lead and zinc with gold-silver values. **Development:** by 1,450' tunnel. **Equipment:** electric with Leyner air compressor. Shipments reported to have been 25 tons a day during 1915.

THOMPSON-QUINCY CONSOLIDATED MINING CO. UTAH
Reorganized, 1915, as New Quincy Mining Company, which see.

THOR MINING CO. UTAH
Merged 1916 with Great Western Gold & Copper Co. and Mountain Lake Mining Co., with title of Great Western Mines Co., which see.

THOUSAND MEMBER GOLD MNG. ASSOCIATION. NEVADA
Described under Eastern Star Mining Co. (a gold brick).

THREE FORKS COPPER MINING CO. MONTANA
Copper City, Broadwater Co., Mont. Herbert G. Dunbar, supt., Three Forks, Mont. **Property:** a group of claims, at Copper City, 7 miles north of Three Forks. Operations resumed Feb., 1916, shaft deepened to 400' and vein shown to dip at 45°. As shaft is in lead material from top down, the lode is said to be 200' wide. Sulphide copper ore appears at 325', or 25' above water level. Company plans extensive prospecting on 400' level.

The ore is somewhat bismuthiferous, assaying up to 20% copper, with small gold and silver values. **Equipment:** includes steam power and an air compressor.

THREE KINGS SILVER MINING CO. UTAH
Mine at Park City, Utah. **Officers:** W. R. Elliott, pres., 616 Newhouse Bldg., Salt Lake City; E. S. Fisher, v. p.; P. J. McIntosh, sec.-treas.

Inc. May 13, 1914, in Utah. **Cap.**, \$100,000; shares 10c par; \$75,000 issued. Annual meeting June 8.

Property: Nelson, Mineola groups, 156 acres at Park City, showing usual geologic conditions of that camp, with fissures carrying silver-lead ore.

Development: 550' shaft, and 660' crosscut to limestone quartzite contact. Started a raise on 500' level, June, 1916.

THREE MAN MINING CO. ALASKA

Office: 31 Nassau St., New York. Mine office: Landlock, Prince William sound, Alaska. **Officers:** W. A. Dickey, pres.-gen. mgr.; H. C. Bryan, sec.; Duncan Edward, treas.; officers are the directors.

Inc. in New York. **Cap.**, \$1,000; shares \$100 par; fully issued. Is a close corporation, having only 3 shareholders.

Property: 43 claims, 10 patented, 812 acres, on tidewater, at Landlock bay, in the Valdez mining district of Alaska, giving the company nearly a mile along a great shear zone, only one end of which has been developed. The property, which has been under continuous development since 1903, is said to show 10 orebodies with a general E.-W. strike, occurring as fissure veins and as replacement deposits in shear zones in greenstone and slates. Orebodies reported to average 8' in width and to carry chalcopryrite ore in lenticular shoots averaging 10% copper. Low-grade ore is continuous, with rich ore found mainly on the footwall in paystreaks of 1 to 8' width, the largest shoot carrying massive chalcopryrite, assaying 10% copper, 1 oz. silver and 50 cts. gold per ton. The quantity of low-grade ore of concentrating tenor is very much greater than that of the smelting ore, but it is not available for present use.

Development: by tunnels, with 6,000' of workings. Six levels have been opened up on one orebody, giving a little over 600' of stoping depth on the ore. Another orebody has been opened up on 3 levels, giving about 500' of stoping depth. No stoping has been done, all ore produced having been extracted from levels and upraises. Company claims to have over 200,000 tons of 3% copper ore developed.

The mine has no machinery or power equipment, owing to development by tunnel, but has 14 buildings, with ore bunkers on a wharf at tide-water, connected by a short ground tram with the portal of the 5th level.

Production: about 600 tons of 10% ore were shipped, 1910, to the Tacoma smelter, yielding 120,000 lbs. fine copper, and over 3,000 tons of 10% ore yielding 610,000 lbs. fine copper in 1912. No shipments were made in 1913 and 1914, but in 1915, 300,000 lbs. copper was produced. Over 5,000 tons of 10% ore has been shipped. Total production to date is about 1,000,000 lbs. copper.

All shipments are made under name of W. A. Dickey and not by the company. Property considered promising

THREE R MINES.

ARIZONA

Patagonia, Santa Cruz Co., Ariz. R. R. Richardson and A. E. Crepin, owners. Mine was operated under option from April, 1912, to Oct., 1914, by N. L. Amster, 67 Milk St., Boston, Mass.

Property: 55 claims, about 1,000 acres, unpatented, on the westerly slope of the Patagonia mountains, 9 miles S. of Patagonia, at an elevation of 5,000'. Claims show alaskite with small, irregular areas of trachyte and rhyolite porphyries. **Ore:** occurs mainly along several lodes in a N.-S. shear zone as chalcocite in high-grade shoots and also disseminated low-grade values. The first orebody opened had stopes 70 to 80' long and 40' wide extending from the 50' to the 400' level; a second parallel ore-shoot, 100' from the first, was 23' wide and carried 8% ore.

Development: the Colossus tunnel, Evening Star tunnel and the 260' Colossus shaft, with total underground workings of 8,740'. Practically all the high-grade ore has been mined.

Equipment: includes a 50-h. p. Fairbanks-Morse oil-type hoist at the Colossus shaft, 40-h. p. and 60-h. p. oil-type engines operating individual belt-driven Sullivan air compressors.

Production: from April to Sept., 1913, 3,717,571 lbs. fine copper from 22,253 tons dry ore, averaging 9.1% copper. During 1914 about 100 tons of 12% copper ore was shipped daily.

Owing to litigation involving title between R. R. Richardson and Ben Heney, a former partner, the Amster lease was relinquished in 1914 and mine has since been idle.

Reported in May, 1916, to have been sold to the Harrison interests of Mexico for \$500,000. A mill is to be built to treat the low-grade ore.

THUNDER CREEK MINING CO.

WASHINGTON

Succeeded by Thunder Creek Transportation & Smelting Co., reorganized as Puget Sound, Chelan & Spokane Railway Co.

TICON MINING CO.

MONTANA

Controlled by Jas. A. Murray and the estate of Silas F. King, of Butte, Mont. **Property:** 1 fractional claim, about 2 acres, lying between the Bell and Wild Bill mines of the Anaconda and the Speculator and Edith May claims of the North Butte. Mine has a 700' incline shaft on the vein with levels opened at 300', 500', 550' and 600', said to show 4' of good ore in the bottom. Work was stopped by an injunction, secured by the Anaconda Copper Mining Co. in 1908.

TIFFANY MINING CO.

WISCONSIN

Address: care E. M. Wagner, Board of Trade, Chicago, Ill. Inc. 1916. **Cap.**, 50,000 shares; \$5 par.

Property: 160 acres, leasehold, known as the Tiffany mine, formerly owned by W. N. Tiffany, of Platteville, Wis. Property has been drilled and orebody proven. Claims lie east of the Wilson Mining Co. land.

Company is sinking shaft and constructing new mill and power plant.

Also reported to own Lucky Three mine and to hold leases on Horseshoe mine, 250 acres, at British Hollow and on Carter Coal Co.'s ground. Two drilling machines are working.

TIGER GOLD MINING CO.**ARIZONA**

Crown King, Ariz. See Oro Belle Development Co.

TIGRE MINING CO., S. A.**MEXICO**

See Lucky Tiger Combination Gold Mining Co.

TILLCUM DEVELOPMENT CO.**WASHINGTON**

Mine at Loomis, Okanogan Co., Wash. **Officers:** A. G. Elston, pres.; L. M. Deller, sec., both of Spokane, Wash.; F. G. Burnham, treas., Holyoke, Mass., at last accounts.

Is the successor of the Palmer Mountain Tunnel Co., inc. Aug., 1912, in Washington. **Cap.**, \$300,000; shares \$1 par; 50,000 preferred, 250,000 ordinary; issued, 30,000. Debentures, \$19,000, 6%, none issued.

Property: 15 claims, 250 acres, in the Loomis (Palmer Mt. or Wannacut Lake) district, 12 miles from the Great Northern railroad. The Summit claim shows a N. W.-S. E. fissure vein in diorite, averaging 8' wide and proven to depth of 115'.

Development: 3 tunnels, all on the vein, said to show ore of commercial grade in small amounts. Vein averages 5' between walls and gives indications of opening up an orebody of profitable size. Ore reported to average \$40 gold and 10 oz. silver with traces of copper. Company has 750-h. p. water power and 450-k. w. electric plant, transmission line and machinery, as well as 100-stamp mill and sawmill.

Company's original plan of tunneling Palmer Mountain appears to have been abandoned. This crosscut is reported to be 5,993' long. Presumably idle.

TILT COVE COPPER CO., LTD.**NEWFOUNDLAND**

Liquidated, 1913. Fully described Vol. XI, Copper Handbook.

TIMBER BUTTE MILLING CO.**MONTANA**

See Elm Orlu Mining Co.

TIMES MINING CO.**ARIZONA**

Oatman, Ariz. **Officers:** Z. J. Bergeron, pres.; W. E. Gray, v. p. and gen. mgr.; F. H. Lathrop, sec.; L. L. Wallace, treas.; preceding and L. R. Myers, directors.

Inc. 1915, in Ariz. **Cap.**, 1,500,000 shares; 25 cts. par; non-assessable, outstanding, 763,000 shares. Listed on San Francisco Stock Exchange.

Property: 12 claims, about 240 acres, in the Oatman district, said to show an almost vertical fissure vein occurring in granitic porphyry, andesite and rhyolite. Pay ore occurs in shoots and values are gold.

Development: includes shaft which it is planned to sink to 550'. Cross-cutting reported to have developed ore of both shipping and milling grades.

Equipment: includes a 40-h. p. hoist, 500' compressor, 80-h. p. engine, power drill sharpener, etc.

Operations began Nov. 1, 1915, and no reports are as yet available.

TINTIC CO.**UTAH**

Office: 734 Fifth Ave., New York. Mine office: Bingham Canyon, Salt Lake Co., Utah. **Officers:** Grant B. Schley, pres.; Kenneth B. Schley, v. p. and sec.; E. B. Schley, treas.; preceding with Frederick Strauss, Alfred Jaretzki, E. J. Berwind and D. Sullivan, directors.

Inc. 1903, in Maine. **Cap.**, \$2,700,000; shares \$3 par; issued \$2,091,249. Original cap., \$3,000,000; shares \$5 par, increased, 1906, to \$4,000,000, with an outstanding issue of \$3,500,000 stock in 700,000 shares of \$5 par, which was first reduced 1909, to \$2,100,000, by cutting the par value from \$5 to

\$3 and was immediately thereafter increased to present amount of \$2,700,000.

Bonds: \$500,000 authorized, at 6%, convertible into stock, of which \$422,900 is outstanding, this bond issue having been made to liquidate a floating debt. The company is a securities-holding corporation only, and is the parent company of the Tintic Mining & Development Co., Yampa Smelting Co. and West Mountain Tramway Co., properties of which are described under the titles of the 2 first-named companies.

TINTIC CENTRAL MINING & MILLING CO.

UTAH

Office: Provo, Utah. Mine address: T. T. Holdaway, Knightsville, Juab Co., Utah. Geo. M. Smoot, pres.; R. L. Anderberg, sec.-treas.

Inc. June, 1907, in Utah. **Cap.**, \$50,000; shares 5 cts. par; assessable; all issued. Three assessments yearly of one-half cent a share. Stock listed on Salt Lake Exchange.

Property: 20 claims, covering ground adjacent to the Iron Blossom in the Tintic district and supposedly carrying the extension of the ore-bearing fissures of that mine. These fissures are in limestone and are cut by porphyry, carrying irregular but very profitable orebodies.

Development: includes a 1,038' shaft with extensive workings on the 870', 920' and 1,020' levels. In 1914 about 542' of development was done on the 870' level, opening up a fissure of low-grade quartz and a streak of lead-silver ore, running parallel with the fissure. During 1915. work was confined to the 800' level.

Equipped with electric power and a compressor.

TINTIC COMBINATION MINING CO.

UTAH

Consolidated with Tintic Empire and Bullock companies to form United Tintic mines, now dead, the property passing to the Tintic Tunnel Co.

TINTIC DELMAR MINING CO.

UTAH

Office: Snow Bldg., Provo, Utah. Mine office: Eureka, Juab Co., Utah. **Officers:** Andrew Madsen, pres.; Wilford Giles, v. p.; Harvey Cluff, sec.-treas.

Inc. March 27, 1909, in Utah. **Cap.**, \$100,000; shares 10 cts. par.

Property: 27 claims, partly patented, in the North Tintic district, on which limestones occur with geologic conditions like those of Centennial Eureka mine. **Development:** by 350' tunnel, to be extended to crosscut formation, which shows stringers of quartz carrying ore said to give good assay values in silver, lead and copper where 2 large cross breaks intersect. A 114' winze encountered fissures opened by a drift, 100' below the tunnel, reported to show ore carrying 300 oz. silver, some gold, lead and a little copper in a shoot encased in low-grade ore. Active development work was resumed the latter part of November, 1915.

Property reported on favorably by C. A. Porter, of Utah Copper Co. and by Prof. J. E. Tallmadge. Is a promising mining gamble.

TINTIC MILLING CO.

UTAH

Provo, Utah. **Officers:** Jesse Knight, pres.; G. Dern, v. p.-mgr.; W. L. Mangum, sec.-treas.; T. P. Holt, gen. supt.

Inc. in Utah. **Cap.**, 1,000,000 shares, 3 cts. par; assessable. The purpose of the company is to provide a process and a mill for treating low-grade ores of the locality, hitherto found valueless. The mill employs the Holt-Dern and Knight-Christensen roasting furnaces and leaching. Operations began Mar., 1916, the mill treating 150 tons daily.

TINTIC MINING & DEVELOPMENT CO.

UTAH

Office: 734 Fifth Ave., New York. Mine office: Bingham Canyon, Salt Lake Co., Utah. **Officers:** Grant B. Schley, pres.; D. Sullivan, v. p.; W. J.

Walworth, sec.-treas.; E. B. Schley, asst. sec.-treas.; preceding with W. S. Gurnee, E. J. Berwind and Kenneth B. Schley, directors.

Inc. Aug., 1896, in West Virginia. **Cap.**, \$3,000,000; shares \$5 par; re-organized Jan., 1906, in Maine. **Cap.**, \$600,000; shares \$1 par. Is a subsidiary of the Tintic Co., and operated as a close corporation, making no public reports. Property was mortgaged 1910, for \$150,000, jointly with the Yampa Smelting Co. and West Mountain Tramway Co., to secure a \$675,000 issue of 8% gold bonds.

Property: includes claims near the Mammoth, Grand Central and Centennial-Eureka mines in the Tintic district, having a 300' shaft, with a power plant and air compressor. Heavy expenditures on this property gave indifferent results, and it has been idle several years.

Owns the Yampa mine and a group of 30 claims, 180 acres, on Carr fork, Bingham canyon, near the Ohio mine, and adjoining the Utah Consolidated on the N. and Boston Consolidated on the W. The claims carry a contact or bedded vein, of 10' minimum, 37' average and 200' maximum width, between a quartzite foot and limestone hanging, this being among the largest orebodies in the Bingham district, outside of the properties having disseminated porphyry ores. The deposit carries disseminated chalcocite, covellite and chalcopyrite, said to average 1 to 3% copper, 2 oz. silver and \$1.50 gold per ton, while smelter returns for 1909 were only about 1.7% copper, and probably under \$2 per ton in combined gold and silver values. The ore has a considerable excess of iron, rendering it valuable for smelting the highly silicious ores common to the Bingham district.

Development: is confined to the Yampa mine, a claim of less than 6 acres, entirely surrounded by the Utah Consolidated, and developed by 2 tunnels and a shaft. The Craig haulage tunnel, on the 1,200' level, is 3,248' long, intersecting the main vein at about 2,200' from the portal and connecting with the shaft at 2,448'. The upper or Yampa tunnel intersects the shaft at 475' and runs about 1,000' on the vein. The 1,700' shaft has 3 compartments, and is operated in 2 sections, 1 from the 400' level to surface, and 1 from that level to the 1,200' level, with balanced hoists. There are 12 levels opened, approximately 128' apart. Ore from the upper workings is sent down the shaft to the Craig tunnel, which has an electric haulage system, with 2 electric locomotives, taking trains of six 3-ton cars.

Equipment: includes an electric hoist, and a power plant near the portal of the Craig tunnel, with steam and electric motors. Power is furnished by the Telluride Power Co. There is a 35-drill Ingersoll-Rand 2-stage air compressor, direct-connected to a 200-h. p. motor. Ore is transported by the West Mountain Tramway Co., controlled by the Tintic Co., which has a 12,270' Leschen aerial tram, the longest in the district, of 700 tons daily rated capacity, having 600-ton ore bins at the upper terminal, connecting with the Yampa smelter at the lower end. The tram line saves about 25 cents per ton on cost of transporting ore.

Production: 4,069,886 lbs. fine copper in 1905; 4,699,765 lbs. in 1906; 5,001,255 lbs. in 1907; 5,412,850 lbs. in 1908; 6,500,000 lbs. in 1909; 6,172,243 lbs. in 1910; 6,157,175 lbs. in 1911; 1,666,000 lbs. copper, 45,680 oz. silver, and 2,699 oz. gold in 1915. Present output July, 1916, is about 200 tons ore per day, shipped to Garfield.

The Yampa mine, though small, is considered valuable and the management good.

TINTIC SMELTING CO.

UTAH

Company dissolved, 1915. Plant described in Vol. XI, Copper Handbook.

TINTIC STANDARD MINING CO.**UTAH**

Office: 422 Judge Bldg., Salt Lake City, Utah. Mine office: Eureka. Juab Co., Utah. **Officers:** E. J. Raddatz, pres., treas.-gen. mgr.; W. I. Snyder, v. p.; Geo. F. Busch, sec.; with A. N. Holdaway and Jas. Beveridge, directors; E. J. Raddatz, gen. mgr.

Inc. Oct. 2, 1907, in Utah. **Cap.**, \$1,000,000; shares \$1 par; assessable; issued, \$895,000. Has levied 19 assessments and is expected to levy 5 more of $\frac{1}{2}$ c each in 1916. Stock listed on Salt Lake Exchange. Annual meeting, Sept. 15th.

Property: 15 claims, patented, 300 acres, $2\frac{1}{2}$ miles from a railway, in the East Tintic district. Company plans acquiring 18 new claims, 300 acres, adjoining on the E. and W. The mine shows limestone and porphyry, carrying fissure veins with N.-S. strike and dip of 55° W., in limestone. Ore carries lead and copper values and is reported to assay from a trace to 50% lead, 1 to 105 oz. silver and \$1 to \$15 gold per ton. The management reports the main orebody as 200' wide.

Development: by an old incline shaft and a 1,200' shaft, with nearly a mile of workings. The 1,000' level, 925' E., had a promising showing but though the company did a large amount of work by shaft, drifts and diamond drill, it failed to locate a profitable orebody. In June, 1916, a 362' incline winze from the 1,200' level is reported down 60'. Management plans sinking to the 1,400' level.

Equipment: includes a 100-h. p. steam plant, with an 80-h. p. double-cylinder hoist, good for 1,500' depth, and a 3-drill air compressor. There are 5 buildings. Shipments from the 1,200' level said to have averaged 33% lead, 12 oz. silver, \$1.20 gold, 30% zinc.

TINTIC TUNNEL CO.**UTAH**

Office: Newhouse Bldg., Salt Lake City. **Officers:** L. A. Martin, mgr., with F. C. Richmond, D. R. Beebe, S. B. Smith, B. D. Lyon, H. J. Fitzgerald, R. J. Evans, D. F. Davis and C. E. Martin, directors. **Inc.** 1916, in Utah. **Cap.**, \$2,000,000.

The company plans to drain the E. and S. ends of the Tintic district by means of a 5-mile tunnel. It has absorbed the holdings of the United Tintic Mines, which was a consolidation of the Tintic Combination, the Tintic Empire and Bullock companies.

Properties: 28 claims, about 600 acres, in the Tintic district, near Eureka, said to show 4 parallel veins in an ore zone, or channel, that lies east of the Mammoth-Grand Central and the Centennial-Eureka ore zones. The claims are so located as to give approximately 2 miles on this vein system. **Ore:** carries copper, lead, silver and gold values. The veins vary greatly in width, but are generally of small size, the Bullock vein, in which work has been centered, showing a maximum width of about 4'. The ore in this vein runs high in iron and carries about \$20 per ton in copper, lead and silver.

Development: principally on the old Bullock property, includes shafts of 280', 215' and 102' and several old tunnels. **Equipment:** includes a small steam plant and hoist.

Plans drifting S. from shaft No. 2 in hopes of finding orebody at intersection of veins. Excess of water and high cost of mining below water level have caused decrease of production.

TINTIC ZINC CO.**UTAH**

Address: Newton A. Dunion, pres., 23 H. St., Salt Lake City; W. A. Black, sec. **Inc.** 1913, in Utah. **Cap.**, \$1,000,000; shares \$1 par. Listed in Salt Lake City.

Property: 270 acres in the Tintic mining district, said to show zinc-lead-silver ore.

TIP TOP CONSOLIDATED MINING CO. ARIZONA

Prescott, Ariz. **Officers:** C. W. Davis, pres.-treas.; A. F. Muter, v. p.; F. L. Haworth, sec., with W. W. Elliott and D. E. Nelson, directors.

Inc. 1916, in Ariz. **Cap.**, \$375,000. Company was organized to operate the old Tip Top silver mine, about 25 miles south of Prescott, credited with a production of several million dollars, 1875-85, under Hagen, Head and Hearst.

The mine was originally opened to the 800' level; the present management has reopened it to the 200' level. The dumps, stope filling and low-grade ore left in the mine will be worked for silver and for the tungsten which was formerly passed over. It is reported that there are 120,000 tons in the dumps that will assay $1\frac{1}{2}\%$ tungstic acid, and over \$5.20 per ton silver, largely as chloride.

TIP TOP COPPER CO. ARIZONA

Idle. **Office:** Commonwealth Bldg., Philadelphia, Pa. Mine office: Helvetia, Pima Co., Ariz. **Geo. A. Aman, pres.;** S. Charles Pratt, v. p. and gen. mgr., at last accounts. **Inc.** 1902, in Arizona. **Cap.**, \$1,150,000; shares \$1 par.

Property: 24 claims, 400 acres, also known as the Little Helvetia mine, including the Tip Top and Copper Duke claims, also a 100-acre mill site, about 2 miles from Helvetia, shows 3 veins, averaging 14' width. These veins have extensive bodies of soft black sulphide ore in altered clayey limestone and porphyry, reported to give average assays of 5% copper and 1 oz. silver per ton, with a trace of gold.

Development: mainly by tunnel with about 4,000' of workings; also the usual prospect shafts and tunnels. **Equipment:** includes gasoline power. Was bonded 1907, to Guggenheim interests, for \$250,000, with cash payment of \$75,000, but both parties to bargain were dissatisfied, and property reverted to owners.

TIP TOP MINE ONTARIO

Col. S. W. Ray, owner, Port Arthur, Ont. Mine near Kashaboiwe, Rainy River district, Ont. **Property:** 4 claims, freehold, 336 acres, locations K62, K63, K64 and K65, 9 miles by trail S. W. of Kashaboiwe station, Canadian Northern railway. The claims are near Round Lake, in Moss Twp., and show schist, greenstone and quartz porphyry of Keewatin age, with folded quartzite cut by quartz porphyry dikes. The ore occurs disseminated in dikes of flesh-colored felsite and quartz porphyry. There are several lenses of this chalcopryite and pyrite ore, stoped for 8 to 10' wide and 40' long, giving average assays of 7% copper, 5 to 12 oz. silver and \$1 to \$2 gold per ton.

Development: by a main incline shaft, dipping 70° N. of 208' depth, with about 760' of workings, on 4 levels, about 190' of drifting on each level. This work is estimated to show 45,000 tons of ore, of 4 to 6% copper, on a vein ranging up to 60' width.

Equipment: includes a 100-h. p. steam plant, with 30-h. p. hoists, and a 4-drill Ingersoll-Sergeant air compressor. See Ontario Bureau of Mines Report, 1911, p. 209.

TIRO GENERAL DE CHARCAS MINE MEXICO

Mine address: Charcas, San Luis Potosi, Mex. Owned by Cia. Metalurgica Nacional de Matehuala, controlled by the American Smelting & Refining Co. Mine was formerly owned by the Cia. Minera del Tiro General, S. A.

Property: 72 pertenencias, 178 acres, with 46-acre mill site, and 50-acre

farm, in the Venado district. The mine, an *antigua*, discovered 1583, was worked on a small scale for 3 centuries, and in a larger way since 1859. It shows 2 main ore zones, carrying fissure veins in porphyry, near a limestone contact, with a generally E.-W. strike and dip of about 70°. The N. vein, of 3 to 8 meters width, with known length of 500 meters, is opened to depth of 1,361', showing chalcopyrite and sphalerite estimated by the management to average 2% zinc, 430 grams silver and 8 grams gold per metric ton. There are 9 tunnels, 4 reported by the management to be of 656' each, and 5 of 1,312' each, the mine having 13,123' of workings. The mine and works, when operating normally, employ about 1,200 men.

Equipment: includes a 700-h. p. steam plant, with hoists of 100-h. p. and 175-h. p. and a 10-drill air compressor, and some use is made of malacates at the shallower shafts. Buildings include an engine house, combination smithy and carpenter shop, machine shop, general store, office, laboratory, warehouses, a hospital, 5 dwellings for officials, and accommodations for 40 Mexican families. There is a 10-stamp mill and a 150-ton concentrator, having Blake crushers and 5 sets of rolls, with trommels and other necessary equipment. The mill has 10 Sutton, Steele & Steele pneumatic dry concentrators, treating sulphide ores and giving a preliminary lead concentrate, cut out from the final zinc concentrate, the latter being a 45% zinc product, secured largely from rosin jack.

See American Smelting & Refining Co. and Matehuala, Cia. Met. Nac. de.

TIRO GENERAL; CIA. MINERA DEL.

MEXICO

Sold property to the Cia. Metalúrgica Nacional de Matehuala, San Luis Potosi, Mex., which is controlled by the American Smelting & Refining Co.

TISDALE GOLD MINING CO., LTD.

ONTARIO

Inc. Oct., 1910, in Ont. Cap., \$500,000; shares \$5 par. See Dobie Mines, Ltd.

TODD MINING CO., R. B.

NEVADA

Office: 203 Nixon Bldg., Reno, Nevada. Lewis E. Aubury, H. F. Norcross, Robt. W. Dunlap, M. H. Jacobs and R. B. Todd, directors.

Inc. Jan. 12, 1916, in Nev. Cap., \$250,000; \$1 par; \$225,000 issued. Is the successor of the Luning Gold Mines Syndicate.

Property: 5 claims and option on 13 more of the L. G. M. Co., 5 miles N. E. of Luning, said to show 12 veins carrying gold and copper ores. The mineralized zone is 300' wide and a mile long.

Development: 300' Robert shaft, on vein and 500' Cevita tunnel. Is reported shipping gold ore from the 12' Hahn vein on a granite contact. See Idaho Luning Co.

TOGO MINING & SMELTING CO.

WASHINGTON

Reorganized under name of Consolidated Copper Co. and described under that title.

TOLTEC MINE

MICHIGAN

Idle many years. Office: care J. M. Longyear, Marquette, Mich. Owners, Gogebic & Ontonagon Land Co. and Galen L. Stone.

Mine at Greenland, Ontonagon Co., Mich., 960 acres, carries the underlay of the Evergreen belt and the Calico and adjacent beds of the Michigan. **Production:** 1851-60, was 413,443 lbs. fine copper. Some diamond drilling was done, 1908.

TOM MOORE GROUP

UTAH

Office: 159 South State St., Salt Lake City, Utah. Mine office: Bingham Canyon, Salt Lake Co., Utah. A. M. Surbaugh and Thos. Moore Surbaugh, owners.

Property: 39 claims, 22 patented, 715 acres, with direct rail connec-

tion, in the N. E. part of the Bingham camp. **Development:** by 16 shallow shafts and short tunnels, principal work being by the Highline tunnel, with another tunnel driving at lower depth. The mine carries gold and silver-bearing lead and copper ores, with small quantities of native copper, in quartz. Owners do not care to have output or other details made public.

TOM REED GOLD MINING CO.

ARIZONA

Office: 503 Central Bldg., Pasadena, Calif. Mine office: Oatman, Ariz. **Officers:** W. P. Moerdyke, pres.; C. Mushrush, v. p.; E. M. Rabb, supt.; Ellis Mallery, cons. geologist.

Inc. 1907, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; outstanding 909,555. No bond issues, mortgages or indebtedness. Listed on Los Angeles Stock Exchange. In treasury March 30, 1916, 90,455 and about \$200,000 cash.

Dividends: aggregate \$2,555,934. The first dividend of 6% was paid in 1908. In 1910 the present 20-stamp mill was built and a second dividend of 3% was paid. Since then dividends have averaged 4½% per month for five years.

History: the mine was discovered in 1900, 20 years after the discovery of the Gold Roads mine nearby. Early development proved unsuccessful and in 1904 the mine was sold for \$75,000, one-tenth cash. The purchasers failed to meet payments and the property passed to the Title Insurance & Trust Co., of Los Angeles, representing creditors, for \$45,000. The present company was formed and deeper development undertaken. The Ben Harrison shaft was then 150' deep and the Tom Reed 90'. The first shoot of commercial ore was encountered on the 150' level.

Property: three distinct groups of claims, 437½ acres. Also owns water rights and mill sites in Cottonwood Canyon. Thus far most of production has been from the Tom Reed group, but development on the Black Eagle group promises early production.

The claims cover the outcrop of the big Tom Reed lode, one of the typical quartz-adularia veins of the district, which has been reopened and crushed by strike faulting with enrichment of the primary ore. The ore-shoots persist to the deepest level developed (1,200') with no change in size or value. **Ore:** is gold bearing; average value about \$24 per ton.

Development: to a depth of nearly 1,400', with total workings of about 30,000'.

Equipment: working shaft has a 150-h. p. electric hoist. Power is supplied by the Desert Light & Power Co., Kingman. Also includes 5 other mine hoists and compressors with capacity of 2,000 cu. ft. The mill has stamps, tube-mills and cyanide machinery. Mine has machine shops, supply store, hospital, recreation hall, etc. Present equipment cost more than \$300,000.

Production: for year ending March 31, 1915, company mined and milled 46,995 tons; average value \$21.23 per ton. Mining, milling, administration and depreciation charges totaled \$9.21, leaving a profit of \$12.11 per ton.

Property is a good one, and equipment complete.

TOM REED, JR. MINING CO.

ARIZONA

Office: Citizens Bank Bldg., Los Angeles, Calif. Mine office: Oatman, Ariz. **Officers:** E. S. Moody, pres.; J. L. Mason, v. p.; C. S. Baxter, sec.; with H. G. Peabody and W. S. Morse, directors.

Inc. 1909, in Ariz. **Cap.**, \$1,000,000; shares \$1 par; non-assessable; issued 786,226 shares. Annual meeting, in Nov. Listed on Los Angeles Stock Exchange.

Property: 6 unpatented claims, about 120 acres, in the San Francisco district, Mohave Co., ½ mile from Oatman. The fissure vein occurs in

andesite-rhyolite and varies in width from 4' to 12'. Pay ore occurs in shoots, and ore developed is said to average from \$4 to \$15 per ton in gold.

Development: by inclined shaft, 300' deep. Lateral workings amount to 330'.

Equipment: includes 2 hoists, a 344' compressor, with gasoline power, shaft house, etc. A larger hoist has been provided to sink a new shaft to 500'. Is a prospect.

TOMBOY GOLD MINES CO., LTD.

COLORADO

Under management of Exploration Co., Ltd., of London.

Offices: 11 Cornhill, London, E. C., Eng., and 61 Broadway, New York. Mine office: Telluride, Colo. **Officers:** Lord Arthur Butler (chairman), Marquis d'Hautpoul, Hon. A. G. Brand, and J. H. M. Shaw, directors; P. L. Foster, cons. engr.; D. A. Herron, gen. mgr.; T. Dundas Pillans, sec., 24 Lombard St., London, E. C.

Inc. June 7, 1899, in England. **Cap.**, 350,000 shares; £1 par, issued 310,000 shares.

Total revenue for year ending June 30, 1915, \$1,050,870; profit, \$396,223; with balance of \$230,000 there was available \$626,223, of which \$226,000 was paid in dividends. After allowing for depreciation, income tax, etc., the balance was \$110,000.

Property: included, July, 1915, 76 claims; others have since been added. Original holdings were the claims acquired from the old Tomboy Gold Mines Co. of W. Va., also claims carrying a parallel vein, known as the Argentine. Later company bought the claims containing the Montana vein and its northern extension from the Nevada Tunnel Co.

A cyanide mill and concentrating plant have been built and paid for out of profits, as well as additions and improvements to the plant of the Tomboy Tramway and Tunnel Co.

Geology: the veins in the Telluride district are filled fissures, 2½' to 4' in width, larger lodes sometimes appearing as a number of parallel plates of filled veins separated by sheets of altered rock. Country rock is andesite, rhyolite and San Juan tuff, with underlying sedimentaries in which the existence of the veins has not been proven. Principal metallic minerals are gold, pyrite, galena, zincblende, and chalcopryite. Ores contain 2 to 3% sulphides, and yield about \$6 in gold and a few ounces of silver per ton. For geology of the district see U. S. G. S. Geologic Folio No. 57, also Lindgren's "Mineral Deposits."

Development: the Tomboy and Montana properties to 2,400' depth, and on the Argentine to 2,200'. **Ore reserves:** Argentine, 185,000 tons; Montana, 200,000 tons, June 30, 1915.

Equipment: 80-stamp mill, concentrating plant and cyanide mill, all arranged practically under one roof, have a daily capacity of 400 to 450 tons.

Milling for the year ending June 30, 1915, gave an average of \$7.05 per ton, 42% being recovered as bullion and the rest as concentrates.

Production: for year ending June 30, 1915, 145,857 dry tons of ore, which yielded in bullion, \$414,114; in concentrates, \$537,494, and in cyanide bullion from tails, \$75,915.

Costs: were \$4.49 per ton; mining and development, \$2.44; milling \$0.53; concentration, including shipping, \$0.48; water supply, \$0.09; assay office, \$0.03; cyaniding, \$0.45; general expense, \$0.24; taxes and insurance, \$0.23.

TOMBOY GROUP OF MINES

ARIZONA

Address: Bruce Hobbs, sec., 29 Otis St., Boston, Mass. **Property:** 7 claims, 150 acres, in the Castle Creek district of the Bradshaw mountains.

about 13 miles from Wickenburg, formerly owned by the Arizona Mines Co., shows an orebody up to 50' in width, traced by trenching for nearly 1 mile.

Development: includes several short tunnels, and a 250' shaft, showing a vein carrying about 3' of disseminated malachite, ore being exclusively oxidized to depth opened. Mine as a whole has about a quarter-mile of workings. **Equipment:** includes an 18-h. p. hoist, good for 600' depth, and necessary mine buildings.

A full report on the property was made Oct., 1910, by Mark Bradley, mg. engr. Presumably idle.

TOMMY BURNS GOLD MINES, LTD.

NOVA SCOTIA

Controlled and operated by Tommy Burns Gold Mining Co., which see. **Property:** 134 acres, ½ mile from Brookfield, the nearest R. R. station, said to show a fissure vein, 2½-3½' wide, running E.-W., with dip 30°, and traceable at surface for 900'.

Development: by 108' shaft, sunk on the vein and drifts on the 50' and 100' levels. **Equipment:** includes a 5-stamp mill, boiler, hoist and pump. A pleasing prospect.

According to T. A. Rickard, who made a report on the gold deposits of Nova Scotia for the provincial government, none of the Nova Scotia gold deposits can be relied upon to carry their values to any great depth.

TOMMY BURNS GOLD MINING CO.

ONTARIO

Office: F. W. Joy, sec.-treas., 1 Wall St., New York. **Officers:** L. W. Myers, pres.; E. Schmid, v. p., with T. B. Pope and J. Fairbrother, directors; P. H. Moore, cons. engr., Porcupine-Bridgewater, Can.

Inc. in Del. Cap., \$3,600,000; shares \$1 par; Registrar & Transfer Co., 32 Nassau St., New York, registrar and transfer office.

Owens all but 5 shares of stock of the Tommy Burns Gold Mines, Ltd. Balance sheet of Jan. 31, 1916, shows no other assets besides this stock and \$5,000 cash. Balance sheet of the same date for the Tommy Burns Gold Mines, Ltd., gives this stock a value of \$99,995 and shows \$4,000 cash and total development expense of \$5,645.

See Tommy Burns Gold Mines, Ltd.

TONOPAH BELMONT DEVELOPMENT CO.

NEVADA

Office: 501 Bullitt Bldg., Philadelphia, Pa. Mine office: Tonopah. **Officers:** C. A. Heller, pres.; W. M. Potts, v. p.; K. Kitto, sec. and treas.; R. G. Wilson, asst. sec.-treas.; C. Berkeley Taylor, gen. counsel; C. Ducheneau, aud.; J. C. Fraley, H. C. Brougher, M. B. Cutter, C. A. Heller, R. G. Park, W. M. Potts, S. D. Sinkler, T. W. Synnott, C. B. Taylor, directors; F. Bradshaw, gen. mgr.; G. H. Garrey, cons. geol. T. F. M. Fitzgerald, supt. of mine; A. H. Jones, supt. of mills; F. W. Holler, supt. of Surf Inlet companies, Surf Inlet, B. C.

Inc. 1902, in N. J. Cap., \$1,000,000; shares \$1 par; increased, 1906, to \$2,000,000, but \$500,000 was later cancelled, leaving \$1,500,000 outstanding. Stock transferred at company's main office. Fourth Street Nat'l Bank, Philadelphia, registrar. Annual meeting, last Tues. in May, at Camden, N. J. Listed on Philadelphia, San Francisco and Salt Lake exchanges and traded in on New York and Boston curbs.

Comparative General Balance Sheet: Tonopah Belmont Dev. Co. and Belmont Milling Co., year ending March 1:

Assets—

Ore On

	Property Invest's	Def.Chgs.	Supplies	Hand	Current	Total
1916 . . .	\$1,563,189	\$27,500	\$360,888(a)	\$188,813	\$1,473,522	\$3,722,411
1915 . . .	2,141,473	29,453	100,040(b)	157,735	1,425,441	3,993,938

(a) \$351,325 advanced for development of Surf Inlet and other mining properties, under purchase options. (b) \$74,750 advanced for development of Surf Inlet mine.

Liabilities—

	Capital Stock	Current	Res. For Deprec.	Special Reserve	Surplus	Total
1916.....	\$1,500,000	\$137,670	.....	.....	\$2,084,741	\$3,722,411
1915.....	1,500,000	96,176	\$217,749	\$216,727	1,963,286	3,993,938

Comparative Operating Account: year ending March 1:

	Metal Receipts	Oper. Expense	Oper. Profit	Total Income	Deduct's (a)	Surplus	P. & L. Surplus
1916	\$2,160,522	\$1,184,865	\$ 975,657	\$1,047,768	\$ 796,756	\$251,012	\$2,084,741
1915	2,806,369	1,318,306	1,488,063	1,562,695	1,568,500	(b) 5,805	1,963,286

(a) Includes dividends; \$750,016, and \$1,462,504. (b) Deficit.

Dividends: 20c in 1906; 20c in 1907; none in 1908-09; 15c in 1910; 90c in 1911; \$1 in 1912; \$1.10 in 1913; \$1.10 in 1914; \$0.50 in 1915; \$0.25 first half of 1916.

Properties: 11 claims, 161.5 acres, adjoining Montana Tonopah and Tonopah Mining on the east, at Tonopah, Nev.; the Surf Inlet Gold Mines, on Princess Royal Island, B. C.; option on this property was exercised Dec. 31, 1915; the partially developed Bull Moose gold mine, near Carrara, Nye Co., Nev., taken under a 2-year option, reported in Sept. 1916, that option had been given up; the Biddlecome mine, near the Bull Moose, taken under a long-term option.

Reported in April, 1915, that an option had been taken on the Potosi gold mine of the Tunkey Mining Co., in Nicaragua, 20 miles from the Tonopah Mining Co.'s Eden mine. If the option is exercised it is proposed to organize a \$2,000,000 company, of which Tonopah-Belmont will own 51% and the Tunkey Mining Co. 49%. Reported in May, 1916, that an option had been taken on the Emma gold mine, in the Cone mining district, Dolores Co., Colo.

Geology: (at Tonopah) the district is made up of a thick series of rhyolitic and andesitic rocks, which is faulted in a very intricate manner, together with the accompanying veins. The deposits are quartz veins, in part filled and in part replacement, intersecting the earlier andesite and to some extent entering into the underlying rhyolite. Principal ore minerals are argentite and polybasite, with small amounts of pyrite, chalcopyrite, galena, zinblend and gold. Veins vary in width from 3' to 25'. The principal producer of the Tonopah Belmont has been the Belmont vein, cut off near 1,500' depth by the Mizpah fault; the veins now producing are not as productive as it was.

Development: by 3-compartment vertical shafts. The Desert Queen workings have a 1,127' shaft and 36,758' of workings, March 1, 1916. The Belmont workings have a main shaft, 1,718' deep and 101,840' of workings. New work amounted to 21,362' in fiscal year ending March 1, 1916, compared with 24,630' during the previous year.

Ore reserves: totaled 142,164 tons, March 1, 1916, compared with 295,084 tons the previous year.

Equipment: includes the old reduction mill at Millers, Nev., operated as a custom mill and the 60-stamp mill of the Belmont Milling Co., at Tonopah; operations started July, 1912. For a detailed description of this plant see Trans. A. I. M. E., August, 1915.

Production: Tonopah plant, year ending March 1:

	Tons Milled	Value p. Ton	Oper. Costs Mine	Costs p. T. Mill	Extr. %	Profit p. Ton	Production—Oz.	
							Gold	Silver
1916	165,157	\$14.13	\$3.92	\$2.68	92.97	\$ 6.59	31,112	2,968,565
1915	181,424	16.74	4.02	2.56	92.99	.....	40,591	3,714,862
1914	172,398	21.08	4.35	3.05	94.45	8.83	44,465	4,251,746
1913	60,359	24.21	4.35	3.66	94.43	12.42	38,371	3,826,399
1912	87,349	20.84	4.85	3.36	.....	14.31	45,069	4,535,762

To offset the decreasing production of the original claims at Tonopah, the company has been branching out, acquiring new properties, thus making the company a permanent organization independent of the life of the Tonopah mines.

TONOPAH BONANZA MINING CO.

NEVADA

Control of this property was acquired, 1915, by the Greenwater Copper Mines and Smelter Co., which see.

Property: 15 unpatented claims, 380 acres, at Tonopah, Nev., increased 1916, by acquisition of the Desert King Mining Co.'s property, 40 acres, adjoining on the S. E. The claims which lie in the western section of the district, had a 2-compartment shaft, 1,100' deep, when new company took over the property and some crosscutting had been done on the 600' level, but no commercial ore had been developed. The new management is sinking to the 1,700' level, 1,470' deep, May, 1916, where lateral development work will be done. **Equipment:** includes a small compressor, and electric power.

TONOPAH EXTENSION MINING CO.

NEVADA

Office: 30 Church St., New York. Mine office: Tonopah, Nev. **Officers:** M. R. Ward, pres.; S. A. Brown, v. p.; L. E. Marsden, sec.-treas.; W. G. Benham, asst. sec.-treas.; John G. Kirchen, gen. mgr., Tonopah; S. A. Brown, B. H. Campbell, J. G. Kirchen, W. R. Rose, M. A. Ward, directors.

Inc. 1902, in Ariz. **Cap.**, 2,000,000 shares; \$1 par; non-assessable; outstanding, 1,272,801. Original capital of 1,000,000 shares was increased June, 1915, to 2,000,000 and issue authorized of 156,294 shares for acquiring Tonopah Merger and 173,074 shares for Tonopah Victor Co. U. S. Corporation Co., 34 Nassau St., New York, transfer office and registrar. Annual meeting, in May. Listed on San Francisco and Nevada Stock Exchanges and on the New York Curb.

Comparative General Balance Sheet: year ending March 31:

Assets—						
	Property & Equip.	Supplies	Invest's	Bullion & Cash	Other Current	Total
1916.....	\$1,636,283	\$97,892	\$209,470	\$206,507	\$156,387	\$2,306,539
1915.....	1,217,246	79,048	130,462	190,606	128,208	1,745,570
Liabilities—						
	Cap. Stock	Current	Surplus	Total		
1916.....	\$1,272,801	\$194,126(a)	\$839,612	\$2,306,539		
1915.....	943,433	134,450(b)	667,687	1,745,570		

(a) Includes dividend No. 18, payable April 1, 1916, \$127,267.40. (b) Includes dividend No. 14, payable April 1, 1915, \$70,756.54.

Comparative Profit and Loss Statement: year ending March 31:

	Receipts Metal	Total Income	Oper'g Expenses	Admin. & Gen.	Treat. & Trans.	Profit For Year
1916.....	\$1,532,900	\$1,555,639	\$859,089	\$66,017	\$46,112	\$584,421
1915.....	1,289,817	1,341,620	662,269	50,140	32,319	596,892

Dividends: (calendar year) 15% in 1905; 15% in 1906; 5% in 1912; 15% in 1913; 20% in 1914; 32½% in 1915; 25% to July, 1916.

Total dividends to 1916, \$1,082,640. Present rate, 10c per share quarterly, increased to 15%, July 1, 1916.

During the fiscal year 1910-11 the company acquired the properties of the Red Rock Cons. Mining Co., McKane Mining Co. and Pittsburg Tonopah Extension Mining Co. and in June, 1915, properties of the Tonopah Merger Mining Co. and the Tonopah Victor Mining Co.

Property: 45 claims, 6 unpatented, 581 acres in the Tonopah mining district, Nye and Esmeralda counties, Nev., adjoins Tonopah Mining Co. on the W. and West End Cons. Mining Co. on the N.

Geology: ore carries silver and gold in quartz veins in rhyolite, trachyte and volcanic breccia. The ore minerals are argentite, stephanite, polybasite, some proustite and pyrargyrite. There are 3 main veins, from N. to S., the North Merger, O. K. and Murray, of which the Murray is the most important, showing a stoping width of 14'. The veins strike N. 45° W., S. 70° W., and N. 70° W., with dip 20 to 70°, growing steeper with depth. The orebodies occur in shoots ranging in width from 3-25', with a maximum length of 450' for any single shoot. Ore treated during year ending March 31, 1916, assayed 24.93 oz. silver and 0.24 oz. gold per ton, a decrease from previous year of 3.20 oz. silver and 0.024 oz. gold per ton.

Development: by 2 vertical main working shafts, viz., the Extension No. 2, 950', and the Victor, 1,540' deep; greatest depth of workings, 1,540'. Operations were temporarily discontinued at No. 1 shaft in Jan., 1916, on account of the remaining ore, so far as exposed, being very low-grade.

New work amounted to 13,967' in fiscal year ending March 31, 1916, compared with 12,651' in 1915. Total underground workings, Feb., 1916, 112,000'. Ore is extracted by overhead stoping and subsequent waste filling.

Developments in 1916 have proven a new 5' vein of \$20 ore, between the Merger and O. K. veins. Stoping is in progress in 3 veins, the O. K. with 6', the North Merger with 10' and the Murray with 14' of ore.

Ore reserves: no attempt is made to block out ore and calculate reserves, but conditions are so favorable that the mill capacity was recently increased 30%.

Equipment: at the mine includes a 150-h. p. Hendrie-Bolthoff hoist, 150-h. p. Nordberg hoist, Dean duplex and Aldrich quintuplex pumps, 2 Chicago Pneumatic Tool Co.'s compressors of 1,700' capacity, and tramway from mine to mill. All machinery is electrically driven. The 50-stamp mill, cyanide plant and concentrator have a daily capacity of 400 tons.

Production: (year ending March 31)

	Tons	Value	Extr.	Oper.	Cost, p. Ton	Metal Sold—Oz.		
	Milled	Per Ton	%	Mine	Mill	Total	Silver	Gold
1916	91,981	\$18.038	92.39	\$4.61	\$4.48	\$9.59	2,106,519	20,576
1915	71,882	19.966	89.57	5.19	3.75	9.39	1,790,032	17,585

Production for the first 5 months of 1916 was 869,115 oz. silver, produced at a cost of 22.2c (after crediting gold values). The new 10-stamp unit at the mill is expected to increase earnings.

The company occupies the premier position in the Tonopah district. Mine development at depth has proven the values to be consistent; the Murray vein in particular has shown up exceptionally well; ore reserves are larger than any other Tonopah mine and the company has a large area

of undeveloped territory. Under the present capable management the outlook is bright.

TONOPAH MERGER MINING CO. NEVADA

Consolidated with Tonopah Extension Mining Co., which see.

TONOPAH MIDWAY MINING CO. NEVADA

Tonopah, Nev. **Officers:** H. C. Brougher, pres.-mgr.; R. P. Stenson, v. p.; E. J. Erickson, sec.-treas.; T. Loddie, W. Brougher, R. B. Govan, W. J. Douglass, directors; W. J. Douglass, supt.

Inc. in Ariz; reorganized, 1915, in Nevada. **Cap.**, 1,500,000 shares; \$1 par; assessable; outstanding, 1,132,096. Annual meeting, in February. Listed on San Francisco and Salt Lake Stock Exchanges.

Property: 5 patented claims, 50.58 acres, in Tonopah district, said to show silver and gold ore. The quartz vein in trachyte dips 45° and pay ore occurs in shoots. **Development:** by 2 shafts, 1,350' and 835' deep.

Operating expenses for year ending February, 1916, were \$25,788 and earnings \$11,088, all received as royalties. Developing.

TONOPAH MINING CO. OF NEVADA NEVADA

Office: 572 Bullitt Bldg., Philadelphia, Pa. Mine office: Tonopah, Nevada. **Officers:** J. S. Austin, pres.; J. Harvey Whiteman, v. p. and gen. counsel; J. E. Spurr, v. p. and advising engr.; C. A. Higbie, sec.-treas.; W. W. Charles, comptroller; with J. S. Austin, C. A. Daniel, C. R. Miller, C. A. Higbie, H. D. Moore, J. H. Whiteman, S. Bell, Jr., directors. W. H. Blackburn, mine supt.; F. F. Heydenfeldt, mill supt.

Inc. 1901, in Delaware. **Cap.**, 1,000,000 shares; \$1 par; all outstanding. Annual meeting, May. Transfer office: 572 Bullitt Bldg., Philadelphia, Pa. Registrar: Fourth Street National Bank, Philadelphia, Pa. Listed on Philadelphia and San Francisco Stock Exchanges and on New York and Boston Curbs.

Comparative General Balance Sheet: year to March 1:

Assets—

	Prop. & Equip.	Invest's	Loans & Advances	Def'd Ch'g's	Other Current	Total
1916.....	\$113,530	\$3,147,832	\$911,532	\$1,603	\$512,364	\$4,686,861
1915.....	162,970	3,104,511	566,265	1,370	929,178	4,764,294

Liabilities—

	Capital Stock	Deprec. Reserve	Net Current	Surplus	Total
1916.....	\$1,000,000	\$250,000	\$53,941	\$3,382,920	\$4,686,861
1915.....	1,000,000	50,000	64,760	3,649,534	4,764,294

Comparative Income Account: year to March 1, Tonopah Mining Co. and Desert Power & Mill Co.:

	Metal Receipts	Oper. Expense	Net Income	Income D. P. & M. Co.	Divid's & Deprec'n	P. & L. Surplus
1916.....	\$1,831,589	\$1,380,693(a)	\$783,064	\$150,629	\$1,089,678	\$3,704,259
1915.....		1,628,648(b)	925,557	124,567	1,165,234	3,860,244

Dividends: 1905, 75% of capital stock; 1906 and 1907, 120%; 1908, 50%; 1909, 130%; 1910, 150%; 1911 and 1912, 160%; 1913, 145%; 1914, 100%; 1915, 90%; total dividends paid to March, 1916, amounted to \$13,300,000. Present rate 60c per share, payable quarterly.

Property: 9 patented claims in Tonopah, Nye Co., adjoins Tonopah Extension on the east and north and Jim Butler Tonopah Mining Co. on the north. Also owns the entire stock, \$400,000, of the Desert Power & Mill Co., and controlling interest in the Tonopah & Goldfield R. R. Co., Eden Mining Co., and Tonopah Placers Co. Acquired a 2-year option on

the property of the Mizpah Extension Co., and began development work on Jan. 1, 1915. The Eden Mining Co., which see, is a Nicaragua company. Also owns \$30,000 capital stock of the Esmeralda Power Co. The company has recently acquired property in the Schist and Flin Flon lakes district in Ontario and is doing considerable diamond drill work there.

For geology of the Tonopah district, see Tonopah-Belmont Mining Co. and Tonopah Extension.

Development: to a depth of 700', chiefly through the Mizpah, Desert Queen, Silver Top and Red Plume shafts. The Mizpah shaft is bottomed at 1,500' but lateral development has not been done at depth. Yearly development work during the past few years has been at the rate of about 17,000'. Total workings aggregate 40 miles, mainly above the 650' level.

Ore Reserves: est. March 1:

	Tonnage	Value		Tonnage	Value
1913.....	200,702	\$3,062,661	1915.....	102,056	1,525,731
1914.....	172,761	2,475,795	1916.....	53,493	798,789

Mill: 100-stamp mill at Millers, Nev., 19 miles from the mine, operated under name of Desert Power & Mill Co., employs the concentrating, leaching and sliming processes. Recovery of gross contents in year ending Feb. 29, 1916, was 94% gold and 90.9% silver, a decrease of 1% gold and 0.3% silver from previous year. Recovery based on net smelter returns was 90.3%, the highest net recovery for the mill, compared with 89% the previous year. In May, 1916, recovery was 13½ oz. silver and \$3.25 gold per ton, a low record compared with 19½ oz. silver and \$4 gold per ton for the first quarter of 1916.

Production: year to March 1:

	Tons Treated	Value p. Ton	Costs Per Ton				Metal Loss	Profit p. Ton
			Mine	Mill	M'k't'g	Total		
1916	136,246	\$13.66	\$3.87	\$2.94	\$0.97	\$7.78	\$1.11	\$4.77
1915	143,432	16.25	4.40	2.96	1.15	8.51	1.23	6.51
1914	163,387	17.79	3.28	2.81	1.32	7.41	1.96	8.42
1913	173,336	18.16	3.27	2.67	1.25	7.19	1.85	9.12

Mine costs include cost of handling dump ore. Marketing costs include freight.

The productive life of the Tonopah property is nearing an end; to counteract this and to make a permanent dividend-paying organization, new properties have been acquired. There is no doubt that the plan will succeed as the management is thoroughly experienced and capable.

TONOPAH NORTH STAR TUNNEL & DEVELOPMENT CO.

NEVADA

Office: 265 Russ Bldg., San Francisco, Cal. Mine office: Tonopah, Nev. **Officers:** H. Zadig, pres.; C. D. Olney, sec.; J. W. Chandler, supt.-treas. Inc. 1912, in Nev. **Cap.,** \$1,000,000; \$1 par; assessable. Company's San Francisco office, transfer agent and registrar. Annual meeting in April. Listed on Salt Lake Stock Exchange.

Property: 5 claims, Ivanpah, Elaine, Pyramid Fraction, Crosscut and Crosscut Extension, 46 acres in Tonopah, said to show gold and silver ore. **Development:** by shaft, 1,250' deep. In 1914 lateral workings totaled about 5,000'.

Soon after reorganization the company struck a shoot which yielded some hundreds of tons of shipping ore in 1913 and 1914, but the shoot proved of limited extent and shipments declined. In 1915, the property shipped a moderate tonnage to the West End mill.

TONOPAH PLACERS CO.

COLORADO

Controlled by the Tonopah Mining Co., Tonopah, Nev., which see.

TONOPAH 76 CONSOLIDATED MINING CO. NEVADA

Address: E. Tanzey, sec.-treas., Tonopah, Nev. **Officers:** M. R. Averill, pres.; T. J. Lynch, v. p.; with W. S. Harris and L. L. Blumenthal, directors.

Inc. 1911, in Nev. **Cap.**, 1,500,000 shares; \$1 par; non-assessable; outstanding, 1,255,575. No annual meetings since July, 1913. Listed on San Francisco Stock Exchange.

Property: 5 patented claims and fractions, about 60 acres, $\frac{1}{2}$ mile W. of Tonopah. **Development:** by vertical shaft 300' deep. **Equipment:** includes a 60-h. p. electric hoist. **Prospecting.**

TONOPAH VICTOR MINING CO. NEVADA

Controlled by Tonopah Extension Mining Co., Tonopah, Nev., which see.

TOPEKA CONSOLIDATED MINING CO. COLORADO

Central City, Gilpin Co., Colo. **Officers:** at last accounts, Henry P. Lowe, pres., treas. and gen. mgr.; C. A. West, sec., with Sir Chas. Allen, Arthur Firth and M. A. Lowe, directors.

Inc. July 30, 1909, in Colorado, as successor of Topeka Mining Co. **Cap.**, \$1,000,000; shares \$5 par; nonassessable; fully issued. Annual meeting, June 30.

Property: 7 claims, patented, 16.46 acres, in the Russell district, shows schists and metamorphic gneiss, cut by 3 veins with N.-E. strike and dip of 45°. One vein of 4' average width, traceable 1,300', carries chalcocopyrite and sphalerite estimated to average 0.5% copper, 2% zinc, 2 oz. silver and \$10 gold per ton. **Development:** by shaft 1,500' deep, with a second 510' shaft and a total of 11,640' of workings, estimated to show 50,000 tons of ore. The mine was discovered 1862, and worked at intervals until 1900, when closed by litigation, until reopened Aug., 1909.

Equipment: includes steam plants, with a 250-h. p. hoist at No. 1 shaft, and a 60-h. p. hoist at No. 2 shaft. There is a 7-drill Rand Imperial 2-stage air compressor and 15 hammer drills. The mine was closed down again in 1914, leaving workmen unpaid. Reputation of management is capable of much improvement.

TORCH LAKE MINING CO. MICHIGAN

Idle. **Office:** 5-19 Exchange Place, Boston, Mass. Mine office: Leopold Bldg., Houghton Co., Mich. Thacher Loring, pres.; Chilton Cabot, sec.; F. W. Nichols, agt. **Inc.** in Michigan. **Cap.**, \$500,000; shares \$25 par; assessable. **Property:** 1,280 acres, Secs. 35 and 36, T. 56 N., R. 33 W., lying east of the Tecumseh mine of the La Salle, and about midway between Calumet and Lake Linden. The property was slightly prospected, 1899-1900, by diamond-drill borings. Reported that exploration work would be resumed in 1916.

TORRETTE GROUP. ARIZONA

Owned by Monte Cristo Mining & Milling Co., which see.

TORREON, S. A.; COMPANIA METALURGICA DE. MEXICO

Torreón, Viesca, Coahuila, Mex. **Officers:** at last accounts, Col. Carlos Gonzales, v. p.; Lic. Pragedise de la Peña, sec.; Lic. Pedro Torres Saldefia, treas.

Inc. June, 1901, in Mexico. **Cap.**, 5,000,000 pesos; shares 100 pesos par, in 1,500,000 pesos 6% preferred redeemable stock, and 3,500,000 pesos common stock. The company maintains a large cash working capital, and has been controlled by the Madero family. Profits were 629,279 pesos in 1904, and 775,285 pesos in 1906. Dividends were 20% in 1902; 18% in 1903; 14% in 1904; 12% in 1905; 12% in 1906; none in 1907 or 1908; 6% in 1909; 6% in 1910; 4% in 1914.

Property: a number of lead mines and several partly-developed copper mines, in northern Mexico. The San Diego and Buena Suerte mines at Santa Barbara, Chihuahua, produce galena and sphalerite ores, treated in a 125-ton concentrator, and employ about 250 men. Las Adargas mine. Jiménez, Chihuahua, has auriferous silver-lead ores; La Voladora and La Mitra mines, in Nuevo León, produce silver-lead ores; Las Cabrillas and Las Higueras mines, at Los Muertos, Centro, Coahuila, produce silver-lead ores and also have promising deposits of iron ore.

Smelter: of 1,250 tons rated daily capacity, is connected with all railway lines entering Torreón, treats the large production of the company's own mines and also does an extensive general custom business on gold-silver, lead and copper ores. Equipped with 10 blast furnaces, including eight 100 metric ton silver-lead stacks, and two 250-ton copper stacks, the blast furnaces using mechanical charging. There are 8 reverberatory roasters, for lead matte, the first-fusion product carrying only 10 to 15% lead, which is calcined and resmelted. The works have a converter plant of 30 tons daily capacity. Water is furnished by 3 large wells. The works employed about 600 men.

This company went through the 1907 panic in better shape than perhaps any other Mexican smelting corporation. The company is one of the most successful and well-managed mining and smelting enterprises in the republic, its success being especially interesting because the works are owned and controlled by Mexicans, who have shown their ability to compete, on even terms, with American and European mining men and financiers. Property was operated throughout 1912, but was forced to close down during the fighting that continued in this district, and has only been operated intermittently since 1914.

TORTILLITA COPPER CO.

ARIZONA

Office: room 1003, 299 Madison Ave., New York. **Western office:** care Hon. J. B. Wright, 32 No. Stone Ave., Tucson, Ariz. **Officers:** Wm. P. Michel, chairman; Robinson V. Thompson, pres.; Thos. Rowland, v. p.; Leon N. Salmon, sec.; J. W. Edward Michel, treas., with Biana Le Manna, directors.

Inc. March, 1912, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; 600,000 issued. Stock is not listed. Annual meeting in January at the Tucson office.

Company claims to have sufficient funds on hand for continuation of systematic development work during 1916. Management is in hands of the Eastern Stockholders Committee, a group of 10 stockholders, business men, who, according to their own statements, form "A Committee of Progress and Development—not Grievance". Is reported to be controlled by Cameron Holding Co. of N. Y.

Property: 17 claims, 340 acres, about 14 miles N. E. of Redrock, Pinal Co., Ariz., includes the Cloudburst and Yankee Girl mines, purchased under foreclosure in May, 1912. Property is an old-time silver producer.

Development: the "Yankee Girl" double-compartment vertical shaft, 12' wide, 440' deep, July 1, 1916, being sunk to the 500' level. Work has also been done on the 300' level.

Equipment: includes an oil driven air compressor, drills and a gasoline hoist. Management is apparently developing the property along sound lines and is in no need of outside financial assistance. The merits of the property itself can not be judged from the present limited development.

TOTTENVILLE COPPER CO.

NEW YORK

Works at Tottenville, Richmond Co., N. Y. A. Weiss, gen. mgr. Is an extensive copper refinery for the production of ingot copper and alloys.

Above information sent through Nassau Smelting & Refining Works, 603 W. 29th St., New York City. No other information available.

TOUGH OAKS GOLD MINES, LTD.

ONTARIO

(Subsidiary of Kirkland, Lake Proprietary, Ltd.) Office: 119 Finsbury Pavement, London, E. C., Eng. Mine office: Kirkland Lake, Ont. Officers: G. R. Bonnard, chairman; Maj. F. Johnson, R. Simpson, E. H. R. Trenow, directors. H. H. Johnson, cons. mgr.; C. O. Connell, mine mgr.; H. J. Almond, sec.

Inc. in England, Jan., 1914. Cap., £500,000; shares £1; 230,007 outstanding. Organized to acquire 426,388 fully paid shares of company of same name registered in Canada, with a capital of \$3,000,000 (£600,000), in \$5 shares, together with an option to January 31, 1915, on a further 85,555 shares at 15s each and 85,555 at 20s. To September 30, 1915, £44,997 cash and £30,000 in fully paid shares had been paid on account of shares of which 66,781 had been delivered, and in the annual report, December 31, 1915, it was stated that legal proceedings were in progress regarding delivery of further shares in the Canadian company. According to latest reports, although the litigation has not been terminated, the control will remain with the Canadian Company, of which C. A. Foster is president.

The financial statement for the year ending Dec. 31, 1915, shows a net profit, \$275,038; mining cost, \$101,897; milling, \$83,054; general and administrative expenses, \$48,843. During 1915, two dividends of 2½% each were paid.

Property: 5 claims, 185 acres, at Kirkland Lake, Ont., said to carry 10 distinct veins. The ore carries gold and silver values, the average for 26,196 tons milled in 1915 being \$21.04 per ton. The mill ore consists of about 75% tough porphyry and quartz with 25% softer graywacke and conglomerate. The ore carries about 1% concentrate. The gold is mostly fine with a small proportion of coarse.

Development: by 2 working shafts, greatest depth about 400'. **Equipment:** includes hoists, buildings and a 100-ton cyanide mill. Electric power is supplied by the Charlton-Englehart Power Co. In the mill, crushing is accomplished by ball and tube mills, concentrating tables remove about 1%, and the pulp is treated by Dorr counter-current decantation. Precipitation by zinc dust.

TOWNSITE EXTENSION SILVER MINES OF COBALT, LTD.

ONTARIO

Acquired by the Mining Corporation of Canada, which see.

TOY TUNGSTEN MINE

NEVADA

Mr. Beck, supt., Toy, Humboldt Co., Nev. **Property:** 6 claims known as St. Anthony mine, formerly owned by Peter and A. M. Anderson, said to show a 5' vein of 4% ore. **Development:** 100' shaft, 100' winze and an adit. A 50-ton mill, 2 miles S. E. of Toy, erected 1915, has crushers, steel ball mills and concentrating tables.

TRAIL CREEK MINING CO.

CALIFORNIA

Callahan, Calif. G. A. Foster, pres. and supt.; G. Hart, sec.

Property: 100 acres in Trail Creek, Siskiyou Co., reached by trail from Callahan. A fissure vein occurring between schist walls, dips 60° N., course N. 40° W., is said to carry an ore shoot 300' long and 2' wide. Workings consist of 850' tunnel, drifts and a stope 200' long.

Equipment: includes two Huntington mills, run by water power and several buildings. Owners claim 3,000 tons ore reserves. Production to July, 1915, \$40,000.

TRAIL SMELTER.

BRITISH COLUMBIA

Owned by Consolidated Mining & Smelting Co. of Canada, Ltd.

TRANSVAAL MINING CO. OF UTAH.**MEXICO**

Mine and works office: Cumpas, Sonora, Mex. **Officers:** Louis J. Hauck, 433 Dayton St., Cincinnati, Ohio, pres.; Percy Andraea, 1st v. p.; Theo. M. Foucar, 2nd v. p.; Alfred Vogeler, sec.-treas., with Louis Hehman, W. C. Geis, Leo G. Cloud, Bernhard Freiberg and Solon Spiro, directors. Leo G. Cloud, gen. mgr.

Inc. Dec. 19, 1908, in Utah, as a reconstruction of the Transvaal Copper Co. **Cap.**, \$6,200,000; shares \$10 par; issued 531,589½ shares. **Bonds:** \$650,000 authorized, at 6%; issued, \$597,600. Annual meeting, first Monday in March.

Property: 5,560 acres of mineral land, including a 50-acre smelter site with 75-acre townsite adjoining; La Piedra Verde ranch of 15,000 acres and an interest in the San Nicolas Tolentino ranch, 26,000 acres, including timber and grazing lands.

Geology: company's holdings cover the heart of a mountainous district showing widespread rock alteration with acid stream waters, bleached and iron-stained areas, and "chimneys" or "pipes" of silicified breccia. The tract shows granitic exposures, part of an underlying batholith, cutting recrystallized volcanic breccias, baked by contact action. In the Transvaal mines, both granite and this cover of fragmental rock are cut by irregular mineralized fractures along which orthoclase, carrying chalcopyrite, fluorite, chlorite, and calcite have been deposited by pneumalytic action. The "pipe" or "chimneys" of brecciated material cemented by quartz, are mostly barren, but in some cases, as at La Verde and Cobre Rico, contain workable copper ores. It is a peculiar type of deposit and resembles the Calumet-Copper Creek deposits of Arizona, the Kamloops mine in British Columbia and the neighboring Washington mine, 4 miles W. of the Cobre Rico property.

Extensive drilling at La Verde, or the Transvaal mine proper, has developed a great tonnage of low-grade primary ore, averaging 1¼% copper and estimated by the management at 3,000,000 or more tons, which will doubtless be treated some day by flotation methods. The drills have shown the ore to extend to a depth of 1,100'.

Development: the Cobre Rico mine has 2 shafts, No. 1 of 100' and No. 2 about 140' deep, with several tunnels and about 16,400' of workings, including diamond drilling developing several orebodies in a mass of brecciated rock, locally called trachite. Ore is estimated to average about 2% copper, 1 to 2 oz. silver and a trace of gold. Management estimates 2,500,000 tons available in this mine.

The Transvaal or Verde mine has shafts, 318' and 210' deep, former the main working shaft with about 5,000' of drift and crosscut work including several tunnels. This development has opened up considerable low-grade ore carrying chalcopyrite which can only be treated by concentration. Development near the mine by diamond-drill work has shown the existence of a large body, or bodies, of primary ore, the cores varying from a trace up to 17.85% copper and 46.8 oz. silver for 2' at 1,032' depth. About 10,000' of drill work had been done up to March, 1913, which shows that the orebody is somewhat irregular in shape and spotty in character but of fair average value.

Equipment: at the Verde shaft includes two 80-h. p. boilers, a steam hoist and air compressor. The water supply at this mine is bad, owing to its acidity. Management estimates between three to four million tons of concentrating ore available at this mine.

The Buckeye mine has about 10,000' of tunnel work, on a blanket vein of 6" to 4' thickness, showing ore reported to have given average returns

of 12% copper and 8 to 10 oz. silver, with a trace of gold. There are about 5,000 tons of high-grade ore left in the mine and a considerable amount of low-grade ore of no present commercial value. The mine, however, has been thoroughly explored in the bottom, or lower tunnel level and the ore shoot found to have played out.

The San Nicolas mine is a silver property about 8 or 10 miles from the Transvaal. It shows a vein along an igneous contact varying from 1 to 4' in width, carrying silver-lead ore said to change to copper in the lower workings. The mine is reported to have yielded 6,000 tons of 60 oz. silver ore and still has between 2,000 and 3,000 tons of 50-oz. silver ore, but is locally regarded as practically worked out, though the limited amount of development work does not disprove the downward extension of the ore shoot. It is regarded as a promising prospect, especially for lateral development.

The Ultima Chanza mine has a 300' incline shaft and a 100' winze, with about 5,000' of workings, developing a fissure vein of 10 to 42" width. The management estimates 50,000 tons of ore in sight, averaging 10% copper, 5 oz. silver and a trace of gold. This property is a good, but small mine, needing further development. Equipment includes a steam plant and hoist.

The Guadalupe mine carries cupriferous iron ore, used for flux.

The nearest rail station is at Nacozari, 30 miles north, but the Cananea, Rio Yaqui y Pacifico railway has surveyed a line to within 9 miles of the smelter. The company has built about 35 miles of wagon roads and 25 miles of trails at a cost of \$50,000, with a maintenance charge of about \$5,000 yearly.

The main camp is at La Verde, 25 miles S. W. of Cumpas, where mining operations are centered. There are 20 buildings, including 3 power plants, machine shop, carpenter shop, smithies at the principal mines, 2 laboratories, a boarding house, general store, with a branch store at the smelter, a hospital, and several dwellings. The company has a telephone system, costing about \$5,000.

Smelter: at Cumpas, at an average distance of about 25 miles from the mines, was located at that point because of a good site and ample water supply, both lacking at the mines. Equipment includes a 125-ton 42x120" El Paso Foundry & Machine Works water-jacket blast furnace, with room for 2 additional furnaces of the same size. There is a reverberatory furnace, variously rated by the company as of 20 to 50 tons daily capacity, and the works have a sampling mill, capable of sampling ore to feed 3 furnaces. The smelter power plant includes three 80-h. p. Babcock & Wilcox boilers, an Allis-Chalmers tandem-compound engine and a Connersville blower. This smelter was blown in, May 1, 1906, treating ores from the Buckeye and San Nicolás mines and doing a little custom business, producing matte shipped to the Laurel Hill works of the Nichols Copper Co., that was reported by the company as averaging 37%-40% copper, 100-140 oz. silver and 0.1-0.5 oz. gold per ton. The smelter was blown out, Oct., 1907, and has been idle since.

From May 1, 1906, to Nov. 3, 1907, a period of 18 months, the smelter, in operation about two-thirds of the time owing to scarcity of freighting outfits, smelted 18,550 tons of ore having an average assay tenor of about 10% copper and 8 oz. silver for copper ore, and 2% copper and 60 oz. silver for silver ore, making 3,089 tons of matte, yielding 2,178,855 lbs. fine copper, 407,607 oz. silver and 240 oz. gold.

The extensive development work done on the property since 1909, shows the existence of small veins of rich ore and large deposits of low-grade ore. The property is a valuable one and will be worked on a large

scale when given the rail connections now lacking, but absolutely essential to the successful exploitation of the ores.

TREASURE MINING CO.**CALIFORNIA**

Office: 575 Mills Bldg., San Francisco. Mine office, Amador City, Calif. **Officers:** W. Rothchild, pres.; E. J. McCutcheon, v. p.; E. S. McCurdy, sec.-treas., with H. G. Stevenson, G. W. McEnerney, directors. J. H. Bell, supt.

Property: one claim, near Amador City, Amador Co., said to show a gold quartz vein in schist with dip 45° to 55° and N. W. strike. **Development:** by 50° incline shaft, 1,650' deep, with levels at 375', 810', 1,000' and 1,600'.

Developing and building mill containing ball and Hardinge mills.

TREMONT & DEVON MINING CO., LTD.**MICHIGAN**

Office: First National Bank Bldg., Hancock, Mich. Mine at Victoria, Ontonagon Co., Mich. **Officers:** H. L. Baer, pres.; Fred H. Begole, v. p.; Chas. D. Hanchette, sec.-treas., with Jos. Bosch, Jas. B. Cooper, W. M. Gibson and Robt. T. Dunstan, directors.

Inc., Dec., 1908, in Michigan. Cap., \$250,000; shares \$25 par; 4,000 issued; two 10-ct. assessments levied to date.

Property: 680 acres, freehold, including the old Tremont and Devon mines, adjoining and directly W. of the Victoria, carrying about 1¼ miles of the strike of the Keweenawan copper formation, and apparently in the horizon of the western extension of the Lake bed. The Victoria has a vein of some promise, outcropping about one-half mile from the Tremont & Devon line. A little work was done, in olden days, on shallow shafts near the center of the property, from which rock was taken, said to have yielded 500 lbs. fine copper per fathom of ground broken, which was better than 25 lbs. of finished copper per ton.

In Feb., 1916, the E. J. Longyear Co. began diamond drilling. Three holes were put down; the first cut an unidentified lode lying above the Forrest lode; the third is said to have shown good values in the Victoria lode.

TRENCH CONSOLIDATED MINES CO.**ARIZONA**

Address: Chas. Clark, Jerome, pres.; John Hoy, mgr. **Property:** also known as the Farrel mine, is near Patagonia and Harshaw, Santa Cruz Co., Ariz. The mines were acquired in 1913 by Senator W. A. Clark at a price said to be \$250,000. A 500' shaft being sunk 1915-16.

TRENTON-SONORA MINING CO.**MEXICO**

Mine Office: Tarachi, Sonora, Mex. L. Laurent, mgr., at last accounts. **Property:** 4 miles S. of La Calera, includes the San José, Santa Eduvigis, El Porvenir and other mines, carrying copper ores, with values mainly in silver. The San José mine is reported to show an 18" paystreak of highly auriferous chalcoppyrite. **Development:** by a 200' shaft, sunk on the vein, equipped with a hoist. There is a mill and a smelter. Probably idle owing to Mexican revolution.

TRES SEÑORES MINING CO.**MEXICO**

Mine: at San Pedro Ocampo, Zacatecas, Mex. **Property:** includes La Providencia and La Poderosa mines, near San Pedro Ocampo, yielding ores that have given smelter returns of 10% copper, 3,234 grams silver and 120 grams gold per metric ton. **Property:** closed down.

TRETWEWEY SILVER COBALT MINE, LTD.**ONTARIO**

Office: 1428 Traders Bank Bldg., Toronto. Mine office, Cobalt, Ont., Can. **Officers:** Alex. M. Hay, pres.; S. R. Wickett, v. p.; L. J. Pashler, sec. and treas., with W. J. Sheppard, J. D. Tudhope, G. Taylor, T. E. Leathers, directors; H. S. Robinson, mgr.

Inc., 1906, in Ontario. **Cap.**, \$2,000,000; shares, par \$1; non-assessable; outstanding, \$1,000,000. No bond issues. Annual meeting, February. Toronto General Trust Corporation, transfer office. C. E. Robinson, registrar. Listed on New York Curb.

No financial statement for 1915 is available, operations having been suspended for most of the year owing to the low price of silver. For the year ending December 31, 1914, gross earnings were \$254,190, of which \$251,843 was realized from sales of ore; operating expenses were \$179,512.

Dividends: total 108% of outstanding capital stock. Last dividend of 5%, paid July, 1914.

Condensed Balance Sheet: December 31, 1914, shows assets, \$1,158,795, with liabilities as follows: cap. stock, \$1,000,000; accts. payable, \$15,762; credit of rev., \$143,033.

Property: one patented claim, 40 acres, Coleman township, Cobalt district; also owns control in Rochester Mines, Ltd., of Cobalt. Ore deposits yield silver and cobalt and occur between conglomerate and diabase. Pay ore occurs in shoots. Average of all ore milled in 1914 gave 18.9 oz. silver.

Development: by vertical shaft, greatest depth about 230' and total linear extent of workings 23,836'. **Reserves:** blocked out, 19,000 tons, and total reserves, 23,011 tons, estimated to contain 529,691 oz. silver.

Equipment: compressors, hoists and other necessary mining machinery besides a 30-stamp concentrating mill with a capacity of 100 tons daily.

Total output to date, about 5,000,000 oz. silver.

Company spent \$17,634. during 1914, in prospecting other properties. Operates under lease the Rochester mine at Cobalt, the Rochester to get 20% of the net profits.

Reports in the Spring of 1916 announce early resumption of operations, due to improved price of silver, also the probable adoption of flotation for treatment of slime dumps.

TRIANGLE MINING & DEVELOPMENT CO. MONTANA

Office: 8 Allen Blk., Missoula, Mont. Mine office: Clinton, Missoula Co., Mont. **Officers:** R. B. Hughes, pres. and gen. mgr; Oliver Blood, v. p.; H. Y. Gephart, sec.-treas., with David C. Smith, E. C. Mulroney, and Geo. E. Sullinger, directors; Henry E. Kuphal, engr.

Inc., Aug. 25, 1906, in Montana. **Cap.**, \$500,000; increased later to \$1,200,000; shares \$1 par, nonassessable; issued \$662,808. Debentures, \$150,000 6%, \$37,900 issued. Annual meeting, third Monday in February.

Property: 13 claims, 10 unpatented, 250 acres, well-watered and partly timbered in the Wallace district, 2½ miles from a railway, in 3 groups, known as the Triangle group of 8 claims, and the Hill group of 5 claims, 2 miles N. E. of Clinton and 17 miles E. of Missoula. The company also owns land in the town of Clinton.

The claims contain fissure veins cutting granite and altered sedimentary rocks near the contact with a large batholith of granite. The veins show chalcopyrite and bornite associated with hematite, siderite, and quartz in altered granite. The Triangle group shows a 16' vein, opened by a 540' tunnel with back of 450'. At the face the vein is 14' wide and assays 2% copper, ½ oz. silver and 40 cts. gold, while an 8" streak averages 15.04% copper, 3.20 oz. silver and .24 oz. gold, and a 4' footwall streak averages 4.65% copper, 1.2 oz. silver and 80 cts. gold.

Development: by a 140' crosscut and 540' drift tunnels and 40' shaft, estimated to block out 25,000 tons ore. The Grass Widow claim has 513' of crosscutting and 300', 75' and 100' drifts. The Hill group has a 300' drift tunnel.

Equipment: includes a 40-h. p. boiler and an Ingersoll-Rand air compressor, besides several mine buildings. Idle.

TRI-BULLION SM. & DEV. CO. ARIZONA & NEW MEXICO

Office: 10 Wall St., New York. Mine office: Kelly, Socorro Co., N. M.

Officers: Judson G. Wall, pres.; Chester E. Gleason, v. p.; J. D. Thompson, treas.; J. R. Gemmill, sec.; preceding with H. H. Barnes, C. P. Brown, H. V. M. Dennis, Jr., J. M. Henderson, W. D. Johnston, A. J. Smith, Howard Paschal and Gustavus Taylor, directors; Geo. E. Farish, cons. engr.

Inc., 1903, in Arizona. Cap., \$5,250,000; shares \$5 par; in 50,000 participating; cumulative 4% stock with 1,000,000 common; issued 6,700 shares preferred and 999,900 shares common. Listed on New York Curb. Empire Trust Co., New York, transfer office.

Property: includes the Kelly mine, for many years the company's principal asset, which is a zinc, lead and copper producer in New Mexico, operated since May 1, 1915, under lease by Ozark Smelting & Mng. Co. It is 2½ miles from Magdalena on the Santa Fe R. R. Also owns the Starlight group of copper claims in Arizona and a 150-acre group of gold-silver claims in the Pipestone district, Jefferson county, Mont. The Montana property has about 800' of shaft work but is idle save for annual assessment requirements.

The Kelly mine, Elmer Pfouts, supt., 350 acres, patented, is said to show veins of ore yielding lead and zinc carbonates in the upper workings, running from 25 to 30% lead with small silver values and 25 to 40% zinc. The sulphide ores occurring in depth, give average smelter returns of 25 to 35% zinc, 12 to 15% lead, ½ to 2% copper and 6 to 8 oz. silver per ton. **Development:** includes the 400' Traylor shaft and a 365' accessory shaft.

The Starlight group of 12 patented copper and lead claims, in Godless gulch, in the Stanley Butte district, 8 miles S. of the San Carlos Indian agency, was discovered 1886, but not opened until 1903, because it was a part of the San Carlos Indian Reservation, previous to its segregation in 1901. This property shows quartzite, granite and limestone, with short veins, carrying replacement deposits, of 3' estimated average width, holding oxidized ores, estimated by company to average 8% copper, 40% lead, 10 oz. silver and \$3.50 gold per ton. The ore being low in silica, and rich in lime and iron, is self-fluxing. Development is mainly by 3,000' of crosscut tunnels exposing low-grade orebodies. Reported in May, 1916, that development would be resumed and machinery added, with John E. Penberthy in charge.

The Nit and Silver Bell groups were acquired in 1912. The Nit mine, adjoining the Graphic, has an underground connection with the Waldo mine of the Ozark Smelting & Milling Co. The workings of this mine disclose a 50' vein of 4.7 to 6% copper ore, 454' E. of the 215' shaft, in a crosscut from the bottom of a 45' winze sunk from the bottom level.

The Kelly mine has a power house with three 150-h. p. boilers, a large first-motion hoist, 15-drill air compressor, electric pumps and electric light plant. An aerial tram connects the Paschal and Grand Tower (or Legal Tender) shafts.

The 100-ton concentrating mill includes a 75-ton magnetic plant equipped with roasters and Ding electric separators for parting the zinc and iron sulphides. This plant has been in successful operation for several years.

The Kelly mine was reported, 1914, to be practically worked out and the operations from Nov., 1912, to July 7, 1913, resulting in a loss and consequent debt of over \$30,000, the mine was shut down on the latter date.

Since the Ozark Sm. & Mng. Co. took a lease on the Kelly mine, it has uncovered a fine body of zinc-copper ore in new-ground, exposing 50,000 tons of ore. The Ozark Co., a subsidiary of the Sherwin-Williams paint manufacturers, owns and operates a 200-ton mill with flotation equipment.

The Tri-Bullion Co. suffered a loss of over \$32,000 from embezzlement by its former treasurer, 1913-15.

Property now in good hands, and with an able consulting engineer has a promising future.

TRIMOUNTAIN MINING CO.

MICHIGAN

Office: 82 Devonshire St., Boston, Mass. Mine office: Trimountain, Houghton Co., Mich. **Officers:** Wm. A. Paine, pres.; Frederic Stanwood, sec.-treas.; Frederick W. Denton, gen. mgr.; preceding with Chas. A. Snow, F. W. Paine and John R. Stanton, directors; John Jolly, supt.; Edw. Koepel, mill supt.; H. T. Mercer, engr.; Benj. D. Noetzel, clerk; Richard Bowden, mg. capt.; Wm. J. Richards, master mechanic.

Inc., 1899, in Michigan. **Cap.,** \$2,500,000; shares \$25 par; paid in \$20; \$1,200,000 issued. In controlled, through ownership of 99,353 shares, by Copper Range Co. Old Colony Trust Co., Boston, registrar. Annual meeting, second Wednesday in May.

Dividends: \$3 in 1903, \$5 in 1908, \$1.50 in 1910, \$3 in 1912, and \$2 in 1913.

Balance of assets Jan. 1, 1916, \$1,244,082, including \$513,558 cash and copper on hand amounting to \$207,974. Liabilities amounted to \$85,938, leaving a surplus of \$1,158,144 for the year.

Property: 1,120 acres, the E. $\frac{1}{2}$ of Sec. 19, W. $\frac{1}{2}$ of Sec. 20, N. $\frac{1}{2}$ of Sec. 29, and N.-E. $\frac{1}{4}$ of Sec. 30, all in T. 54 N., R. 34 W. The Baltic mine lies to the N. and the Champion to the S., with undeveloped lands to the E. and W.

Owing to a very heavy sand overburden the mine was opened by drop-shafts sunk through alluvium, with raises to surface on the angle of the dip of the stratified formation. The Baltic bed runs 15 to 50', with an average width of 25', on the Trimountain property. Heavy copper is found near the walls, and masses upwards of a ton in weight have been found, but values occur mainly disseminated in stamp rock.

The Trimountain shafts enter lean streaks or shoots, sometimes 500' in horizontal length, with flat northerly pitch or rake, underlain by copper ore. Lying parallel with and about 65' W. from the Baltic bed, is a wide amygdaloid, carrying some heavy copper and considerable stamp rock. This bed has not yet been worked, but may be made available for production at some time in the future. The great width of the lode has led to a dry-wall-ing with waste rock, which is used also for building underground chutes, which are roughly circular, with inner diameter of about 5' and are filled about with waste, as stopes are carried upward, the chutes being built at a sharp pitch, the wedging of the surrounding waste rock serving to hold the walls immovable. The saving in timbering brought about by dry-wall-ing and building chutes of mine rock is very great.

Development: No. 1 shaft, 210' north of the Champion boundary line, is sunk at an angle of 68°, with 1st level opened 168' below the collar, levels thereafter at 100' intervals. The upper levels tributary to No. 1 shaft have been worked out, and the shaft abandoned at depth of 2,284'. It now serves as a waste sand chute.

No. 2 shaft, 1,023' N. E. of No. 1, was 3,859' deep at the end of 1915, and a considerable improvement has been noted in ground below the 14th level, with the bottom levels the best opened in this shaft. The shaft rock house,

has 2,000-ton rock bins, and is equipped with an engine, steam hammer and two crushers. Rock is raised by a 2,500-h. p. Nordberg direct-connected duplex hoist, with double-conical drum of 18' maximum diameter, capable of raising 6-ton skips from 1 mile depth.

No. 3 shaft, 1,027' N. E. of No. 2, sunk at an angle of 68°, was 2,563' deep at the end of 1915. Beneath 60' of sand, the rock was found to be badly fractured and barren down to the 2nd level, only becoming solid and payable below the 14th level.

No. 4 shaft, the northernmost, 2,548' deep at the end of 1915, is the best shaft of the mine.

Equipment: the mine buildings near shafts Nos. 2 and 3, include machine and carpenter shops, smithy and warehouse. There is a 35-drill Rand air compressor at No. 2 shaft, with a Deane condensing plant in a separate building. The power plant at No. 3 shaft includes a battery of Stirling water-tube boilers and a 4,500' Nordberg air compressor. The mine has electric pumps and works about 60 drills. The property is served by the main line of the Copper Range railway, which reaches all the shafts and principal shops.

The mine property has macadamized roads, a large boarding house, upwards of 100 dwellings, general store, hospital and a nurses' home.

Mill: The mill, at Beacon Hill, 2 miles west of Redridge, occupies a 100-acre mill site having about 2 miles of frontage on Lake Superior. It has 4 steeple-compound Nordberg stamps. Complementary machinery for each stamp includes crushing rolls, 36 improved Hodge jigs, 6 slime tables and 1 Wilfley table. Tailing losses, originally as high as 0.50 to 0.65%, have been reduced to 0.26%, by the installation of regrinding rolls and settling tanks. The mill is also equipped with regrinding machinery, including Hardinge mills, for treating the richer portions of the mill tailings, has a 300-h. p. engine, and a small but complete machine shop on the second floor.

The mill boiler house has six 250-h. p. and two 200-h. p. Stirling boilers, the latter maintaining a steam pressure of 180 to 200 lbs. per sq. inch.

The pump house at the mill has a 20,000,000-gal. Nordberg pump, taking water from a well connected with a tunnel running 1,960' to an intake crib in Lake Superior.

Production was begun Jan. 4, 1902, with 1 leased head at the Arcadian mill. The Trimountain began production with a return of 37 lbs. fine copper per ton, but fell off later to 27 lbs., and, when the present management secured control, the production fell sharply to 18 lbs. fine copper per ton.

	Rock Stamped Tons	Copper Produced, Lbs.	Yield per Ton, Lbs.	Cost, c. per Lb.	Price, c. Rec.	Net Profits
1915.....	349,684	8,302,896	23.75	09.53	17.40	\$ 654,746
1914.....	277,251	5,048,306	18.21	12.21	13.38	58,639
1913.....	229,149	4,990,938	21.78	12.62	14.89	113,363
1912.....	366,663	6,980,713	19.04	11.73	16.16	308,472
1911.....	347,885	6,120,417	17.59	11.55	12.54	60,370
1910.....	317,299	5,694,868	17.95	12.17	12.74	32,250
1909.....	323,408	5,282,404	16.33	13.89	13.00	(d) 47,841
1908.....	334,929	6,034,908	18.00	12.69	13.39	41,842
1907.....	444,358	8,190,711	18.43	12.63	17.28	380,302
1906.....	506,924	9,507,933	18.76	12.16	18.85	635,508
-	3,497,550	66,154,094	18.90	12.01	15.39	\$2,237,655

(d) Deficit.

TRINIDAD MINING & SMELTING CO.**WASHINGTON**

Office: Tonasket, Wash. **Officers:** Jos. Coleman, pres.-mgr.; T. W. Brown, v. p.-sec.; E. H. Twight, treas.; T. W. Brown, supt.

Inc., Dec. 1, 1911, in Washington. **Cap.,** \$1,000,000; shares, \$1 par; 703,700 issued.

Property: the Central group, 16 unpatented claims, 320 acres in the Galena mining district, Okanogan Co., shows gold and silver-bearing lead-copper ores, occurring as a dissemination in andesite. **Development:** to depth of 150', consists of shaft, tunnel, trenchings and open cuts, with a total of 700' of underground workings. Average assays said to run from \$12 to \$30 for shipping ores and from \$2 to \$8 for low-grade ore. Property is owned and operated by the officers of the company.

TRINITY COPPER CO.**CALIFORNIA**

Office: 33 State St., Boston, Mass. Mine office: Kennett, Shasta Co., Calif. **Officers:** Thos. W. Lawson, pres.; Arnold Lawson, v. p.; Homer Albers, sec.; Allen Arnold, treas.; F. M. Leland, gen. mgr.; preceding with Arthur P. French, John N. Reynolds, John R. Turner, E. A. McSweeney, directors.

Inc., Oct. 18, 1900, in New Jersey. **Cap.,** \$6,000,000; shares \$25 par; 240,000 shares outstanding. International Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Shares listed on Boston Stock Exchange and on the New York Curb. Federal Trust Co., Boston, transfer office.

Balance sheet as of Sept. 1, 1915, shows assets: mining claims, \$5,221,000; mine development, construction and interest account, \$705,810; expenses, \$208,383; Railway and Power Co., \$36,500; cash, \$925; total, \$6,172,618. Liabilities: capital stock, \$6,000,000; American Smelting contract payable in ore, \$28,547; ore account, \$39,471; accounts payable, \$104,600; total \$6,172,618.

Property: 1,700 acres, also a patented town site, near Kennett, with total holdings of 3,233 acres. Property includes the Shasta King, which is the principal mine, the Lost Desert and King Copper groups.

The Shasta King group, 12 claims, adjoins the Balaklala mine, on the southern fork of Squaw creek, 4 miles east of Iron mountain. The main double track tunnel is 1,145' long; there is another tunnel driven 175' vertically lower. The mine has 15,000' of workings and property has been tested by 5,119' of diamond-drill borings. The orebody is a lens, claimed to be approximately 150' wide by 1,000' long, but apparently the ore does not go to great depth, and it is possible that the bottom limits have been reached. The property is said to have ore reserves of 400,000 tons, with fair chances of 750,000 tons, and possibilities of a greater tonnage. The cross-cut tunnels, driven in from the sides of the mountain, connect with drifts on the orebody, which is low-grade pyritic ore containing disseminated chalcopyrite, and holding 1 to 2½% copper, with combined gold and silver values of about \$1 per ton. The ore carries small quantities of zinc and an excess of iron, and probably averages around 2½% copper and 1 oz. silver per ton, with small gold values. The Trinity also has an orebody, of undetermined size, on the opposite side of the gulch from the Shasta King.

The Shasta King mine has ore bins, and a 2,000' incline tram, of about 500 tons daily capacity, leading to the head house of the Balaklala tramway. The Copper King group of 22 claims, on Motion creek, about 2½ miles S. of the Shasta King mine, has about 1,000' of exploratory workings, but apparently no ore has been found in place. The Statesman group has been partially explored, in an effort to locate and develop silicious ores required for fluxing the heavy sulphide ores of the Shasta King mine. The Uncle

Sam group, held under bond and lease at last accounts, also has been explored for fluxing ores, the Shasta King having large bodies of low-grade copper sulphide, but lacking the silicious ores required to make free-smelting furnace mixtures. The Uncle Sam group shows some oxidized ore, at and near surface, of 3 to 8% copper tenor.

Equipment includes a steam plant with 6-drill air compressor and power drills; also a diamond drill, with which considerable boring has been done. Buildings include a laboratory, warehouse, shops, hospital and about 25 houses for employes.

The company was reported to be ready for production Sept., 1907, at the rate of about 150 tons daily, but none of the ore reached the smelter. Management started production Oct., 1908, and shipped ore to the Balaklala smelter, but closed down early, 1909, and no record of the actual production of copper can be secured. The Trinity Co. claimed to have a contract with the Balaklala smelter calling for the treatment of 300,000 tons of ore for the first year and 360,000 yearly for the 9 succeeding years; with a minimum of 300 and maximum of 1,000 tons daily, which was to have been matted for \$3 per ton, but the contract was not carried out, and the mine has been closed down since Feb., 1909, waiting first for 15 ct. copper and now for the Balaklala smelter to resume operations. For history of the company, see Vol. X, Copper Handbook.

President Lawson stated, at the annual meeting, 1913, that Trinity's day will come and that the property's decriers will be forced to "eat their boru-of-ignorance criticisms." His statement was in part as follows: "Trinity is still awaiting the resumption of First National-Balaklala smelting operations, and if these efforts are successful, the unbroken chain of Trinity's misfortunes should be at an end. Mining operations were entirely suspended during the year, but mine workings, machinery, buildings, roads and fire-protection apparatus have been maintained with a minimum of depreciation, considering the adverse conditions of a shutdown in a rugged, mountainous country, so that ore extraction may commence economically at short notice."

TRINITY GOLD MINING & REDUCTION CO. CALIFORNIA

Office: 654 W. 51st St., New York. **Mine office:** Carrville, Trinity Co., Calif. **Officers:** at last accounts, Henry W. Miller, pres.; Archibald Nesbitt, v. p.; James H. Lee, sec.-treas.

Inc. Feb., 1909, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; issued, \$969,220. Lincoln Trust Co., New York, registrar. Annual meeting, second Tuesday in January.

Property: 498 acres, 323 patented, including the Headlight mine, in Trinity Center district, 1½ miles S. E. of Carrville. Company also owns 115 acres timber land. The mine has an orebody forming a flat shoot 40' thick but containing large dikes of disintegrated porphyry which did not show at the surface, so that the ore reserves reported by engineers do not exist and the oxidized ore has been worked out. A new orebody, found 1912, in another part of the property, is said to have developed 100,000 tons of ore, carrying ½ to 2% copper, 47% sulphur and about \$4.50 in gold and silver. This orebody has been proved by diamond drilling and by a 200' crosscut.

Equipment: includes a complete power plant, stamp mill and concentrator, which in 1912 treated 47,600 tons of ore with a recovery of 81.88% at a cost of \$1.01 per ton. Mining costs were \$1.43 and the ore assayed \$4.36 per ton. Property was idle in 1914 and management was experimenting with a wet process for the treatment of the sulphide ore, as it cannot be roasted owing to the Government Forestry restrictions. Nothing has been reported since and the management has ignored all requests for information.

TROJAN MINING CO.**SOUTH DAKOTA**

Office: Deadwood. Mine office, Trojan, S. D. **Officers:** H. W. Seamon, pres.; G. M. Curtis, v. p.; F. M. Clark, sec.; H. S. Vincent, mgr.; above are the directors.

Inc. 1911 in S. D. **Cap.**, 3,000,000 shares; par \$1; nonassessable; outstanding, \$1,000,000. Annual meeting, June.

The company publishes no financial reports.

Property: 157 patented claims, 1,000 acres, at Trojan, Lawrence Co. Deposit is a flat blanket body between sandstones and slates and yields gold and silver.

Equipment: 100-h. p. electric hoists, capacity 5,000'; 600 cu. ft. compressor and 2 gasoline locomotives. Mill equipment is for cyaniding. Capacity 400 tons daily. Crushing is by Chilian and tube mills.

Production: stated to be 315,000 tons to date, part of which was shipped directly to smelters and the rest milled.

TROY ARIZONA COPPER CO.**ARIZONA**

Address: A. K. Sloan, sec.-treas., 15 Maiden Lane, New York City. **Officers:** John F. Galvin, pres.; Calvin Page, v. p.; Brackley Shaw and H. C. Rogers, directors. Leo Von Rosenberg, engr. in charge of mine.

Cap., \$3,000,000; shares \$10 par. Company is a reconstruction of the old Troy Copper Co., succeeded by Troy-Manhattan C. Co., which in turn was succeeded by the Troy Consolidated Mining Co., fully described in Vol. IX, Copper Handbook. Operations of all these "Troy" companies proved disappointing. Stock offered, 1916, at \$5 per share by Boston brokers, prior to listing on Boston Curb.

Property: 85 claims, 1,600 acres, 3½ miles N. E. of Erman, on the Arizona Eastern R. R., known as Troy, Climax and Manhattan groups. The Troy group said to have 12 and Manhattan group 6 veins. **Development:** reported to aggregate over 5 miles, including several shafts, deepest 500'. Company's engineer states that while a large tonnage of ore is not blocked out, yet with a moderate amount of work several hundred thousand tons could readily be made available.

TUCKER MINING & MILLING CO., LTD.**IDAHO**

Office: Gem, Idaho. Mine near Mullan, Shoshone Co., Idaho. Peter Bahn, pres.-gen. mgr.; J. Pearson, v. p.; W. Turner, sec.-treas.; above are directors.

Inc. March, 1907, in Idaho. **Cap.**, \$1,000,000; shares \$1 par; assessable; issued, \$700,000; given in exchange for the property. Annual meeting, second Saturday in April.

Property: 6 claims, unpatented, 120 acres, in the Hunter district, 3 miles E. of the Snowstorm, shows Revett quartzite, cut by a diabase dike with veins, 1 to 4' in surface width, said to carry copper-gold-silver ore. Average assays said to run \$8 silver, \$1 gold, with small copper values.

Development: by a 1,200' tunnel, shows a 4' vein, 85' from the portal, carrying low-grade copper and lead ore, and another vein, about 300' from the portal with stringers of high-grade copper ore carrying silver. Present work consists of crosscutting the ledge every 200'.

Equipment: includes an hydraulic installation of about 100-h. p.

TUCSON CONSOLIDATED COPPER CO.**ARIZONA**

Office: 511 Chamber of Commerce, Milwaukee, Wis. Mine office: Tucson, Pima Co., Ariz. **Officers:** J. H. Wussow, pres.; Dr. M. A. Brandt, v. p.; F. J. Rodee, sec., Tucson; C. W. Schneider, treas.; Hon. Fred W. Fickett, gen. mgr.; preceding officers, J. G. Albright, C. F. Freeman, P. P. Donohue, A. Ballantine, R. L. Bennett and S. W. Purcell, directors.

Inc. April 15, 1907, in Arizona. **Cap.**, \$3,000,000; shares \$1 par; non-assessable; in one-half full paid and one-half common stock; issued, \$1,500,000. Annual meeting, third Monday in March.

Property: formerly 103 claims, now 81 claims, unpatented, in 4 groups, 1,620 acres, in the Papago district. The property of the Old Pueblo Mining & Milling Co., 9 claims, is held by this company under an option calling for 51% of stock on completion of \$50,000 worth of work. Presumably includes Purcell Grand Cons. Mng. Co. property.

The 4 groups are 8 miles W. of Twin Buttes and 35 miles W. of Tucson. Claims show granite-porphry and limestone, with fissure veins and contact deposits, 5 being under development. The largest deposit is described as a chimney in limestone, about 55x150' in size. The groups as a whole have 3,800' of workings, mostly tunnels, longest 800', but including 10 shafts, deepest 525'. Ore is said to give assays of 6 to 30% copper, 12 to 80% lead, 3 to 125 oz. silver and 80 cts. to \$30 gold per ton, from azurite, chalcocite, chalcopyrite and galena. The reserves were estimated at 500,000 tons ore blocked out for stoping, which estimate is regarded as excessive.

The **Purcell** group of 16 claims, 3 fractional, 275 acres, shows 3 approximately parallel mineral zones, developed by a 96' shaft and a 200' tunnel, estimated by the company to give assays of 15% copper, 20 oz. silver and \$1.50 gold per ton.

The **Bolello** group of 9 claims, 180 acres, 2 miles S. of the Purcell, has basic granite, with frequent quartz-porphry intrusions, showing 3 copper veins, slightly developed, carrying ore that has given assays up to 24% copper, with gold and silver values.

The **Black Dyke** group of 48 claims, 960 acres, is W. of and about 3 miles N. from the Purcell group, constituting a parallelogram 3,600' wide and 12,000' long, showing strong iron outcrops, with favorable indications, having a number of shallow shafts, showing copper ore of 4 to 25% copper tenor, and silver-lead ore assaying up to 69% lead and 139 oz. silver per ton. This group has little development, but appears promising.

Equipment: includes a 250-h. p. steam plant, burning petroleum, with 2 hoists, and there are 6 buildings, including 2 general stores.

The **Old Pueblo Mining & Milling Co.'s** property consists of 9 claims, 5 miles W. of Tucson, developed by the 517' Quien Sabe shaft and a tunnel. A 70' shaft cut, at depth of 30', a 15-ton pocket of chalcocite, assaying 33% copper, 16 oz. silver and \$2.50 gold per ton.

The reports by Wishon, 1908, and Attix, 1903, issued by the company are so old, one wonders why this "sure thing" mine has been so long idle, and what work, if any, has been done in the past 8 years.

TUCSON MINE.

COLORADO

George O. Argall, mgr., Leadville, Colo. See Iron Silver Mining Co.

TULAROSA COPPER CO.

NEW MEXICO

Office: Tularosa, N. M. **Mine office:** Bent, Otero Co., N. M. **Officers:** F. P. Kern, pres.; A. J. Merrill, Geo. B. Bent, secretaries; J. M. Beaty and P. M. Lynch, directors; W. Roland Cox, cons. engr.; Geo. F. Harley, gen. mgr.

Inc. March 5, 1905, in New Mexico, as successor of Tularosa Mining & Milling Co. **Cap.**, \$5,000,000; shares \$5 par; issued, \$3,125,000. Stock listed on New York curb. Registrar & Transfer Co., New York, transfer office.

Property: 807 acres, 307 acres patented, at Bent, on the Tularosa river. Mine is 12 miles N. E. of Tularosa on the E. P. & S. W. R. R., about 100 miles N. E. of El Paso, Texas.

Geology: the property is underlaid by a flat sheet of diorite resting on

quartzite and covered in general by the basalt sandstone of the Red Beds of the region. This diorite outcrops at the Virginia mine, as the company's workings are called, and dips gently in every direction away from this point. The ore is found in the uppermost part of the diorite, which is much altered to a depth of 35 to 55' below its surface. This ore bed shows lenses of glance, 2 to 18" wide, running in all directions, which together with stringers and veinlets of ore, make a stockwork proved to be ore-bearing over an area 200' wide and about 1,200' long. The altered rock between the lenses also carries disseminated copper glance and the ore as a whole averages $2\frac{1}{2}\%$ copper; 30 to 55' below the diorite surface, the rock is fresh except along fractures; stringers of ore occur, however, at depths of several hundred feet.

Development: at the Virginia mine there is an open pit 60x120' across and 35' deep which is opened on the richest part of the deposit. The 1st level corresponds to the bottom of the pit; the 2nd level is 25' deeper. These workings are said to block out 85,398 tons of ore in an area of 105x180' in extent. Twelve diamond-drill holes from 88 to 400' deep prospect the ground, and the results form the basis for an estimate of 800,000 tons of indicated ore of an average value of $2\frac{1}{2}\%$ copper.

Property was to be drilled in 100' squares and the limits of the orebody fully determined. One drill hole encountered 136' of ore at a depth of 300'.

Equipment: includes a 12,000' power ditch with hydro-electric plant, consisting of Platt-Francis turbine, alternating-current generator and complete electrically-driven concentrating plant.

The mill was remodeled and enlarged to 300 tons capacity in 1912, new rolls, a hydraulic classifier, another Wilfley table and 5 No. 3 Deister slime tables being added under the supervision of Godfrey D. Doveton. It is said that about 7,000 tons of ore was run through the 30-ton experimental plant in the 4 years ending July 1, 1910, giving a return of 221,230 lbs. fine copper, a net return of almost exactly 1.5% copper. The mill put 15 into 1, giving concentrates said to average 37% in copper tenor, with about 1 oz. silver per unit of copper, but the figures indicate 25% copper tenor for concentrates, if made at the ratio named.

Compared with other deposits of similar character, this one is small and the ore bed thin, averaging perhaps 35', while the ore reserves are not large enough to compare with those of any of the copper porphyries. The property does not warrant a large mill.

There seems to be no reason why the orebody should not extend over a greater area, or another one be found, and a drilling campaign may result in such an extension being found. The new parties in control have had wide experience in mining and possess ample means to test the property thoroughly. All work was suspended in 1914.

TULLOCH GOLD & COPPER CO.

NEW MEXICO

Silver City, Grant Co., N. M. D. H. Tulloch, president. Inc. 1907. **Lands:** 50 claims, 1,200 acres, on Edith mountain in the White Signal district, said to show good ore near surface. Developed by 2 shafts, 1 of 200', on the Dagger Point claim, showing ore claimed to average 14% copper. A crosscut tunnel on the Wild Horse claim, run along a dike of iron gossan, showed ore averaging 3% copper. No reports received and property presumably idle.

TUNGSTEN COMPANY OF AMERICA.

CONNECTICUT

Office: 115 Broadway, New York. Mine and concentrating plant at Long Hill, Conn. **Officers:** B. T. Lyons, pres.; Lawrence Mortimer, v. p.;

F. H. Osborn, sec.; E. M. Post, treas.; with H. C. Dickinson and Melville E. Grey, directors; T. Parsons, asst. sec.; Kirby Thomas, cons. engr.

Inc. March 9, 1916, in Del. **Cap.**, \$1,000,000; shares \$5 par; all outstanding. Registrar & Transfer Co., New York, registrar and transfer agent. Listed on New York Curb. Statement of assets and liabilities, June 9, 1916, shows: assets, \$1,323,140, which includes leases and contracts, \$1,250,000; accounts receivable, \$10,340; ore and concentrates, \$22,500; equipment, \$40,000; cash, \$300. Liabilities include bills payable, \$20,000; accounts payable, \$11,500; surplus, \$68,640.

Property: the old tungsten mine at Trumbull, Conn., was acquired in Jan., 1916. See U. S. G. S. 22nd Annual Report, 1900-1901. **Ore:** consists of wolframite, scheelite and wolfram ocher, occurring in a contact deposit, 3' to 5' thick, between crystalline limestone and hornblende-gneiss; dip 25° N. Company claims ore averages 2 to 3% tungsten.

Development: shallow pits and a short adit. Management states "pending the completion of the new plant, mining operations on a large scale will be continued to block out large bodies of ore and to pile up ore reserves," also "the cost of mining and milling this ore will not exceed \$5 per ton."

The old buildings were destroyed by fire; plans building a 100-ton concentrator. The present company began production of tungsten concentrates about April 6, and to May 11, 1916, shipped to the Vanadium Alloys Steel Co., Latrobe, Pa., 4,008 lbs., yielding \$8,734. Prior to being taken over by new management the property had been operated in a small way. Mine is an old and well known mineral producer, but it is very doubtful if it could pay operating expenses should the price of the tungsten ore decline to its anti-war price of \$6 per unit.

TUNGSTEN EXPLORATION CO.

COLORADO

Lakewood, Colo. Peter Knuth, supt. Inc. April, 1916. **Officers:** L. A. Ewing, pres.; Chas. Theobald (of Theobald & Knuth, Cripple Creek, Colo.), v. p.; Dr. R. W. Bailey, treas.; L. A. Tilborg, sec.; with C. M. Webb, Norfolk, Va., G. C. Stumm and Clark G. Mitchell, directors.

Property: the Bradley tract, 200 acres, 1 mile E. of Lakewood, adjacent to Primos Chemical Co.'s mines, the Gold Spring Cross and Bonanza mines.

TUNGSTEN GIRL CO.

COLORADO

Offices: 325 Majestic Bldg., Denver, Colo. and Ward, Boulder Co., Colo. **Officers:** Joe Connors, pres.; S. T. Weller, v. p.; Dr. Osee Wallace, treas.; Hon. L. I. Harrington, sec.; above, with Kenneth Kennedy, A. V. Lafferty, Dorothy Weller and E. S. Connors, directors.

Inc. 1916 in Ariz. **Cap.**, \$1,000,000; shares \$1 par.

Property: the Blue Jay and Burnt Mountain groups, 3 miles from Ward, adjoining holdings of the National Tungsten Co.

TUNGSTEN METALS CORPORATION.

COLORADO

Boulder, Colo. Inc. April, 1916. **Cap.**, \$550,000. Company has taken over property of the Tungsten Metals Co. and the Ferberite Co., including the Red Sign, Red Sign No. 2 and the Ferberite mines, and is constructing a \$50,000 mill in Boulder Canyon, about 7 miles from Boulder.

TUNGSTEN MINES CO.

CALIFORNIA

L. L. Stevens, gen. mgr.; Cooper Shaplye, supt., Bishop, Calif. **Officers:** T. M. Townsend, pres.; Leo Kaufman, sec.; G. L. Cooper, A. J. Clark, L. L. Stevens and J. C. McKinstry, directors. **Cap.**, \$3,000,000; shares \$10 par. Operates a tungsten mine and mill near Bishop and is preparing for extensive development and equipment 1916.

Property: a group of claims, purchased 1915 from the Standard Tung-

sten Co., situated in a deep gulch known as Deep Canyon, 7 miles west from Bishop. The scheelite bearing garnet rock occurs in granite.

Development: by 2 tunnels, one on each side of the new mill and connected therewith by 700' tram line.

The 300-ton mill, built 1916, is equipped with Allis-Chalmers rolls, tube mills and tables.

TUNKEY MINING CO.

NICARAGUA

See Tonopah Belmont Mining Co.

TUOLUMNE COPPER MINING CO.

MONTANA

Mine office: 311 Daly Bank Bldg., Butte, Mont. **Officers:** Edw. Hickey, pres.; N. J. Bielenberg, v. p.; Lyman J. Roscow, treas.; preceding officers, T. E. Murray, Wm. Jahn, Paul Gow, mgr., and Geo. Palmer, directors; J. J. Harrington, sec. Walter Harvey Weed, cons. engr.

Inc. June 4, 1906, in Arizona. **Cap.**, \$800,000; shares \$1 par, of which \$400,000 in stock was given for the property, and 210,000 shares were sold on the Butte market at par, increased May, 1916, to \$2,500,000; \$1 par. Shares are listed on the New York curb, Boston, Spokane and Butte stock exchanges. State St. Trust Co., Boston, transfer office. Beacon Trust Co., Boston, registrar. Annual meeting, June 20.

Balance sheet: as of May 31, 1916, shows assets of \$2,082,457; this includes, Tuolumne property and equipment, \$828,502; deferred, \$9,000; current, \$44,955; Butte Main Range Copper Mining Co. and Colusa Leonard Extension Copper Co. properties under options and contracts, for which 1,200,000 shares of capital stock are held in trust, \$1,200,000. Liabilities include: issued capital stock \$2,000,000, of which \$800,000 is outstanding and \$1,200,000 is held in trust; current liabilities, \$39,584; surplus, \$42,873.

Profit and Loss Statement: for 1914, 1915 and to May 31, 1916, shows: operating loss, 1914, \$2,083; operating loss, 1915, \$26,591; depreciation, \$28,899; other, \$3,061; total loss, \$60,635, or \$1.39 per ton ore mined. Net earnings for first five months, 1916, \$42,939, or \$0.985 per ton ore mined, leaving a net loss on operations, \$17,695, or \$0.405 per ton ore mined.

Dividends: 15 cts. per share in 1911; none in 1912, and two 10 ct. dividends in 1913.

Property: the Tuolumne, 1 fractional claim, and a tract of 80 acres near the Tropic and East Butte mines held through a 51% interest in the Colusa-Leonard Extension and a $\frac{2}{3}$ interest in the Butte Main Range companies, described under their respective titles. Properties adjoin the Tropic mine of Anaconda on the north. Under terms of the agreement Tuolumne must do development work estimated at \$500,000. This work includes sinking the Colusa-Leonard shaft from 800' to 1,600' depth and crosscutting to the side lines of the claim about 1,500'.

The Tuolumne claim carries the Jessie and Edith May veins, parallel N. W.-S. E. fault veins with large oreshoots.

Development: by a main 3,000' shaft, developing an orebody of 12 to 15' width, which carried ore ranging from 5 to 12% copper with an average of about 7% down to 2,000', but in the lower levels the vein consists mainly of pyrite, with low copper values. In 1916 all development was confined to the 2,400' level and mining carried on on the 800', 2,000', 2,200' and 2,400' levels.

Equipment: includes a steam plant with six 150-h. p. Erie City boilers delivering steam at 150 lbs. pressure per sq. inch. There is a powerful Nordberg hoist, good for 3,000' depth, and a 20-drill Nordberg air compressor.

Ore shipped to the Washoe Works, under contract.

Comparative Statement of Production.

	Tons 1st Class Ore	Tons 2nd Class Ore	Lbs. Copper	Ounces Silver	Av. % Copper	Av. oz. Silver
1909.....	1,713.9	1,334.7	475,439	10,728.05	7.80	3.52
1910.....	33,699.6	1,070.1	6,545,241	117,367.90	9.41	3.38
1911.....	24,935.4	4,905.7	4,261,705	96,373.20	7.16	3.24
1912.....	14,011.4	32,671.6	4,716,047	131,867.40	5.05	2.83
1913.....	930.0	33,346.5	1,880,514	77,571.	3.84	3.20
1914.....	—24,283	—	1,945,286	115,355.78	4.10	*....
1915(a).....	.....	9,698	532,959	32,688	2.75	3.37
1916(b).....	.....	10,310	640,013	41,726	3.10	4.05

(a) Last 5 mos. (b) First 5 mos. * Not reported.

Work was stopped on property in Oct., 1914, resumed Aug., 1915.

The Eastern holdings of the company embrace 10 claims, 80 acres, covered largely by wash, but containing several strong veins, proven by development work from the Sinbad and the Colusa-Leonard shafts to contain commercial orebodies. Moreover, the tract lies in line with the extension across the valley bottom of several of the known productive veins of the North Butte and Anaconda holdings, and the claims lie west of the big displacement known as the Continental fault.

At the Sinbad shaft, drifts on the 400 and 500' levels expose a 6' vein in which a 12" band of high-grade ore occurs that will be mined. The 700' level, under water July, 1916, will be unwatered and cleaned out as soon as the shaft is retimbered.

Both shafts will be operated, and shipments made in the Autumn of 1916. This tract is very favorably regarded, and development is confidently expected to disclose large and profitable orebodies.

With its new ground the company has started on an active campaign of development which will, it is believed, make it an important producer and dividend payer.

TUSAS PEAK GOLD & COPPER MINING CO. NEW MEXICO

Idle. Office: Portage, Wis. Mine and mill at Tusas, Rio Arriba Co., N. M. R. H. Owen, pres.; R. J. Rosenfeld, sec.-treas.

Inc. April 28, 1902, in New Mexico. Cap., \$2,000,000; shares \$1 par. Bonds, \$100,000 authorized; issued, \$16,000.

Property: 13 claims, 230 acres, and a 5-acre mill site, in the Bromide district, 14 miles W. of Tres Piedras, and 10 miles from a railway. Principal development is on the Tampa mine, having a 13' vein of copper ore, with a 5' paystreak said to average 7.5% copper, balance of ore being of concentrating grade. The Tampa has shafts of 80', 85' and 425', with about one-half mile of workings, showing ore reported by company to assay 5 to 44% copper, 1 to 4.5 oz. silver and \$1.20 to \$3.80 gold per ton, with some ores assaying up to 2.3 oz. platinum per ton and carrying some molybdenum. The main shaft shows ore of good average tenor, but in small quantities, and the management believes that it will be necessary to sink to 500 or 1,000' depth in order to develop good orebodies.

Equipment: includes a hoist and 3-drill air compressor, with an hydraulic dam on Tusas creek, sawmill and a 40-ton leaching plant, planned to treat oxidized ores, but not in operation.

TUSCARORA MINING & MILLING CO. CALIFORNIA

Address: care Al. D. Myers, president, Los Angeles, Cal. Mine in the Monument Peak, or Whipple Mountain district, 12 miles N. of Parker, and 14 miles N. of Vidal, on the A. T. & S. F. R. R. Company is a reorganization of the Tuscarora Mining Co. Property shows pre-Cambrian schist and gneiss with veins from 2 to 5' wide, carrying chalcocopyrite and glance ore

with gold values. **Development:** by 2 shafts on the same vein, 2,000' apart, opening ore to a depth of 300'. A "strike" of gold ore was reported, Feb., 1912. Property closed down and company in litigation.

TUSCARORA-NEVADA MINES CO.**NEVADA**

Bankrupt. **Address:** J. E. Harrington, 1482 Broadway, New York. Henry Stanley Haskin, receiver; \$150,000 receiver's certificates authorized; 53,286 issued; \$600,000 claim against company allowed by Court. Property leased Aug. 18, 1915, for ten years to Jas. E. Harrington.

The mortgage held by the Dexter Tuscarora Cons. G. M. Co. on the Dexter group of this company has been foreclosed and the property purchased by the mortgage holders. This includes 17 claims and the Jack Creek power plant, all under bond and lease for \$175,000.

TUSCUMBIA MINING CO.**IDAHO**

Address: Morton Webster, sec.-treas., Wallace, Idaho. **Officers:** George May, pres.; George W. Dougherty, v. p.; with D. L. McGrath, Wallace, D. J. Whaley, M. L. Whaley and A. A. Whaley, of Stevensville, Mont., directors.

Inc. 1910 in Idaho. **Cap.**, 1,500,000 shares; 50c par. Mine is under lease for 2½ years from April, 1915, to Gust Ehrenburg, of Spokane, and Albert Nelson, of Wallace.

Property: 4 claims, 76 acres, covers nearly 3,000' of the apex of the Tuscumbia (Sunset) lode, and 1,000' more or less of the Idora lode. The Tuscumbia is a strong, persistent vein in Pritchard slate, varying from 6 to 20' in width and branching at times. It carries shoots of silver-lead ore and of zinc.

Development: by tunnels, the lowest now worked being the Idora crosscut tunnel. The Hill tunnel, 4,000' long, has not cut the vein; it is 1,015' below the Idora tunnel.

Mine has been stoped and orebodies largely mined out above the Idora tunnel, but the vein is believed to give promise of large bodies of milling ore at deeper levels. The property also has title, through ownership of apex, to an important orebody of the Idora mine. Deep development can be done by tunnels, as the Roy or Hill tunnel is 1,300' below the Tuscumbia apex and 1,015' below the Idora tunnel.

Property considered very promising, but company needs financing to provide funds for deep and extensive development work.

TUSCUMBIA MINING & MILLING CO.**ARIZONA**

Jas. H. Sullivan, supt., Crown King, Ariz. **Inc.** March, 1916, in Arizona. **Cap.**, \$1,000,000; shares \$1 par.

Property: the Tuscumbia mine, in the Bradshaw Mtn. district, carrying a lode with silver ores, said to be like those of Tonopah. A shoot opened May, 1916, is reported to show 3.8% copper and 115 oz. silver per ton in a shoot 50' long and 4' wide.

TWIN BUTTES MINING & SMELTING CO.**ARIZONA**

Office: 314 Railway Exchange, Milwaukee, Wis. Mine office: Twin Buttes, Pima Co., Ariz. **Officers:** Michael Earls, pres.; W. A. Barber, v. p.; Edw. P. Hackett, treas.; preceding, with Hon. David S. Rose, W. B. Hill, Howard Nunnemacher, Geo. P. Mayer, John G. Baxter and Jas. R. Ricketson, directors; Albert L. Waters, gen. mgr.

Inc. Sept. 8, 1903, in Arizona. **Cap.**, \$2,000,000, increased, 1905, from \$1,000,000 to \$1,250,000, and again increased, Jan., 1910; shares \$1 par. Bonds outstanding were \$100,000, at last accounts. Controls the Twin Buttes Railroad Co. Wisconsin Trust Co., transfer agent and registrar. Annual meeting, third Tuesday in January.

Property: the King and Glance mines with 61 claims, partly patented,

1,250 acres, in the foothills of the Sierrita mountains, in the Helvetia district. Lands are reported to carry fissure veins in limestone, and contact deposits having a limestone foot and granite-porphry hanging. The various properties of the company had about a mile of workings 1906, estimated to show 50,000 tons of ore blocked out for stopping, averaging 7% copper and 1.85 oz. silver, with traces of gold, which estimate was too high.

Development: the Senator Morgan shaft, of about 500' depth, shows a vein of 25' width, carrying sulphide ore.

The new Main shaft, 700' deep, has a hoist and compressor.

The Copper Glance mine has a 415' shaft, sunk on an orebody having a 30' gossan, succeeded by about 200' of carbonate ore. On the 300' level a crosscut passed through 35' of marcasite carrying kidneys of chalcocite, and a crosscut on the 400' level encountered a promising ledge of soft leached ore.

The Copper King mine has a 200' shaft, showing carbonate ores in the upper workings and sulphides in the bottom.

Equipment: includes a 300-h. p. steam plant, burning wood and petroleum, with a 125-h. p. Leyner double-drum hoist, capable of raising 3-ton loads, and a 10-drill Leyner compound air compressor at the main shaft. There is a gasoline plant at the Copper King mine. There are 14 dwellings, including the power house, machine shop, smithy and a general store.

The Twin Buttes railway, 25 miles in length, running from Twin Buttes to Tucson, completed 1906, has 1 locomotive and 3 flat cars. It is said that the company sold its line to the Southern Pacific.

Production: 258,672 lbs. copper and 3,446 oz. silver in 1910. Shipped about 100 tons daily in 1912, to the Pioneer smelter. The Glance mine has been worked under lease to E. G. Bush since 1913. Property not considered especially promising.

TWIN CITIES MINING CO.

MISSOURI

Address: Geo. Moore, mgr., Webb City, Mo. Inc. in Mo. **Cap.**, \$50,000. Is a merger of the Laura Alice and Ben Franklin mining companies.

Operates lands leased from Daugherty & Davey, in Jasper Co., on Center Creek, between Webb City and Carterville, using the 175-ton Davey No. 1 mill. Developed by two shafts, steam power being used. Work is in progress on the 160' level on a face said to show 18' ore.

TWIN CITY MINING & MILLING CO.

MONTANA

Elliston, Powell Co., Mont. **Officers:** W. M. O'Connell, pres.; F. B. Hubbard, v. p.; E. J. P. Dwelly, sec.-treas.; preceding, with P. H. McCauley, J. L. Hurd and John Churchill, directors; Allan McNaughton, gen. mgr.

Inc. in Montana. **Cap.**, \$500,000; shares \$1 par; issued, 300,000, fully paid and nonassessable. Annual meeting, April 4.

Property: 5 claims, 70 acres, patented, in Elliston district, 8 miles from Elliston, on east side of Telegraph creek. Ore occurs in granite and management reports 6 veins, of which one is developed by 2 shafts, 185' and 50' deep, and a 250' tunnel with 3 crosscuts. Total workings 525', said to prove vein 18' wide, traceable for 3,000' and proven to 170' depth, carrying 5% copper, 4% lead, 19 oz. silver and \$3 gold per ton. Values said to increase in depth and sulphide ores expected at about 300'.

Equipment: includes steam power, one 40-h. p. hoist and several buildings. Reported in March, 1915, that development would be resumed during the summer; nothing reported since.

TWIN-EDWARDS COPPER MINE CO.

NORTH CAROLINA

Greensboro, Guilford Co., N. C. Inc. Sept., 1902. **Cap.**, \$100,000; shares \$100 par. Owns sundry old properties, including the Twin mine, with an 18' vein, which was worked previous to the American Civil War. Property

shut down many years, but company understood to be only dormant, not dead.

TWIN LAKES MINING & MILLING CO.

COLORADO

Twin Lakes, Colo. G. W. Boyce, mgr. Inc. with Leadville and Chicago capital to lease and operate the Gordon-Bengal Tiger mine in the Twin Lakes district, Lake county. Working capital provided, \$100,000.

The Gordon-Bengal Tiger was at one time a large producer. In 1897 it was sold for \$225,000, but litigation prevented operation for seventeen years. At the time of leasing, reserves were said to be between 40,000 and 60,000 tons of \$10 ore. Ore is white quartz with some pyrite and galena, gold occurring free.

Equipment: includes new 10-stamp mill, which began operations latter part of 1915.

TWO LAKES COPPER MINING CO., LTD.

ONTARIO

Idle. Office: Oil City, Pa. Mine office: Sowerby, Algoma, Ont. Officers: Dr. E. L. Dickey, pres.; S. F. Amsler, v. p.; D. G. Bailey, sec.; J. C. Wilkins, treas.; F. W. Bailey, gen. mgr.; preceding, with J. W. Russell, C. W. Coulter, G. W. Freeman and Edw. Schwabenbauer, directors.

Inc. Oct. 12, 1906, in Ontario. Cap., \$500,000; shares \$1 par; nonassessable; issued, \$270,000. Annual meeting, first Tuesday in November.

Lands: 8 claims, 1 fractional, 300 acres, freehold, including the Robinson and Tupper mines, 8 miles from Thessalon, and 4 from a railway. The property shows pre-Cambrian rocks, slate, conglomerate and greenstone, carrying a number of fissure veins, of which 3, under development, are of 2 to 10' estimated average width, carrying sulphide ores of about 4.5% copper, with small quantities of silver and gold. **Development:** by shafts of 50', 25' and 10'.

Equipment: includes a 60-h. p. boiler and 35-h. p. hoist. There are 8 small buildings. At last reports the management was planning further development as soon as the financial situation improved, but is apparently still adhering to a "watchful waiting" policy.

TYEE COPPER CO., LTD.

BRITISH COLUMBIA

Office: 45 Leadenhall St., London, E. C., Eng. E. V. Hearn, agent, Victoria Trust Bld., Victoria, B. C. Works office: Wm. J. Watson, mgr., Ladysmith, Vancouver Island, B. C. Thos. Headland Wilson, chairman; Harry von Berg and H. Loeffler, directors; Wm. Gardner, sec.

Inc. April 4, 1900, in Great Britain. Cap., £180,000, increased 1901 from £120,000; shares £1 par; fully issued and paid.

Accounts: for year ending April 30, 1915, show a debit balance of £120,205; cash, £379; debtors, £7,947; creditors, £1,779. Reserve for royalties owing, £7,333; mortgage on property, £19,100.

Dividends: 10%, or 2 shillings in 1904, 10% in 1905, 5% in 1906, 7½% in 1907, none since.

Property: 1,247 acres, including 13 claims, crown granted, 342 acres, a 45-acre smelter site and 800 acres timber lands. Company had option on the Big Strike group of claims, on Ship bay, near Valdez, Alaska, and also prospected for coal, with diamond drills, on islands adjacent to the E. coast of Vancouver Island.

The Tyee mine, on Mt. Sicker, in the Somenos district, 11 miles N. W. of Duncans, and about 80 miles from Victoria, yielded only 1,200 tons of ore 1907, and has been idle since. The orebody was rich, but shallow, and although the vein was explored thoroughly, nothing of value was found.

Company has been looking for a new mine for several years. It had a bond and lease on the Cornell mine, at Van Anda, Texada island, B. C.,

and was reported to have acquired the McGraw claims, adjoining the United Metals property on Granby Bay, for \$100,000 in 1914.

Smelter: known as the Ladysmith works, is well located, on a 45-acre site on Oyster harbor, and treated custom ores from as far N. as Alaska and as far S. as Mexico. The smelter was remodeled and practically rebuilt 1909-10. There is a 40x210' wharf, having an electric hoist, connected, by an elevated incline trestle, with the smelter bins, which are of 5,400 tons capacity. The works are terraced throughout, permitting handling of material by gravity, and have a capacity of 500 tons daily.

The furnace building has 42x120" and 48x160" Allis-Chalmers blast furnaces, of 200 and 300 tons daily capacity, respectively. The furnaces use a hotblast, and have water-jacketed forehearth, slags skimming into a settler, and thence into a launder, where granulated and sluiced out by running water to low ground in the bay for filling. The 8x11x165' dust flue leads to a 90' smokestack of 7' diameter. The furnaces reduce 9.45 tons of ore and flux with 1 ton of coke. Equipment also includes a briquetting plant for fines. Furnace product is a 40% copper matte, shipped to American works for refining. Smelter closed down Dec., 1911. The smelter power plant uses electric current and includes 2 Connorsville blowers and an Ingersoll-Sergeant air compressor. Miscellaneous buildings at the smelter include a good laboratory, smithy and machine shop.

Smelter production was 3,604,474 lbs. copper in 1903; 5,045,000 lbs. in 1904; 3,039,398 lbs. copper, 103,474 oz. silver and 5,952 oz. gold in 1905; 3,173,431 lbs. copper in 1908; 2,148,058 lbs. copper in 1909; 45,758 tons of ore, yielding 3,392,901 lbs. copper, 41,128 oz. silver and 10,041 dz. gold in 1910. In 1911, 42,030 tons of custom ore were treated. In 1913 the Tye Co. leased the smelter to the Ptarmigan Mines, Ltd., for the ores from the Big Interior mine, and Mr. H. H. Johnston was sent out as manager.

TYRONE COPPER CO.

NEW MEXICO

Properties at Tyrone, Grant Co., N. M., adjoining the Chemung group, are now owned by the Phelps, Dodge Co.

UBEHEBE COPPER MINES & SMELTER CO.

CALIFORNIA

Idle. **Office:** 956 Rockefeller Bldg., Cleveland, Ohio. **Operating Office:** Tonopah, Nev. **Mine Office:** Lone Pine, Inyo Co., Calif. **Officers:** John Salisbury, pres., St. Francis Hotel, San Francisco, Calif.; Henry G. Merry, v. p. and cons, engr.; J. J. Griffith, sec.-treas.

Inc. 1907 in Nevada. **Cap.**, \$3,000,000; shares \$1 par.

Property: 50 claims, 1,000 acres in the Butte range, 48 miles from Thorpe on the Bullfrog & Goldfield railway, said to show veins of 8 to 50' width, in granite and limestone, carrying copper ore with gold-silver values. Property advertised 1907 as a mountain of gold-silver-copper ore nearly 2,000' high.

Development: by an 80' shaft and 145' tunnel, with some work on other holdings. The company has done annual assessment work but contemplates no further extensive development until the financial situation improves, and means of transportation are devised. Was a promotion in 1907 of Pearce Hill & Co. of Baltimore, Md. Property has merit and systematic development is needed.

UMATILLA-TONOPAH MINING CO.

NEVADA

Office: 265 Russ Bldg., San Francisco, Calif. **Mine office:** Tonopah, Nev. **Officers:** H. Zadig, pres.; A. S. Wolberg, v. p.; C. D. Olney, sec.; preceding and R. L. Colburn, directors; A. H. Haskins, supt.

Inc. in Nev. **Cap.**, \$1,500,000; shares \$1 par; assessable. **Company**

office, transfer office Registration Surety Co., San Francisco, registrar. Listed on San Francisco and Salt Lake exchanges.

Property: 8 claims, 80 acres, in Tonopah district. Developed by 1,200' shaft. Diamond drilling said to have struck \$1 to \$7 ore at a depth of 1,762'.

Reported in May, 1916, that Umatilla-Tonopah Mining Co. and Montana-Tonopah Mng. Co. would merge and operate under name of the After All Mines Co.

UNA MINING CO.

IDAHO

J. M. Hinton, supt., Oro Grande, Ida. **Officers:** J. W. Turner, pres.; Thos. A. White, v. p.; Ralston McCraig, sec.-treas., with Dr. W. B. Phillips and W. S. Willis, directors.

Inc. 1914. Cap., \$1,250,000; shares \$1 par.

Property: the Una mine, near Oro Grande shows a vein 100' wide, carrying pay streaks of a few inches to 5' thick. In the 40' shaft the ore is said to average \$7 per ton in gold with some silver. **Development:** by 900' tunnel to cut vein at 200' depth.

UNCLE SAM CONSOLIDATED MINING CO.

UTAH

Office: 516 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. **Officers:** Hon. John Dern, pres.; M. P. Braffet, v. p.; Frank D. Kimball, treas.; Fred C. Dern, sec.; J. C. Dick, gen. mgr.; C. C. Griggs, supt.

Inc. June 29, 1900, in Utah. Cap., \$750,000; shares \$1 par; assessable; increased, Aug. 21, 1912, from \$500,000; issued, \$550,000, with 1 assessment levied. The company formerly owned a 50% stock interest, 400,000 shares, in the May Day Mining & Milling Co., which stock was distributed 1910, to shareholders, as a stock dividend. The Richmond & Anaconda Mining Co., adjoining, was absorbed 1912, by the Uncle Sam.

Shares are listed on the Salt Lake exchange. Annual meeting, first Monday in June.

Regular dividend rate was 2 cts. per share monthly, changed June, 1910, to 2 cts. quarterly, with an extra dividend of 3 cts., Dec., 1910, dividends for 1910 having been 19 cts. per share; total dividends to April, 1913, were \$470,000; none since.

The annual statement for year ended May 31, 1916, shows cash on hand, \$8,703.

Receipts:		Value.	Disbursements:	
Ore sales, zinc ore.....	\$	6,824.31	Ore sales, paid lessees, exp.	
Ore sales, lead ore		7,973.14	on ore	\$ 8,568.66
			Mine expense	2,179.79
Total		\$14,796.45	Mine labor	2,511.38
May Day M. & M. Co. div.		33.11	Assaying	75.40
Gen. exp.		52.00	Gen. expense	702.84
Cash on hand, June 1, 1915		9,333.10	Salaries	1,200.00
			Taxes	273.08
Total		\$24,214.66		
			Totals	\$15,511.15
			Cash on hand, June 1, 1915	8,703.51
			Total	\$24,214.66

Property: 4 claims, patented, in Tintic district, including the Humbug mine, which is the principal property, producing mainly auriferous silver-lead ore of both smelting and milling grades. A good orebody was developed, 1911, in the western part of the property. Equipment is electrical. Mine worked by 5 lessees in 1916.

Production: in 1915, 183,396 tons zinc ore and 520,744 tons lead ore.

Last report states that company expects to do development on west part of the property, with funds derived from royalties. This work will it is hoped disclose the southern extension of the Yankee orebody, recently opened.

UNDERWRITERS LAND CO.

Joplin, Mo. **Officers:** G. H. Worthington, pres.; A. Good, sec.; F. N. Bendelari, treas.; F. R. Harrington, gen. mgr.; with J. W. Gibbons, A. E. Bendelari, directors.

Inc. 1901. Cap., \$1,000,000; shares \$1 par; outstanding \$1,000,000; non-assessable. Annual meeting in February. No bond issues. Transfer office: 812 Hippodrome Bldg., Cleveland, O. **Registrar:** Delaware Trust Co., Wilmington, Del. No dividends in 1915.

Property: 240 acres, leased and 232 acres, in fee, in Jasper Co., Mo., and Ottawa Co., Okla. The blende ore is hoisted by vertical shaft, total depth of working, 250'. The concentrating mill yields 62% zinc concentrates.

UNION AMALGAMATED MINING CO.

NEVADA

Manhattan, Nev. **Officers:** C. F. Wittenberg, pres.; J. H. Forman, v. p.: Percival Nash, sec.

Inc. in Nevada. Cap., 2,000,000 shares; 10c par. C. D. Olney, 265 Russ Bldg., San Francisco, Calif., transfer agent. Company is a merger of the Manhattan Amalgamated Mining Co., Litigation Hill Merger Co., and the Manhattan Earl Mining Co.

Property: 6 claims, 74 acres; 3 claims patented, covering Litigation Hill at Manhattan, Nye Co., said to show gold-silver ore in fissure veins, from 4-8' in width. **Development:** mainly by the 350' Earl shaft with 5 levels. The three properties have produced 9,615 tons ore returning \$183,848, ore running from \$15 to \$21 per ton.

Equipment: includes electric hoists, transformers, surface track, ore cars and the Manhattan Milling & Ore Co.'s 10-stamp mill, cyanide plant and sampler. Work will be prosecuted through the Earl shaft, 350' deep and connecting with five levels.

Total production: of the properties merged, about 10,000 tons; value \$15 to \$21 per ton. A large amount of mill ore, running \$7 to \$10 per ton has been developed by lessees, which will be treated in the mill, recently overhauled and repaired.

UNION BASIN MINING CO.

ARIZONA

Office: 67 Milk St., Boston Mass. **Mine office:** Golconda, Mohave Co., Ariz. **Officers:** N. L. Amster, pres.; C. R. Jeffers, v. p., sec-treas., with Otto Sussman, directors. J. D. Wanvig, Jr., supt.

Inc. in Ariz. Cap., \$1,000,000; shares \$1 par; 835,350 outstanding. Annual meeting, third Tuesday in March.

Property: the Golconda zinc mine, at Golconda, 16 miles N. of Kingman. Developed by 1,000' shaft, to be sunk to 1,200' level.

Equipment: includes a 200-ton flotation mill. Electric power is obtained from the Desert Power & Water Co. at Kingman. Property is an important producer, 1916.

UNION CHIEF MINING CO.

UTAH

Office: Newhouse Bldg., Salt Lake City. **Officers:** G. L. Bemis, pres-mgr., Santaquin, Utah; Geo. Baglin, sec.; A. N. Larson, supt.

Inc. 1903 in Utah. Cap., \$1,000,000; shares \$1 par; assessable. Listed on Salt Lake Exchange.

Property: 18 claims, 6 patented, 370 acres, in Santaquin mining district, shows lead-silver ore in vein reported to be about 6' wide.

Development: over 8,000' of tunnels and drifts. Reported to have found

high-grade ore at 550' depth in 1916, but as only picked samples seem to have been assayed, no averages can be given. Equipped with electric power line and compressor. Extracting several tons of ore daily, 1916, with small force of men.

UNION CONSOLIDATED MINING CO.**NEVADA**

Offices: 265 Russ Bldg., San Francisco, Calif., and Virginia City, Nev. **Officers:** H. L. Slosson, Jr., pres.; W. W. Turney, v. p.; A. P. Swain, sec., with Whitman Symmes, J. H. Goldman and H. G. Dodds, directors. Whitman Symmes, supt.

Inc. Nov., 1904, in Calif. Cap., \$200,000; shares \$1 par; all outstanding; assessable. **Transfer office:** 381 Bush St., San Francisco, Calif. **Registration Surety Co., San Francisco, registrar.** Annual meeting, third Thursday in Nov. Listed on New York Curb and San Francisco Exchange. Company is under same management as Mexican Gold & Silver Mining Co., which see.

Gross earnings in 1914-1915, \$72,615, all from ore sales; operating expenses, \$76,095.

Property: 2 claims and 6 fractions, patented, located on the Comstock lode at Virginia City, carries silver ore. See Mexican Gold & Silver Mining Co. for geology of Comstock lode. Present work is on the 2,500' level and above; ore being shipped from the 2,400' level ranges from \$11 to \$32 per ton; from the 2,400' level, \$16. The old Union shaft has been retimbered and put in first-class condition from the 2,000' to the 2,400' level; this will give better ventilation to the north end lower levels and should make a material reduction in operating costs. Greatest depth of workings, 2,700'; total underground workings, 6,400'. Ore blocked out, April 20, 1916, 6,000 tons of \$20 ore.

Equipment: includes electric hoists, 2 air compressors of 75 and 100-h. p. each and electric power.

Pumping is done by the United Comstock Pumping Ass'n. Ore is treated at the Mexican mill; tonnage treated in 1915 amounted to 3,117 tons, averaging \$15.60 per ton; a 92% extraction was obtained.

Production: to 1916, approximately \$3,000,000.

New work planned consists of completing the Union shaft to 2,700' level, and reopening the 2,300', 2,400' and 2,700' levels in the main Comstock and "East vein."

UNION COPPER CO.**NEVADA**

Yerington, Nev. Title changed to Standard Copper Co., in 1912.

UNION COPPER LAND & MINING CO.**MICHIGAN**

Office: 70 State St., Boston, Mass. **Mine office:** Houghton, Mich. **Officers:** Harry F. Fay, pres.; Harold H. Anthony, Ezra H. Baker, Samuel Carr, Albert B. Merrill and John G. Stone, directors. C. J. Morrissey, sec-treas.

Inc. 1863, and reincorporated 1893, in Michigan. Cap., \$2,500,000; issued, \$2,000,000; shares \$25 par, \$2.06—2/3 share, paid in. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock listed on Boston Stock Exchange. Annual meeting, fourth Thursday in March. Books close 20 days before. Net cash balance, Jan. 1, 1916, \$13,745.

Dividends: in 1899 company paid 50c per share and 1/8 share of stock of Old Colony Copper Co. and in 1907 and 1908 dividends of \$2 and of 50c per share respectively were paid; none since.

Property: 5,323 acres of land, carrying both surface and mineral rights, and 1,043 acres additional of mineral rights only, comprising 200 different tracts on the Keweenaw copper belt in Keweenaw, Houghton, Ontonagon and Gogebic counties. Company is primarily a land-holding corporation,

although its charter empowers it to carry on mining operations as well and it has from time to time investigated various tracts to determine their mineral value. Greater part of the land is covered with timber, stated by company's president to be valued conservatively at \$125,000. In 1910-11, exploratory work was done by diamond drill on 320 acres of land, lying W. of the Allouez and North Kearsarge mines. The drill holes cut the Allouez conglomerate and the Quincy-Pewabic amygdaloid, the latter showing good copper values; a number of other beds carrying indications of copper were also cut. Through sales of part of its timber, concluded 1914 and 1915, the company is amply supplied with funds and is saving a considerable amount yearly in taxes.

UNION COPPER MINE

NORTH CAROLINA

Office: care Sig. H. Rosenblatt, 18 Broadway, New York. **Mine address:** % Thos. Smith, Gold Hill, Rowan Co., N. C.

Lands: 550 acres, freehold, about 15 miles from Salisbury, in Rowan and Cabarrus counties, well watered and timbered. The property has schists, carrying 5 veins with average strike of N. 20° E. and practically vertical dip, of 2 to 20' width, 3 of which carry copper ores, the other 2 reported to carry silver and gold ores respectively, being but slightly developed. The copper veins are mineralized zones carrying lenticular shoots of ore, longest about 100' in length.

Development: is on the Big Cut copper vein, trenched at intervals for a distance of about 1 mile, and having 10 shafts, deepest 650'; these shafts were claimed to show a vein of 20 to 40' width, but actual maximum width is about 20' only. The Big Cut vein shows oxidized ores and a little native copper in the upper workings, succeeded by chalcopyrite, with quartz gangue. A careful sampling by Dr. A. R. Ledoux gave averages of 4.4% copper, 4 oz. silver and 40 cts. to \$1.20 gold per ton. No. 7 shaft, of 200' depth, shows a vein 4" wide at surface and 3 to 4' wide on the bottom level, where the ore is claimed to average 4.5% copper. There are 14 shafts all told, and the mine has about 5,000' of workings. The property has been claimed, in the press, to have produced about \$1,000,000 worth of gold in early days.

Equipment: machinery plant is extensive, but archaic, including 27 boilers, 18 hoists and a new Ingersoll-Rand air compressor. There is a small electric light plant.

Buildings include a machine shop, smithy, engine house, boiler houses, foundry, office building, 50-room hotel, 130 dwellings and a stable for 400 horses and mules. A little development work was done in 1915.

UNION COPPER MINES CO.

NORTH CAROLINA

Company dissolved. Formerly owned the Union Copper Mine.

UNION DEVELOPMENT CO.

IOWA

Owns Blazing Star mine, Calaveras Co., Calif. See Blazing Star mine.

UNION HILL MINING CO.

CALIFORNIA

Office: 716 Phelan Bldg., San Francisco. **Mine office:** Grass Valley, Calif. **Officers:** F. W. McNear, pres.; G. S. Johnson, v. p.; O. B. Johnson, sec.; E. L. Oliver, treas.; Errol MacBoyle, gen. mgr.

Property: about 160 acres in Grass Valley district, Nevada Co. Ore is free milling gold, but some tungsten ore has been shipped. The shaft, 800' deep, will, it is reported, be sunk to 1,200'. Most of the gold produced was extracted from upper 300' of the mine.

Equipment: includes a hoist good for 2,000', 20-drill compressor, black-smith and machine shops, pumps, 20-stamp mill, assay office, buildings, etc.

Production: of bullion 1915-16 has been reported to be from \$12,000 to \$15,000 monthly. Total production is said to exceed \$2,000,000.

UNION LEASING CO.

Office: 715 E. & C. Bldg., Denver, Colorado. Owns no mining properties, but operates under lease the mine of the Gold Sovereign Mining & Tunnel Co., which see.

UNION MINES CO.

Office: Union, Nev. **Officers:** W. P. Fairman, pres.; E. T. Comfort, sec.; L. R. Thatcher, mgr. Operates a silver-lead mine, 35 miles S. of Palisade, Eureka Co., Nev. A close corporation and prefers not to publish information.

UNION MINES CO.

Union, Wash. Company owns a group of claims carrying veins with silver-lead ores, said to average \$25-\$45 per ton. **Development:** by a 200' shaft with a level at 190'. Twenty-five men are employed and shipments made occasionally. Company plans sinking shaft to depth of 400'.

UNITED COPPER CO.

Dead. Fully described Vol. XI, Copper Handbook.

The preferred stockholders' protective committee of the United Copper Co. stated Aug., 1915, that it had been unable to obtain any offer from the holders of the company's pledged assets which justifies the committee in continuing its efforts either to formulate a reorganization plan or redeem the pledged assets; that \$750,000 would have to be provided to redeem assets, which would require a cash assessment of about \$20 per share, which it is believed could not be raised under existing conditions. Committee also stated that it had considered possibility of instituting proceedings to recover wasted assets, but decided that there were no reasonable prospects of obtaining substantial results in such proceedings. Preferred stockholders were notified that stock deposited with the committee would be returned on presentation of certificates of deposit to the Central Trust Co. of New York.

The \$10,500,000 cash which was turned over to the United Copper Co. at the time that corporation sold its principal physical assets to the Rede Metals Mining Co., controlled by the former Butte Coalition Mining Co., was made the subject of an investigation by the receivers of the United Company in 1914.

When F. A. Heinze was on trial in the United States Court in New York several years ago it was charged that for a time preferred dividends were paid from capital account, while two of the common dividends were not from earnings but from money borrowed from Heinze and his associates.

Explanation is yet to be made as to what became of the cash and assets of the United Copper Co. treasury, both before and after the Assets Realization Co. became entangled with it.

UNITED COPPER-GOLD MINES CO.

Office: Murphy Blk., Salem, Ore. Mine at Selma, Josephine Co., Ore. **Officers:** W. S. Low, pres. and gen. mgr.; E. O. Mull, v. p.; Daniel Webster, sec.; C. E. Lebold, treas.; preceding with W. C. Buckner, James Greig and H. Neugabauer, directors.

Cap., \$500,000; shares \$1 par; issued 219,654. Annual meeting, first Monday in August.

Property: on Pickett creek, near Merlin, has been sold and company now owns 11 claims, in Illinois district, Ore., about 12 miles N. W. of Selma. Ore occurs, in serpentine near porphyry and diorite contacts. A dark gossan sometimes stained with copper is underlain at 15' depth by ore carrying 18% copper and 5 to 10 oz. silver and upwards of \$1 gold, according to management.

Development amounts to 1,000' with a 500' tunnel and 200' crosscut, ex-

COLORADO**NEVADA****WASHINGTON****UNITED STATES****OREGON**

posing 1,000 tons of ore. Property is 34 miles from S. P. R. R. Is regarded as a prospect which will be worked on a large scale when railroad transportation is nearer.

UNITED COPPER MINING CO.**WASHINGTON**

Office: 417 Hutton Bldg., Spokane, Wash. **Mine office:** Chewelah, Stevens Co., Wash. **Officers:** Conrad Wolffe, pres.-gen. mgr.; W. G. Collins, v. p.; M. E. Poole, sec.-treas.; with Daniel Hoch, J. H. Griffith, S. Rosenhaupt, directors. E. A. Wolffe, supt.

Inc. 1906 in Washington. **Cap.**, \$1,000,00; shares \$1 par; fully issued; assessable. Last assessment Sept., 1914, ½ cent a share. Annual meeting, Jan. 28.

Annual report for 1915 shows a net indebtedness Jan. 1, 1916, of \$84,928. Total net smelter returns for 1915 were \$117,269. Net profits for first quarter of 1916 were \$14,029.

Dividends: \$40,000 to end of 1912.

Property: 11 claims, patented, 123 acres, and 240 acres miscellaneous lands, 4½ miles N. E. of Chewelah, the nearest rail point. The property shows shale and schist, and a vein with an orebody of 6' estimated average width, carrying malachite, chalcopryite and tetrahedrite, reported by the company to have been proven to average 2.5% copper, 5 oz. silver and 40 cts. gold per ton. Ore is mainly chalcopryite, with streaks of gray copper ore on both walls, latter carrying up to 24% copper, 400 oz. silver and \$2 gold per ton.

Development: by shafts of 1,000', 175' and 275', and a 1,700' tunnel on the 400' level, of which the first 735' is a crosscut and balance a drift, with a 3,700' lower tunnel, on the 1,000' level, planned to be driven 5,000' to gain a back of 1,100'. Considerable development work was done in 1914-15; diamond drilling reported to prove the orebodies to depth of 1,400'. The mine has about 40,000' of workings.

Equipment: includes 2 hoists, air compressors, capacity 1,200 cu. ft., 11 power drills, 2 pumps, and an electric light plant. Electric power is obtained from the Meyers Falls Power & Light Co. There are several mine buildings, including a 15x24' frame machine shop.

In 1915 the capacity of the 125-ton concentrator was increased to a daily capacity of 235 tons by the addition of 50 stamps, making a total of 74, and an oil flotation plant, in which Gen. Naval Stores oils are used. Recovery to date has been from 77% to 80%. Ore and concentrates are shipped to the Cons. Mng. & Sm. Co., at Trail, B. C.

Production: for 1915, 650,995 lbs. copper, 103,195 oz. silver and 8 oz. gold.

UNITED COPPER SECURITIES CO.**NEW YORK**

(Dead). Fully described Vol. XI, Copper Handbook. Also see United Copper Co. Assets apparently consisted solely of a \$30,000,000 "damage" suit brought early 1913, against the Amalgamated Copper Co., and its subsidiaries, which was dismissed in U. S. District Court, New York, Dec., 1914.

UNITED EASTERN MINING CO.**ARIZONA**

Oatman, Ariz. **Officers:** F. A. Keith, pres. and supt.; G. W. Long, v. p.; W. K. Keith, sec.; R. I. Rogers, treas.; F. A. Keith, G. W. Long, J. L. McIvor, D. C. Jackling, S. W. Mudd, R. C. Nowland, R. I. Rogers, W. K. Ridenour, P. Wiseman, directors.

Inc. 1914, in Ariz. **Cap.**, 1,500,000 shares; par \$1; outstanding 1,200,000. Equitable Trust Co., New York, transfer office. Listed on Los Angeles stock exchange and on New York and Boston curbs.

Property: 194 acres, patented, at Oatman, Mohave Co., adjoining the Tom Reed mine on the N., and covering the N. W. extension of Tom Reed vein.

Development: main shaft 665' deep, with crosscuts opening the vein on the 303', 465', 565' and 665' levels. Development to June, 1916, is said to indicate that average width of orebody is about 20' and value about \$26 per ton. Before the vein was cut on the 665' level the ore reserve estimate gave 115,253 tons of \$23.84 ore.

Equipment: has been ordered for a 400-ton cyanide mill; the first 200-ton unit is under construction. Crushing will be by gyratories, ball and tube mills, and treatment by Dorr counter-current decantation and zinc dust precipitation.

Is a great gold property, which will soon be making large earnings.

UNITED GLOBE MINES.

ARIZONA

Office: 99 John St., New York. **Mine office:** Globe, Gila Co., Ariz.

Officers: Jas. Douglas, pres., A. C. James, v. p., Geo. Notman, sec.-treas., with C. H. Dodge, Jas. MacLean, Wm. Church Osborn and E. Hayward Ferry, directors. **Cap.**, \$2,300,000, shares \$100 par. Is controlled through ownership of entire stock issue, by the Old Dominion Co.

Income account for 1915 was \$1,454,323 from sales of ore and limestone, with expenses of \$642,072, giving net income of \$812,251, and a total surplus of \$277,468, Dec. 31, 1915.

Dividends: \$6.50 in 1905; \$6 in 1906; \$4 in 1907; \$20 in 1912; \$30 in 1913; \$18.50 in 1914 and \$27 in 1915, a grand total to 1916 of \$2,576,000. In 1916 has paid \$33 per share to July 1.

Property: 60 claims and 4 mill sites, lying W. of the Old Dominion group, including the Grey, Buckeye and Buffalo mines. **Development:** is by several shafts and through the workings of the Old Dominion, of which this mine is practically a part, carrying the main vein of the Old Dominion in which the greater part of the development work is centered. The Kingdon and Grey are the operating shafts. In 1915 operations were confined to ore extraction, exploration and development work on the Old Dominion, Grey, and Buffalo veins. Operations in the Grey mine were suspended Aug., 1914, but were resumed Oct., 1915.

Good productive ground is opened on the 800', 1,000', 1,200', 1,400' and 1,600' levels in the Old Dominion vein. The orebodies are extensive, but erratic, and the ores are decidedly silicious, but are in good demand at the smelting works of the southwest for converter charging. Practically all of the ore is treated in the Old Dominion smelter. An enormous tonnage of concentrating ore, of 3 to 4% copper, has been developed, as well as large quantities of high-grade smelting ore up to 10% in copper tenor. An underground haulage line has been installed on the 14th level E. drift from "A" shaft of the Old Dominion mine.

The Kingdon Shaft is being sunk from the 14th to 16th level. This will permit the shaft to be used for hoisting and ventilating purposes down to the present lowest operating level of the mine, and will greatly facilitate mining operations on the east side. It is planned during the coming year to add at the Kingdon Shaft an adequate hoisting plant, together with necessary surface and underground equipment to allow of the entire Old Dominion and United Globe tonnage being hoisted at this point in cases of a shut-down at the "A" shaft.

Production:

Year	Copper			Silver			Gold				
	Lbs.	Oz.	Oz.	Year	Lbs.	Oz.	Oz.	Year	Lbs.	Oz.	Oz.
1906	4,607,537	5,277		1912	12,252,073	124,361	789				
1907	3,399,084	12,382		1913	11,348,100	119,587	1,536				
1908	2,599,155	29,308	17	1914	11,086,674	91,582	1,580				
1909	3,674,728	43,486	33	1915	11,536,021	105,109	1,508				

(See Old Dominion Co.)

The following table gives a comparison of tonnages and grades of ore for the last two years:

	Dry Tons		% Cu.	
	1915	1914	1915	1914
Smelting oxide ore.....	19,112	14,352	6.90	6.38
Smelting sulphide ore.....	292	12,639	1.01	1.69
Concentrating ore	119,537	121,812	3.63	3.23
Silica converter lining.....	2,299	6,402	4.73	7.44
Total	141,240	155,205	4.08	3.57

All the 141,240 tons of ore produced was shipped to the Old Dominion Copper M. and S. Co. The metal production from this ore was 11,536,021 lb. of fine copper, 105,109 oz. of silver and 1,508 oz. of gold. The costs at Globe for mining, pumping, development and other expenses at the mine were \$624,574, or about \$4.44 per ton of ore.

UNITED GOLD MINES CO.

COLORADO

Office: Exchange Nat'l Bldg., Colorado Springs, Colo. **Officers:** A. E. Carlton, pres.; H. McGarry, v. p. and gen. mgr.; R. C. Wilson, sec.-treas.; L. J. Russell, supt.; R. Roelofs, L. J. Carlton, I. T. Snyder, directors. Stock is listed on Colorado Springs Stock Exchange.

Controls several subsidiary mining companies at Cripple Creek, Teller Co., including the W. P. H., Damon and Montrose Co., Ironclad Hill, May B. Squaw Mountain, Deadwood, Wild Horse, Regua Gold Mining & Milling Co., B. H. & S. M. Co. on Bull Hill. Company leases its mines.

Production: by lessees in 1915, 13,966 tons of ore. Gross value, \$181,657. Net profits, \$7,221.

UNITED GOLD MINES CO.

IDAHO

Officers: % Underwriters Idaho Mines Syndicate, 120 Broadway, New York and Boise, Idaho. **Officers:** Jas. H. Hawley, pres.; L. M. Hart, v. p.; Geo. W. Fletchers, treas.; Geo. C. Luebbers, sec.; J. A. Czizek, mgr.; above are directors.

Inc. April, 1916, in Del. **Cap.**, 500,000 shares; \$5 par; outstanding 199,800 shares. Security Transfer & Registrar Co., New York, transfer agent and registrar. Listed on New York Curb.

Property: 2 groups of claims, 120 acres, including the Little Giant and Charity mines, in the Warren mining district, Idaho Co., 49 miles from a railroad. Has been idle for several years. Claims said to cover 2 distinct veins for 4,500' along the outcrop. In addition company owns a millsite, and 4½ miles of ditches and pipe lines, with water rights.

Ore: is gold, in a series of parallel quartz veins. **Development:** by tunnels and shallow shafts.

The Little Giant, said to have yielded \$1,000,000 in the past, is claimed to show an orebody 4' wide and 50' thick, proven for 120' east of the shaft. That will assay better than \$40 per ton, with \$20 dump ore. No work has been done below the 200' level. Present management is driving a tunnel to cut the vein 400' below present workings; estimated time to complete this tunnel, 9 months from March, 1916. The Charity mine has been developed by shallow tunnels. Plans continuing a tunnel that will cut the vein 100' below present workings and building a 10-stamp mill. No estimate of ore reserves given.

Property is a prospect.

UNITED GREENWATER COPPER CO.

CALIFORNIA

Office: Tonopah, Nev. **Mine office:** Dale, via Amboy, San Bernardino Co., Calif. Company is now operating the Supply mine and owns the O. K.

mine. This group is developed by shafts of 800' and 1,100'. Has a 50-ton cyanide plant which was enlarged in 1915. Reported to have treated 60 tons of ore daily, 1915, averaging \$14 per ton. Milling costs said to be 75c per ton.

UNITED LEAD CO.**COLORADO**

Controlled since 1906 by the National Lead Co., which see.

UNITED LEAD MINING CO.**IDAHO**

Office: 616 Old National Bank Bldg., Spokane, Wash. Mine near Osburn, Shoshone Co., Idaho. **Officers:** E. S. Ross, pres.; Dr. W. B. Pickrell, v. p.-gen. mgr.; C. D. Muxen, sec.-treas., directors. Thos. Stoll, supt.

Inc. in Washington. **Cap.**, \$2,500,000; shares \$1 par. Indebtedness, \$4,000 mortgage.

Property: 21 claims, 440 acres, $\frac{1}{4}$ mile from the O. W. R. & N. R. R., shows lead-silver vein in quartzite developed by about 5,000' of workings.

Equipment: consists of 25-h. p. compressor and 6 buildings.

UNITED METALS CO.**ALASKA**

See Alaska Metals Co. Property is the Corbin mine, near Coppermount.

UNITED METALS SELLING CO.**NEW YORK**

Office: 42 Broadway, New York. John D. Ryan, pres.; T. Wolfson, v. p.; C. W. Welch, sec.-treas., with Wm. Rockefeller and H. H. Rogers, directors. C. S. Henry & Co., 12 Leadenhall St., London, E. C., Eng., European agts.

Inc. Jan. 29, 1900, in New Jersey. **Cap.**, \$5,000,000; shares \$100 par; dissolved in 1915 and reorganized March 15, 1915, in Delaware. Is controlled by the Anaconda Copper Mng. Co., through ownership of entire share capital.

The company does a general commission business in metals, mainly in copper, and is the largest copper broker in the world, being the sales agent for the Anaconda Copper Mng. Co., and affiliated corporations, and for a number of other producers, having the marketing of upwards of 400,000,000 lbs. of copper yearly.

UNITED MEXICAN MINES**MEXICO**

Idle. Mine near La Verde via Cumpas, Sonora, Mex. O. L. Neer, manager. **Lands:** 40 miles S. of Nacozari, include the Veta Grande and Cerro Gordo groups, near the Transvaal mine.

Property shows rhyolite, granite and porphyry, with several orebodies occurring in fissure veins, and as breccia deposits between trachite and granite. Ores are copper sulphides.

UNITED MINES COMPANY OF ARIZONA**ARIZONA**

Bouse, Ariz. **Officers:** J. C. Denton, pres.; George D. Christie, v. p.; Sydney H. Stewart, treas.; E. A. Goodrich, sec., with H. E. Woods and Arthur G. Halm, directors.

Inc. May, 1916, in Ariz. **Cap.**, \$1,750,000; shares \$1 par; 900,000 in treasury.

Property: 30 claims, 600 acres near Bouse, Ariz., including former holdings of Little Butte Cons. Mines Co., the Arizona Pride and Bullion groups.

Geology: the holdings are in an extensive district of pre-Cambrian schists, quartzites and limestones, cut by intrusive granites and other igneous rocks, and covered by recent volcanic flows. The ore deposits of the country though varied in nature carry gold, silver or copper ores. The typical copper ores of the region contain specular red hematite, and the deposits worked at Planet, Mineral Hill and the Clara are largely replacements of limestone beds.

The **Little Butte** claims cover an area of sedimentary rocks running E. W. and dipping at 50°, including a 1,500' belt of brown limestone in part overlaid by an old rhyolite breccia. These rocks are faulted against a coarse granite, the fault being mineralized, though nearby, the limestone caps and covers the granite. The vein outcrop shows an interlacing network of quartz-hematite stringers forming a wide lode. The underground workings show irregular lenticular bunches of oxidized ore on and above the 120' level, and close to the granite hanging-wall, with 75' or so of altered andesite (rhyolite) between the lode and the limestone. Shipments of 388 tons yielded \$8,040, or \$20.72 per ton. The lode is in part leached below these residual masses of ore, and former development was stopped at 388', below which the richer ore probably lies. The association of chlorite specularite and quartz indicates that the mineralization will extend downward to very considerable depth, and the ores will be chalcopyritic.

Development: a 388' incline shaft with 1,000' of levels at depths of 75, 120, 210 and 310'. Water was encountered at 200', but the lowest limit of oxidation has not yet been reached. The 120' level shows ore bunches for 600' along the drift. The 210' level shows mainly leached vein matter with occasional bunches of copper ore, but the leached material is said to average \$7 per ton for 200' along the drift. Similar conditions obtain at 300', but the best ore in the mine is said to have been found on this level.

The **Arizona Pride Group** claims cover part of the granite area in which gold-bearing quartz veins occur. Development includes 50' and 60' shafts, both showing ore.

The **Bullion Group** covers a sedimentary area, cut by intrusions of diorite and andesite, with veins following the intrusive contacts. A 205' shaft on one vein has not yet reached water level, the filling being leached.

Production: under former owners the Little Butte mine shipments produced 73,400 lbs. copper, the ore averaging \$7.60 per ton gold, 9.4% copper, 29% iron and 32.4% silica.

The property has merit and warrants carefully planned development, as conditions promise extensive bodies of chalcopyrite ore in depth.

UNITED MINING CO.

NEVADA

Mine office: Carson City, Nev. **Officers:** H. D. Cowden, pres. and gen. mgr., Bloomington, Ill.; R. H. Hingston, treas. and gen. supt.; F. W. Boston, sec.; L. B. Perry, asst. sec.

Inc. 1905 in Nev. **Cap.,** \$3,000,000; shares \$1 par; nonassessable; 500,000 preferred and 2,500,000 common; issued \$1,876,150.

Property: 34 claims, 680 acres, in the Delaware district, 12 miles from Carson City. Country rock is granite, cutting sedimentary and intrusive rocks. Claims show 4 fissure veins in andesite and porphyry, capped by a strong iron gossan up to 200' in width. The limestone is highly crystallized and intruded by porphyry dikes. Ores developed are azurite and malachite with some copper oxides and silicates succeeded by sulphide ore at a shallow depth.

Development: by shafts of 100' and 450', numerous test pits and prospect tunnels. The veins vary greatly in width, the principal orebody said to be 7 to 12' wide, so far as developed.

Equipment: includes a 25-h. p. gasoline hoist, a 90-h. p. gas engine with air compressor of 5 drills capacity and a sinking pump, with about 8 buildings. Management reported, Jan., 1916, "property is not working now, as we are looking for some process that will enable us to handle our ores and have our own plant."

Reported in 1915 that the Nevada mine was abandoned and stockholders given shares in the Boston American Mining Co., an equally unpromising

and doubtful proposition. It is evident from the misrepresenting literature sent out by these companies that the management prefers to mine the public instead of its mines.

UNITED M., M. & COPPER SM. CO. MARYLAND & PENNSYLVANIA

Idle. Office: Frederick, Md. Mines at New London, Md., and Charmian, Pa. A. L. Wickart, sec., Allentown, Pa. Inc. 1913, in New Jersey, as a merger of the Eagle Metallic Copper Co. and the Linganore Copper Co., now dead. Owns all the property of Linganore C. Co. Cap., \$2,000,000.

Property: 806 acres, in 2 groups, include the Dolly Hyde, New London and Eagle mines, on the Western Maryland and Baltimore & Ohio railroads.

The Dolly Hyde mine, 220 acres, was for many years the principal copper property of Maryland, though never a large producer. The mine has contact deposits in dolomite and phyllite, carrying a little malachite in the upper workings, succeeded at shallow depth by bornite and chalcopyrite in white marble. This mine is idle, but was being prepared for production, late 1913.

The New London or Linganore mine, 86 acres, with 14 acres of timber land, was opened and worked 1835-55, apparently at a profit, and was idle after 1881, until reopened, May, 1907, but is again idle. The property has two 4 to 5' fissure veins in slate, with N.-E. strike, carrying bornite and gray copper, estimated to average 3% copper and 16 oz. silver per ton, with a trace of gold. Development is by a 250' shaft and 4 tunnels, longest 340', with a total of 1,095' of workings, estimated to block out 17,307 tons of ore for stopping.

The New London mine has a 65-h. p. steam plant, with a 35-h. p. hoist, good for 500' depth, and an 8-drill Sullivan air compressor. There are 12 buildings.

The mill, 40x25' in size, consisting of a ball mill and slime tables, was built in 1911.

The Eagle mine comprises 500 acres near Charmian, including an old copper mine, never successfully worked. Property shows a mineralized zone of 400' average width, carrying native copper, chalcocite, bornite, chalcopyrite and tetrahedrite, averaging about 2 oz. silver per ton, with traces of gold. Mine has a 480' shaft at 40° incline, in ore from surface, giving assays up to 6% copper, but is worked opencast.

Equipment includes a 175-ton smelter and 150-h. p. steam plant.

UNITED NORTHERN MINES CO.

ARIZONA

Office: 434 I. W. Hellman Bldg., Los Angeles. Mine office: Oatman, Ariz. Officers: C. T. Howland, pres.; W. H. Thomas, sec. and treas.

Inc. 1915, in Ariz. Cap., 1,000,000 shares; par, 10c; in treasury 500,000. Listed on Los Angeles Stock Exchange.

Property: the Lion, Kennedy Fraction, and Poorman claims, 40 acres, between United Eastern and Gold Road mines, N. of west end of Fessenden claims. **Equipment:** 25-h. p. gasoline hoist, compressors, etc. Sinking 2 compartment shaft to explore two veins.

UNITED PROMONTORY MINING CO.

UTAH

Officers: B. D. Siegfus, pres., 572 S. 12 E. St., Salt Lake City, Utah; M. Rumph, v. p.; B. O. Siegfus, sec.-treas., with A. W. Phillips, O. P. Peterson and Geo. A. Horn, directors.

Cap., 700,000 shares, 1c par; 300,000 shares in treasury, June, 1916.

Property: 6 claims, in Boxelder Co., Utah, 7 miles N. of Promontory on the S. P. R. R., shows vein 20' thick in limestone-porphry contact. Developed by 125' shaft with levels at 45' and 115'. Upper level showed some

high-grade copper ore; 115' level, at 18' from shaft showed bunches of copper ore. Company has been developing the mine for about 8 years.

UNITED SMELTERS, RAILWAY & COPPER CO. WYOMING

Dead. The property claimed by this company is described under the title of the Penn-Wyoming Copper Co., which apparently was the legal owner, and full particulars regarding the entire chain of rotten promotions, including this company, are given in Vol. X, Copper Handbook, under Penn-Wyoming Copper Co.

Judgment for \$2,500,000 secured by Continental & Commercial Trust & Savings Bank, Chicago, Dec., 1913. Bank had loaned money to company taking a mortgage on property. Several years of litigation were thus ended and the properties of the United Sm., R'y. & C. Co. and its subsidiaries were sold at forced sale, being bought in by the bank.

UNITED SMELTING & REFINING CO. MONTANA

Is controlled by American Smelting & Refining Co. **Property:** the East Helena, Mont., silver-lead smelting plant.

UNITED STATES CONTINENTAL MINES CO. ARIZONA

Office: I. K. Farrington & Co., 30 Broad St., New York. Arthur P. Monk, sec. **Cap.**, \$1,000,000; shares \$1 par; outstanding \$670,000. Registrar & Transfer Co., New York, transfer office and registrar. Controls 80% of capital stock of the Cons. Homestead Mines Corp., cap. \$600,000; shares \$1 par; payment for this stock being 50,000 shares U. S. Cont. M. Co.'s stock, placed in pool, and \$7,500 payable within one year.

Property: includes the Copper Bullion mine of the Continental and the Homestead mine, acquired in 1916; the latter consists of one patented claim in the Lynx-Creek mining district, near Walker, Yavapai Co., Ariz. This claim is said to carry the Homestead-Eureka vein, 4' to 7' wide in porphyry and diorite, showing gold ore, partially free milling, silver, lead, zinc and copper ore. The mine workings opened years ago were badly caved when present management acquired it.

Management reports "two powerful veins opened for 1,500"; that the deepest shaft is 120' and estimates \$210,000 yearly earnings on a basis of 100 tons ore daily, an output which will never be realized.

Equipment: one report states there is a 5-stamp mill on the property, another that there is a 5-stamp mill building; also that "management therefore does not contemplate reconstructing its 5-stamp mill until a tonnage is developed that will warrant larger mill construction than 5-stamps."

UNITED STATES COPPER CO. NEW MEXICO

Hanover, Grant Co., N. M. **Officers:** J. W. McAlpine, pres., treas.-gen. mgr.; John Orelbeke, 1st v. p.; F. C. Bell, 2nd v. p. and supt.; N. A. Karsten, sec., 869 7th St., Milwaukee, Wis. J. T. James, cons. engr.

Inc. May 1, 1911, in New Mexico, as a reconstruction of the Philadelphia Copper Mines Co. **Cap.**, \$500,000; shares \$1 par; non-assessable; issued 252,164. Annual meeting 3rd Monday in February.

Property: 6 claims, 3 fractional, surveyed for patent, about 60 acres, partly timbered, in the Central district, near Hanover, showing a contact vein between limestone and granite-porphyry, with strike of N. 36° E., and practically vertical dip. The ore estimated by the management at 4-20' width, carries chalcopyrite, with some bornite and occasional chalcocite, said to carry 6-20% copper, 30%-60% iron and \$2-\$5 gold-silver values. The mine, opened 1881, is said to have shipped \$110,000 worth of ore under various ownerships.

Development: by trenches and shafts of 180', 268', 65' and 60', with 3,388' of workings. Reported to be producing 240 tons per month, 1916.

Equipment: includes a steam plant with two 100-h. p. Freeman tubular

boilers, 2 hoists, and a 10-drill air compressor. There are 10 buildings, including warehouse and office. Plans sinking shafts No. 1 and 2 to the 550' level.

UNITED STATES COPPER-GOLD MINE WASHINGTON

Prospect about 3 miles N. E. of Chewelah, Stevens Co., Wash., shows small quartz veins in limestone. Ore is chalcopyrite, pyrite with some malachite and azurite. Developed by 340' and 100' tunnels.

UNITED STATES EXPLORATION CO. CALIFORNIA

Office: 617 Pacific Bldg., San Francisco. Mine office: Granite Basin, Plumas Co., Calif. Officers: O. P. Posey, pres.; C. N. Miller, sec. and mgr. Inc. 1904, in Nev. Cap., \$1,000,000; shares \$1 par; promotion stock, 300,000 shares.

Owens Pepin mine, also lease and option on Robinson mine. Report of E. C. Reed, mining engineer, gives value of \$20.50 for 240' of ore-shoot. Vein said to average 2' wide. Machinery on ground for 75-ton mill, including crusher, rolls, jigs, concentrators.

U. S. GOLD CORPORATION COLORADO

Boulder, Colo. Officers: N. P. Garretson, Topeka, Kansas, pres.; J. R. Wolff, v. p.-gen. mgr.; W. T. McGinnis, sec.-treas.; J. W. Middlesworth, J. H. Howry, F. E. Campbell and C. N. Watts, directors. Geo. W. Oates, gen. supt., and T. J. Benjovsky, mine supt.

Inc. 1903, in Colo. Cap., \$3,500,000; shares \$1 par; non-assessable; \$3,271,062 outstanding. Net receipts for 1915 were \$626. Treasurer's report for 1915 shows \$36,360 received from stock sales and ore; disbursements \$35,733.

Property: the Klondike group, 225.93 acres, patented, Sphinx group, 22 mining claims, in T. 1 N., R. 72 W. in Boulder Co., Colo., Livingston group, 50 acres. Company also owns 50,000 shares, or entire capital stock of the U. S. Reduction Co., which owns the mill.

Development: 1914-15, totaled 1,470.19'. Claims show fissure veins in porphyry, carrying gold ore. Widths, 3'-15' in different workings; mill feed varies from \$4 to \$12 per ton.

Production: 34 tons of ore were shipped, 1915 to Denver smelters, which netted \$1,414. Company reports April 10, 1916, bullion to the amount of \$15,086 shipped to U. S. Mint, Denver, and that 7 tons ore shipped to Denver smelter Feb. 9, yielded \$1,974. Mill said to be treating 45 tons daily and expected to handle 100 tons daily at end of 1916.

After 13 years of intermittent development, and lurid advertising, company is at last producing. Barber & Co. said to be promoting the enterprise. The corporation is not looked upon favorably, and investors are advised to take company statements with a grain of salt.

U. S. LEAD & ZINC CO. MISSOURI

Promoted by C. L. Glass & Co., Vandergift Bldg., Fourth Ave., Pittsburgh, Pa. Directors: P. S. Chambers, D. A. Rees, D. R. Stitsel, W. S. Maxey and J. H. Montgomery. Inc. in Delaware. Cap., \$600,000; shares, \$1 par; non-assessable.

Property: Operates a 20-acre lease in the lead-zinc sheet ground formation in the Joplin district. Development: 140 ft. shaft, with a drift said to show 9½ feet of ore and drill holes said to show ore at depth of 160 feet and 180 feet. Ore milled is reported to have given returns of better than 12%.

Equipment: "Consists of everything necessary for economical operation." A 150-ton mill has recently been completed.

Promoters claimed in August, 1916 that "dividends of ¼c to 2c per share monthly are possible inside of 90 days."

UNITED STATES MANGANESE CO.**VIRGINIA**

Office: 74 Broadway, New York. **Mine address:** Elkton, Va. Fred Berger, supt. **Property:** a tract of several hundred acres S. E. of Elkton, shows 5' of manganese ore mostly psilomelane and pyrolusite, occurring disseminated and massive in yellow clay overlying quartzite. Recent development indicates a large deposit of commercial ore. Mine has washer and concentrating tables.

UNITED STATES METALS REFINING CO.**NEW JERSEY**

Office: 120 Broadway, New York. **Works office:** Chrome, Middlesex Co., N. J. and East Chicago, Ind. F. Y. Robertson, v. p. and gen. mgr.; R. W. Deacon, supt. Copper Ref'y, Chrome, N. J. Wm. Thum, supt. Lead Ref'y, East Chicago, Ind.

Inc. Nov., 1903, in New Jersey. Reorganized Oct. 15, 1906. Cap., \$4,000,000, shares \$100 par, half in 7% cumulative preferred and half in common shares; issued \$3,100,000, half preferred and half common stock. Is controlled, jointly, through stock ownership, by the United States Smelting, Refining & Mining Co., and Aaron Hirsch & Sohn, of Halberstadt, Germany. Annual meeting, second Tuesday in May.

The Chrome works, which have had to be enlarged nearly every year since they were first built, include a complete smelting and converting plant for the treatment of ores, concentrates and mattes, with smelting capacity of 15,000 to 18,000 tons a month, converting capacity of 3,500,000 to 4,000,000 lbs. of blister a month, and an electrolytic refinery with a capacity of 180,000,000 lbs. annually.

The smeltery has two 42x180" blast furnaces, two 84x120" basic-lined converters, one 60x6' rotary kiln for sintering fine material, and one Dwight-Lloyd sintering machine. The smeltery is further equipped with a 500' steamship dock, with berth for 2 steamers, the most modern type of Fairbanks scales, having a sensitiveness of 10 lbs. on a load of 100,000 lbs., and a very complete automatic sampling mill, equipped with Brunton samplers.

The refinery has one 225-ton and two 175-ton anode furnaces and two 225-ton wire-bar furnaces, equipped with charging cranes, casting wheels, waste heat boilers and the most modern devices for mechanical handling. The tank house has 896 tanks arranged on the Walker system.

The power house is steam-driven and arranged for highest economy with economizer and superheater equipment, 3 compound condensing units and 1 triple expansion unit, using an exhaust steam turbine for the third expansion. Current is generated at the rate of 13,000 amperes. Three circuits are carried in the tank house with a voltage of 115 volts each, 1 power unit being carried in reserve.

The anode slimes are refined by the usual processes, the doré bullion produced being parted electrolytically. Some of the rarer elements are recovered as byproducts.

The Grasselli plant, consisting of a 75-ton electrolytic lead refinery, was the first electrolytic lead refinery in the United States. Has annual capacity of 72,000,000 lbs. lead.

The plants of the United States Metals Refining Co. are strictly modern in design and equipment and are noted for the technical excellence of their practice and the purity of their commercial products. The Betts process is used which permits the recovery of bismuth and other by-products.

UNITED STATES MINING CO.**COLORADO**

W. R. Benzie, 502 Majestic Bldg., Denver, Colo. **Inc. in Colo. Cap., \$50,000; shares \$1 par; non-assessable. "No individual liability." Organized to operate leases in the Cripple Creek district. Is a stockbrokers', mail order promotion.**

UNITED STATES MINING CO.**UTAH**

Dissolved. See U. S. Smelting and U. S. S. R. & M. Co.'s, and Vol. XI, Copper Handbook, for full description.

U. S. REDUCTION & REFINING CO.**COLORADO**

Address: Byrne & McDonnell, 60 Broadway, New York. Defaulted in payment of interest on bonds due Jan. 1, 1916, and plant ordered sold at auction May 11, 1916, by Federal Court in bankruptcy, all restrictions as to minimum bid being removed, when no bids were received April 25, for price of \$250,000. Property included the Standard plant, near Colorado City; the Union plant near Florence, Fremont county; metallic cyanide plant at Cyanide, Fremont county; interests of the company in the Cripple Creek Sampling & Ore Co.; property in Cripple Creek mining district, Teller county; all interest in the plant and site of the United States Smelting Co. near Canon City in Fremont county; National plant near Florence, in Fremont county; National sampler site near Cripple Creek; all mining claims owned by the defendant company in Summit county; the Brush Hollow ranch of 200 acres in Fremont county, together with all water rights, reservoirs, pipe-lines, franchises, contracts, etc.

U. S. SMELTING, REFINING & MINING CO.

Office: 55 Congress St., Boston, Mass. **American operating office:** 920 Newhouse Bldg., Salt Lake City, Utah.

Selling Office, United States Smelting Co., Inc., 120 Broadway, New York City.

Needles Mining and Smelting Co.

Custom Lead and Zinc Concentrator at Needles, Cal. **Address:** Needles, Cal.

Mammoth Copper Mining Co.

Custom Copper Smelter at Kennett, Cal. **Address:** Kennett, Cal.

United States Smelting Co.

Custom Lead and Copper Smelters and Custom Lead and Zinc Concentrating Mills at Midvale, Utah. **Address:** Salt Lake City, Utah. Custom Zinc Smelters at Iola, Altoona and La Harpe, Kansas. **Address,** 413 Republic Bldg., Kansas City, Mo.

Goldroad Mines Co.

Goldroad, Arizona.

United States Metals Refining Co.

Custom Copper Smelter and Electrolytic Copper Refinery at Chrome, N. J. Electrolytic Lead Refinery at Grasselli, Ind. **Address:** 120 Broadway, New York City, N. Y.

Cia. de Real del Monte.

Mines and Mills at Pachuca and Real del Monte. **Address:** Pachuca, Hidalgo, Mexico.

U. S. Smelting, Refining & Mining Exploration Co.

For Examination and Purchase of Metal Mines. **Address:** 55 Congress St., Boston Mass.; 120 Broadway, New York, N. Y.; 1504 Hobart Bldg., San Francisco, Cal.; Newhouse Bldg., Salt Lake City, Utah; 906 Mills Bldg., El Paso, Texas; Edificio La Mutua 411, Mexico, D. F. **Officers:** Wm. G. Sharp, pres.; Chas. G. Rice, B. Preston Clark, Jas. J. Storrow, Sidney W. Winslow, executive committee; Frederick Lyon, v. p., in charge of operation; Sidney J. Jennings, v. p., in charge of exploration and mining investments; C. W. Van Law, 2nd. v. p., in charge of operations; Robt. S. Bradley, Stephen L. Bartlett, Robt. J. Edwards, Chas. F. Brooker, Robt. Treat Paine, 2d., Andrew Preston, Frederick Ayer, C. A. Hight, Edw. B. Bayley, J. J. Phelan, S. W. Winslow, Jr., and David A. Ritchie, directors; F. W. Batchelder, sec.-treas.; M. F.

Kennedy, asst. to the pres.; John Laurie, comptroller; Carl F. Moore, chief engr.; A. P. Anderson, field engr.; Geo. W. Heintz, traffic mgr. and gen. mgr. United States Smelting Co.; J. H. Horlick, mercantile mgr.; G. W. Cushing, traffic mgr.

Inc. Jan., 1906, in Maine. Cap., \$75,000,000; shares \$50 par, in \$37,500,000 of 7% preferred cumulative stock and \$37,500,000 common stock; issued \$24,317,500 preferred and \$17,555,750 common stock, May 19, 1915. National Shawmut Bank, Boston, registrar; Old Colony Trust Co., Boston, transfer agent. Annual meeting in May. Listed on Boston and New York Exchanges.

Dividends: rate is 7% on preferred stock, payable in quarterly dividends of 1¾%; first dividend paid April 15, 1906. Dividends on the common stock are given in the table below. 1916 dividends amount to \$2.75 per share up to July 15, the new rate being \$1 quarterly.

Financial Statement:

	Net Earnings	Deprec. & Reserve	Pfd. Dividend	Bal. for Common	Earned Common	Paid Com.
1915....	\$7,579,184	\$ 986,859	\$1,702,225	\$4,890,100	27.85%	
1914....	2,932,519	666,878	1,702,222	563,421	3.21%	\$1.50
1913....	4,555,122	969,536	1,702,145	1,883,441	10.73%	3.00
1912....	5,497,965	1,265,000	1,702,120	2,530,845	14.41%	2.25
1911....	3,961,103	1,120,690	1,702,120	1,157,954	6.71%	2.00
1910....	3,551,387	1,067,069	1,701,701	781,765	4.45%	2.00
1909....	3,956,608	810,248	1,700,963	1,429,487	8.14%	2.00
1908....	3,359,222	311,632	1,700,801	1,308,737	7.46%	2.00

\$600,000 was written off 1915 earnings, and balance was written off during 1916 to pay off the cost of the three zinc smelters acquired in 1915, amounting to \$953,597.

The working capital of the company has been increased to \$13,700,000, and the company had at the end of the year cash on hand \$2,482,830, as against current liabilities of \$3,620,148. Total assets and liabilities stood at \$65,444,732. The balance sheet as of Dec. 31 last shows:

Assets: capital assets, \$47,368,980; improvements, options and other deferred charges \$635,845; discount on gold notes to be amortized \$96,666; ores, matte and by-products at cost \$1,287,127; supplies, fuel and timber at cost \$1,573,611; metals in transit, in process and on hand (at less than market value) \$6,172,835; notes receivable \$3,867,148; accounts receivable \$1,959,685; cash \$2,482,830; total \$65,444,732.

Liabilities: common stock \$17,553,837; preferred stocks \$24,313,725; capital stock of subsidiary companies not held by U. S. Sm. Ref. & Mng. Co.; \$1,029,699; 4-year 5% gold coupon notes \$4,000,000; current liabilities \$3,620,148; depreciation and reserve funds \$6,327,798; undivided surplus, applicable to stocks of subsidiary companies not held by U. S. Sm., Ref. & Mng. Co., \$346,069; profit and loss surplus \$8,253,454; total \$65,444,732.

1916 earnings to June 1 are \$5,072,840, only \$1,000,000 being derived from Mexico.

Company is a securities-holding corporation only, owning shares in the following subsidiaries:

	Par	CAPITALIZATION		
		Auth. Shares	Issued Shares	Owned by U. S. S. R. & M. Co. Outstanding
United States Smelting Co.	\$100	10,000	10,000	None
Centennial-Eureka Min. Co.	25	200,000	100,000	99,964
Mammoth Cop. Min. Co....	25	100,000	60,000	60,000
Gold Road Mines Co.	5	400,000	314,011	314,911
The Needles Min. & Smel. Co.	5	1,000,000	674,887	674,887
				None

United States Stores Co... (Succ. to Bingham Mercantile Co.)	10	500	500	500	None
Cia de Real del Monte y Pachuca	None	2,554	2,554	2,534	20
U. S. Smel., Ref. & Min. Exp. Co.	\$ 50	1,000	900	900	None
U. S. Metals Ref. Co.	100 (Pfd.)	20,000	15,500	10,433	5,067
U. S. Metals Ref. Co.	100 (Com.)	20,000	15,500	10,450	5,050
Richmond-Eureka Min. Co.	10	380,000	309,397½	182,213	128,884½
Niagara Min. Co.	1	1,000,000	650,005	443,259	41,873
Carbon Emery Stores Co.	5	30,000	27,000	27,000	None
San Pete Valley Coal Co.	10	2,000	2,000	1,877	123
The Utah Co.	50	100,000	100,000	100,000	None

The Utah is a holding company owning the following shares and bonds:

	Owned by The Utah Company				
Utah Railway Co.	\$100	35,000	30,589	30,589	None
Castle Valley Coal Co.	5	1,500,000	923,800	482,139	441,661
Consolidated Fuel Co.	1	2,000,000	1,500,000	1,493,000	None
Black Hawk Coal Co.	10	30,000	25,200	25,200	None
Panther Coal Co.	5	100,000	91,000	45,500	None

	Title of Security	Authorized	Issued	Owned by the Utah Company
Castle Valley Coal Co., First & Ref. Mtge. 15-yr. 6% S. F. Conv. Gold Bonds		\$1,000,000	\$1,000,000	\$ 624,000
Black Hawk Coal Co., First Mtge. 6% Gold Bonds		200,000	200,000	None
Consolidated Fuel Co., Joint First Mtge. 6% Serial Gold Bonds		800,000	450,000	None
Utah Railway Co., Utah Ry. Co. 5% Gold Coupon Notes		2,750,000	2,750,000	2,750,000

*1 U. S. S. Co. owns 10 shares of the Centennial-Eureka Mng. Co.'s stock and 1690 shares of the Niagara Mng. Co. stock. It also owns 81 shares of the Pfd. stock and 41 shares of the Com. stock of the U. S. Sm. Ref. & Mng. Co.

*2 The Centennial-Eureka owns 54,824 shares of the capital stock of the Bullion Beck and Champion Mng. Co., of which there are 63,787 shares issued.

*3 2,000 shares of the Consolidated Fuel Co. are owned by the U. S. Sm. Ref. & Mng. Co.

*4 45,500 shares of the Panther Coal Co. are owned by the U. S. Sm. Ref. & Mng. Co.

*5 \$221,500 of the Castle Valley bonds are owned by the U. S. Sm. Ref. Mng Co

*6 \$200,000 of the Black Hawk bonds are owned by the U. S. Sm. Ref. & Mng. Co.

*7 Held in treasury for subscription by U. S. S. R. & M. Co.—158,349 shares. Held for exchange of old Niagara Mng. & Sm. Co. stock, 6,524 shares.

June 1, 1916, the only outstanding obligation of the company was \$12,000,000 6% convertible gold notes, dated Feb. 1, 1916, and due Feb. 1, 1926.

The above named subsidiary companies are described elsewhere in this book under their own names.

Production:

	Zinc Lbs.	Copper Lbs.	Lead Lbs.	Silver Oz.	Zinc Oz.
1915	34,105,471	26,923,674	87,102,179	12,071,863	196,481
1914		17,946,659	64,443,260	9,936,237	124,719
1913		20,239,973	58,116,504	13,089,708	148,372
1912		21,152,620	56,385,769	12,059,829	140,183
1911		22,199,141	49,022,791	10,285,150	118,703
1910		28,430,423	51,450,985	10,776,465	113,246
1909		36,672,606	41,627,995	9,637,119	128,393
1908		32,803,603	27,304,347	8,340,566	128,208

Average prices received:

	Copper Per Lb.	Lead Per Lb.	Silver Per Oz.	Zinc Per Lb.
1915	\$0.18183	\$0.04546	\$0.49965	\$0.14964
1914	.13404	.03827	.55564	
1913	.15433	.04396	.60503	
1912	.16237	.04529	.61291	

The total amount of ore from the Centennial-Eureka, Mammoth, Gold Road, Tennessee, and Bingham mines, also mines in Mexico was 1,066,025 tons, of which the values of the metal-contents were in the proportion of 30% copper, 5% lead, 21% zinc, 25% silver, and 19% gold. The Real del

Monte mills were operated at 50 to 80% of their capacity, in spite of great handicaps. The coal output was 707,559 tons.

Profits for the first quarter of 1916 have been at the rate of \$30 per share on common stock and with advancing prices for silver will be greatly augmented. Developments at company's silver mines in Mexico are the most sensational that have ever taken place in Mexico's mining history. The ore developed on the 1,400' level is reported to have a net value of \$15,000,000, while a reasonable extension of the orebodies would give a net valuation of \$75,000,000 according to reports received. The company's operations have not been as seriously curtailed as those of other companies, and with peace in Mexico, these properties will break all records for silver production.

Company is ably managed and in the hands of experienced, yet courageous, executive officials, so that an even more prosperous future is assured.

United States Smelting Co.

Office: 55 Congress St., Boston, Mass. **Operating office:** 920 Newhouse Bldg., Salt Lake City, Utah. **Works office:** Midvale, Salt Lake Co., Utah. **Officers:** Wm. G. Sharp, pres.; C. G. Rice, v. p.; C. W. Van Law, 2nd v. p., in charge of operations; F. W. Batchelder, sec.-treas.; preceding with S. W. Winslow, B. Preston Clark and J. J. Storrow, directors; Geo. W. Heintz, gen. mgr.; L. D. Anderson, smelter supt.

Is controlled, through ownership of entire capital stock issue, by the U. S. Sm., Ref. & Mng. Co. Inc. Sept. 2, 1902, in Maine. Cap., \$1,000,000; shares \$100 par.

The company owns the following property: (1) The Old Jordan, Telegraph & Galena mines, including 99 patented and 15 unpatented claims at Bingham, Utah. (2) The Midvale Smelter, at Midvale, Utah. (3) Three zinc smelters, in Kansas, with a total capacity of 70 tons spelter per day, purchased in 1915 to handle the output of the company's subsidiaries and to obtain the great profit between the price of ore and spelter. (4) Lime quarry at Topcliffe, Utah. (5) This company also owns 10 shares of Centennial Eureka Mng. Co., 1,690 shares Niagara Mining Co., 81 preferred and 41 common stock of the U. S. Sm. Ref. & Mining Co. stock.

The Bingham mining property includes very valuable mines producing silver-lead, copper, gold and zinc ores, in part complex. They have been operated since 1870, and by this company since 1899. The orebodies occur in limestone, which precludes the economic blocking out of large ore reserves, but the company states that 2 or 3 years supply is developed, the unexplored territory is large and the outlook promising. The geology of the district is fully described in U. S. Geol. Survey Prof. Paper No. 38, 1905.

In 1914 the mines produced 194,898 tons of ore of an average value at the mine of \$7.198, at a mining cost of \$2.86. Production in 1915 amounted to 94,166 tons of lead and 34,313 tons of copper. The mines are connected by a 3 mile aerial tram with the D. & R. G. Ry., and by the Niagara tunnel with the Garfield Bingham Ry.

Midvale smelter

Midvale smelter, at Midvale, Utah, comprises a lead smelter, and lead and zinc concentrating mill which treat not only the company's ores but do a general custom business. The smelter has six blast furnaces with a smelting capacity of 481,000 tons per year. It is equipped with modern blast and roasting furnaces, charging apparatus and bag houses which eliminate smelter fumes, and recover arsenic and cadmium.

All ore is received at the sampling plant, which contains 2 mills, one for oxidized and one for sulphide ores. The former is equipped with one 10"x20" Blake crusher, one No. 2 style D Gates crusher, one set 14"x27"

Davis rolls, one set 14"x26" Colo. Iron Wks. rolls, two 42" Snyder samplers, two 27" Snyder samplers, giving final sample of 1 part in 720, 50-h. p. a. c. induction motor.

The sampling mill for sulphide ores, which is also used for a crushing plant, contains: one 10"x20" Blake crusher, two 36"x16" Allis Chalmers class B rolls, three 27" Snyder samplers, giving final sample of 1 part in 360, one 50-h. p. a. c. induction motor.

The **Lead Smelter**: of 1,500 tons daily capacity, contains: six 250 tons blast furnaces, having 5 water jackets each side and one at each end; ten 3½" tuyeres each side. Each furnace is 48"x160" at tuyeres and measures 7', 11"x13', 4" at charge floor. The crucible is elliptical with I beam binders. The forehearth is 4', 5x9' and is 3" to 6" deep.

The matte pans are 5' dia.x9" with anchors for embedding in the cast matte for handling by monorail crane. The slag is handled in Stearns-Rogers slag cars of 28 cu. ft. capacity which are emptied by tapping through hole 8" from bottom. The molten lead is drawn off from side of crucible into pots, wheeled to remelting plant, dumped into 4 remelting kettles of 9' dia. and 30 tons capacity.

Skimmings are handled by a Howard dross press. Most of the lead is drawn through iron siphon pipes and cast into anodes on a continuously revolving casting table carrying 10 moulds, but a small amount is cast into pigs. The anode plates are sent to Grasselli works of U. S. Metals Ref. Co. for electrolytic refining. The blast furnace building is ventilated by hoods over forehearth and slag pots, with No. 12 Sirocco fan to baghouse, containing 768 cotton bags 12"x23' long.

Ore handling. Ore is bedded by means of 18" belt conveyor from oxide sample mill and Robins automatic reversing tripper. 3 Brownhoist electric scale charge larries make up charges and deliver into 6' gauge charge cars which dump directly into tops of blast furnaces.

The roasting department contains: 26 converter roasters (worked during one 8 hr. shift only), each converter roaster consists of a 6'x6x3' high cast iron shell with 3' hood, bottom of grate bars, through which 9 oz. blast is blown for about 4 hrs. Solid sintered cake is discharged by ram car, and carried by half gantry crane to a 24"x36" Farrel crusher which delivers the broken product to an inclined skip hoist discharging into R. R. cars. There are also 4 Wedge furnaces, each 21' dia.x7 hearths; the feed is brought by belt conveyors; the product handled by pan and belt conveyors. Sulphur in product is still further eliminated in D. & L. plant. The plant also contains 6 Dwight-Lloyd sintering machines for which the feed is mixed in bins and on conveyor belts, and the product is discharged into R. R. cars.

The fumes pass into a brick baghouse 60'x283' in ground section and 58' high, with 8 separate compartments, 5 for roaster fumes, each compartment or bay having 416 woolen bags 18" dia.x32'-6" long; 3 handle part of the blast furnace fumes, each having 420 woolen bags. All bays have steel hoppers under thimble floor provided with 9" screw conveyors for discharging dust into cars.

All Dwight-Lloyd roaster fumes pass into a 5½' balloon flue, leading into two 10' dia. cooling flues, where fumes from the ZnO furnace are added to neutralize SO₂.

Wedge furnace and converter roaster fumes pass into 8½' balloon flues and through a 122" fan run by 50-h. p. motor into two 10' cooling flues above. Slack lime is added to neutralize SO₂. All roaster fumes pass through 13'-6" Sturtevant fan run by 150-h. p. motor to roaster section of baghouse. From baghouse two No. 20 Sirocco fans run by 150-h. p. motor force gases into 16'-6"x245' steel stack, at same time drawing in fresh air

for diluting gases. Gases issuing from stack must contain less than .75% by volume of SO_2 by Court decree. Part of the blast furnace fumes pass through rectangular brick flue with hopper bottoms to 15' Sturtevant fan run by 100-h. p. motor and then into blast furnace section of baghouse. Each of 3 blast furnace bays has a separate stack 6' dia. x 100'. The blast furnace fumes not handled in this baghouse pass through a balloon flue 15' dia. x 160' to a No. 14 Sirocco fan (run by 50-h. p. motor) into a brick chamber which is connected by air operated valves to a 5-compartment baghouse lined with asbestos sheets. This baghouse has 1,200 12" x 34' cotton bags. Dust is collected in cars in tunnel under baghouse hoppers. Blast furnace fumes are neutralized with slacked lime before they enter baghouse.

Roaster dust is briquetted in Chrisholm-Boyd-White machine. Blast furnace dust averaging 40 to 50% arsenic is taken to arsenic plant.

The crude product carries 97 to 99% arsenious trioxide, which is removed through the doors, and sent, in buggies, over a monorail crane to the refining furnace, where charged direct into a 30x66" steel hopper in the top of the refining furnace. Access to the interior of the refining furnace is through three 9x15" doors on each side and a temperature of about 700° F. is maintained. The capacity of the refining furnace being 15 tons daily, and output of crude arsenic being only about 2 tons daily, from each Brunton furnace, the refining furnace is worked only part time. The product of the refining furnace is crystalline arsenious trioxide of 99.87% average tenor, which is sent to a 3' buhr-mill, ground and packed for shipment. The grinding is done in a small room, tightly closed, and connected with an exhaust fan discharging into a small baghouse, so that no arsenic may escape into the air. Workmen about the arsenic plant wear a one-piece suit of overalls, with a hood, furnished by the company, and also wear respirators, when entering the chambers, or otherwise coming in contact with the arsenic. All employes of the arsenic plant are required to take a bath and make a complete change of clothing when going off shift.

Residue from Brunton furnaces is ground in 3'x3' 6" pebble mill, treated with sulphuric acid, roasted in a reverberatory type roaster, ground again, agitated with water in a Pachuca tank, filtered, the filtrate going into 8 electrolytic tanks having lead anodes and aluminum cathodes on which cadmium is recovered.

The Power Plant contains 4-250-h. p. batteries of water tube Sterling boilers (2 of which are in continuous operation) generating steam at 140 lbs. pressure; 2 batteries with American stokers and 2 with Roney stoker. Steam is used to operate 3 Nordberg tandem compound Corliss engines 12"x24"x36" each, direct connected to 175 cu. ft. Connersville blower, and 1-10"x18"x36" Nordberg cross compound Corliss engine tandem connected to 12"x12"x36" compressor for supplying air for forges, air hammers, air lift pumps, hoists and various pneumatic machinery. Main power plant includes one 500-k. w. Curtis steam turbine, one 200-kva synchronous motor generator set for D. C. current at 500 volts, one 150-k. w. D. C. generator, one 150-k. w. A. C. generator, both connected to 12"x24"x36" tandem compound engine by belt, one 200-k. w. D. C. generator connected to 16"x32"x36" tandem compound engines.

Electric current is supplied by the Utah Power & Light Co. at 44,000 volts stepped down to 480 volts in three 300-kva single phase transformers and one 400-kva 3 phase transformer. Current for electrostatic zinc mill and 150-ton concentrator is stepped up to 1,440 volts in 200-kva. auto transformer, and again stepped down at mill to 480 volts in 200-kva auto transformer.

Zinc-Lead Concentrating Mill

The concentrating mill has a capacity of 210,000 tons of ore per year. It treats the low-grade silver-lead ores of the Bingham mines, producing lead concentrates sent to the smelter, and a "middling" product containing zinc and iron sulphides, which is treated in the Huff electrostatic mill. The wet concentrating plant has two units, one of 150, the other of 450 tons daily capacity.

The 450-ton concentrator has the following equipment: one 10x20 Allis Chalmers-Blake crusher, three 36x16 Allis Chalmers style B rolls, 10 trommels, seven 3-compartment single Harz jigs, twenty 8' and 9' Callow tanks, two shovel wheels, six 16" Bucket elevators, two 5'x14' Denver Eng. Wks. tube mill, eleven 20" to 60" double cone classifiers, eight Deister slime tables, 11 Overstrom tables, 24 Wilfley tables, one 4-compartment concentrates bin, misc. settling tanks and centrifugal pumps, one 100-h. p., one 75-h. p., two 50-h. p., one 35-h. p., one 30-h. p., one 25-h. p. motors.

Concentration $2\frac{1}{2}$ to 1; extraction is 85 to 90% silver-gold-lead, 40% zinc, 80% copper.

The 150-ton smelter at the concentrator contains one 9x15" Hodge Blake crusher, four 30x12" Allis Chalmers rolls, 7 trommels, four 3-compartment single Harz jigs, six 8' Callow tanks, one shovel wheel, one 24" Atkins classifier, four 12" and 16" bucket elevators, nine 20" 60-60" double cone classifiers, 12 Wilfley tables, 4 Deister slime tables, one 2-compartment concentrates bin. Misc. settler tank and centrifugal pumps, one 75-h. p. motor, two 35-h. p. motors. Ratio of concentration is $1\frac{3}{4}$ into 1. Extraction averages 85 to 90% gold, silver; lead, 50% zinc, 80% copper.

The 75-ton electrostatic zinc mill contains 1 zinc middlings receiving bin, one 60"x30' Ruggles-Cole dryer, 2 Banks of Newaygo screens—16, 40, 60, 100 mesh; 9 Huff roughing machines, 12 Huff finishing machines, 6 combined roughing and finishing toboggan machines, one 35-h. p., one 50-h. p., one 10-h. p., three 5-h. p. induction motors; one baghouse with No. 70 A. Blower Co. fan for collecting dust from mill, with 64-12" dia. x 16' cotton bags. Product 40% to 50% zinc and iron pyrites.

Other Plants

The U. S. Smelting also owns and operates zinc smelters at Altoona, Iola, and LaHarpe, Kansas, and operates under a lease the Ravenswood mine near Reeds, Mo. All smelters are equipped for either oxide or sulphide ores.

Altoona Zinc Plant: Altoona, Kansas. Local supt., I. A. Palmer. The property includes 30 acres, and has a capacity of 39,000 tons of ore per year. It contains 6 blocks; 12 furnaces; 3,960 retorts; the total capacity per day is 108 tons, producing approximately 30 tons spelter per day.

Iola Zinc Plant: Iola, Kansas. Local supt., A. R. Campbell. The plant has 34 acres land and a capacity of 34,000 tons of ore per year. It consists of 5 blocks, 10 furnaces, with 3,440 retorts. Total capacity per day 95 tons, producing approximately 25 tons spelter per day.

LaHarpe Zinc Plant: LaHarpe, Kansas. Local supt., A. R. Campbell. The plant has 19 acres and treats 18,000 tons of ore per year. The smelter has 3 blocks, 6 furnaces, 1,924 retorts. The total capacity per day is 52 tons, or approximately 15 tons of spelter.

All three smelters use natural gas as fuel, having 14,481 acres of gas land in fee or under lease. The total capacity per day is 225, or 7,650 tons per month, which is approximately 70 per day, or 2,100 tons per month of spelter.

Ravenswood Mine: Local supt., T. J. Rightly, Reeds, Jasper Co., Missouri. Mine production 218,000 tons (per annum). The zinc mill has a

capacity of 218,000 tons (per annum). The mine was unwatered and production begun at the end of 1915.

In 1916 the company purchased the Marbury leases consisting of 60 acres lying between the Blue Goose and Beaver mines in the Cardin camp, and has started the development of the property by sinking two shafts to the ore deposit. The consideration given for the property is said to have been \$125,000. There were 20 drill holes put down and of these 18 were said to have struck good ore from 280 to 312'. The company moved its Ravenswood mill to the newly acquired lease.

U. S. Smelting, Refining & Mining Exploration Co.

Office: 120 Broadway, New York. **Operating office:** 508 Dooly Bldg., Salt Lake City, Utah. Subsidiary of the U. S. Sm. Ref. & Mng. Co., which owns the 900 shares issued of a total of 1,000 shares capital stock.

Inc. in Maine. Officials: C. W. Van Law, v. p.-gen. mgr.; A. P. Anderson, Pacific Coast mgr.; E. N. Funston, El Paso mgr.; D. D. Muir, Jr., Inter-Mountain mgr.; C. F. Moore, cons. engr.

Company was organized for the purpose of exploring and developing new properties, which, when acquired, would be turned over to operating subsidiaries of the U. S. Sm. Ref. & Mining Co.

Leadville Unit. Leadville, Colo. H. S. Lee, mgr. E. H. Hamilton, supt.

This unit is unwatering the 407' Harvard shaft on Fryor Hill, and the shaft will be sunk several hundred feet through quartzite to the second contact. Thorough exploration and a geological study of the entire territory controlled by this unit is in progress. Property is equipped with hoist, compressor, etc.

Arizona Unit. F. B. Weeks, Tucson, Ariz. The Durham property in the Tortillita Mountains, 50 miles N. E. of Red Rock, Ariz., is being explored by churn drills. The land adjoins that of the Tortillita Copper Co.

UNITED STATES TUNGSTEN CORPORATION NEVADA

Address: O. E. Roodhouse, mgr., Tungsten, Nev. Operates a mill for concentration of tungsten ores, S. of Osceola, White Pine Co. Ores milled are partly purchased and partly obtained from company ground on the Snake range. The statement that this company is a subsidiary of the Tonopah Mining Company or has any connection with it is officially denied.

In May, 1916, took over properties near Nederland, Colo., held by Colorado Tungsten Co., controlled by W. M. Long of Boulder, Colo. The property at Tungsten, Nev., includes not only the Hub vein from which the company has obtained most of its ore, but also numerous new discoveries of hübnerite ore elsewhere on the group.

A mill is in operation, treating custom ore, as well as the company's own production.

The Independent Tungsten, Consolidated Tungsten, Nevada Scheelite, Ophir Mining and Atkins, Kroll companies are also operating in this district.

UNITED STATES ZINC CO. COLORADO

All stock owned by the A. S. & R. Co., which see. Plant at Pueblo, Colo., has 2,320 retorts.

UNITED TINTIC MINING CO. UTAH

Office: 403 Newhouse Bldg., Salt Lake City. L. A. Martin, pres.; C. E. Martin, sec. **Inc. in Utah. Cap., \$1,000,000; shares 50c par; assessable.** Listed in Salt Lake City. Owns 28 claims in the Tintic mining district. Operations not reported.

UNITED VERDE COPPER CO.**ARIZONA**

Office: 20 Exchange Place, New York. **Mine office:** Jerome, Yavapai Co., Ariz. **Smelter office:** Clarkdale, Ariz. **Officers:** Wm. A. Clark, pres.; Jas. A. MacDonald, v. p.; J. H. Anderson, sec.; H. H. St. Clair, treas.; Chas. W. Clark, gen. mgr.; officers are the directors; Will L. Clark, mgr.; Robt. E. Tally, mine supt.; Thos. Taylor, smelter supt.; Clarence V. Hopkins, mg. engr.; Dave Hopkins, purch. agt.; A. L. Reese, chem.-assayer.

Inc. 1883, in New York and reorganized Sept. 2, 1899, in West Virginia. **Cap.**, \$3,000,000; shares \$10 par; fully issued and fully paid. Is practically a close corporation, having less than 20 shareholders, and is controlled, through stock ownership, by W. A. Clark. Five hundred shares were sold at auction, March, 1910, for \$70 per share.

Gross sales of copper, silver and gold were \$5,368,672 in 1909, \$5,605,488 in 1910, \$4,736,834 in 1911, \$5,899,457 in 1912, \$6,171,116 in 1913, \$5,186,909 in 1914.

Company's investments at end of 1915 were valued at \$2,587,724, compared with \$2,696,725 in 1914. Cash on hand and in bank total \$1,163,044 Jan. 1, 1916.

Dividends: were begun, 1892, by old company on the basis of 25 cts. per share monthly. Recent dividends have been: \$2,005,000 in 1905, \$2,700,000 in 1906, \$2,700,000 in 1907, \$2,025,000 in 1908, \$2,700,000 in 1909, \$2,700,000 in 1910, \$2,250,000 in 1911, \$1,800,000 in 1912, \$1,575,000 in 1913, \$1,125,000 in 1914, \$1,800,000 in 1915, \$2,025,000 to July 4, 1916, a total of \$37,747,000.

Property: 13 claims, patented, 230 acres, with sundry adjoining property, including the North Venture and South Venture claims, which have produced a little high-grade ore, in the Verde district of the Black Hills range, at an average elevation of 5,600' above sea level, and about 1,800' above the valley of the Verde river.

Geology: the property shows granular porphyritic igneous rocks, slate and schist, the ore deposit being connected with intrusions of acidic porphyry in dioritic rocks; the rocks are sheared and schistose, the overlying limestone having no genetic connection with the ore deposit.

The mine is opened on a single large deposit of sulphide ore, in a sheared diorite, about 600' in extreme width and 1,900' length, proven to depth of 1,500'. The orebody consists of more or less irregular masses, in a much broken and disturbed area, the ore-shoot having a dip of 72° and containing a 70' quartz vein that carries about 1% copper and from 0.25 to 0.75 oz. gold per ton, this quartz being used for converter linings. The gossan outcrop, originally carrying auriferous and argentiferous oxidized ores to a depth of about 160', has been worked out. The zone of secondary enrichment carries chalcocite, with some covellite, and other secondary copper ores, all highly argentiferous. The primary zone carries mainly chalcopyrite, with a little bornite. No ore assortment is attempted, and no concentration is made, everything from the mine going to the furnaces, the average of ore from all openings formerly being about 6.5% copper and 15 to 32% sulphur, with considerable gold and silver values in the oxidized zone.

Development: to a depth of 2,000', but production is mainly from the 6th and lower levels. The older portions of the mine are worked pillar-and-stall and timbered with square sets, filled with waste, worked-out stopes being filled with culls, and occasionally with barren rock blasted from the mountainside above the mine and milled into abandoned stopes. The oxidized zone has been mined by open cut and by the milling system. In the newer workings, and parts of the old mine where the ground will permit, bottom slicing and a modification of the shrinkage system is used.

The ore is very easily oxidizable, owing to its high sulphur tenor, and is therefore liable to spontaneous combustion, while, owing to the more or less shattered condition of the orebody, it is difficult to entirely prevent the access of air, very little of which will keep a sulphur fire burning incessantly. The fire on the 400' level has been burning since 1897, and the mine is on fire in various places, from the 7th level to surface, fire in stopes not worked being walled off by cement bulkheads having steel gates. Mining has been in progress for several years, in the fire zone, under the Plenum system, introduced by J. J. Shaw. By this method, air under pressure is blown against the face of the stopes by electric fans. The air feeds the fire, which is a smouldering one, but drives back the deadly fumes into the shattered rock mass and permits the extraction of ore. The fire, while dangerous and annoying, does not destroy the copper, all of which will be recovered eventually, by mining or leaching.

Equipment: the compressed air plant on surface includes a 2-stage compressor, 28 and 52 and 26 and 44 $\frac{1}{4}$ x48" and 3 smaller units, including 2 machines driven by 600-h. p. and 300-h. p. motors, also a compressor driven by a 275-h. p. motor. No. 3 hoisting shaft has a first-motion hoist, good for 1,500'. No. 5 shaft will have an Allis-Chalmers mechanical double-drum hoist, with electrical equipment, speed of 1,900' per minute, and good for 3,000' depth; 7-ton skips operated in balance will be used. Haulage equipment underground includes nine 4-ton, four 6-ton and three 7-ton locomotives.

Smelter: the old smelter, built on the hanging-wall side of the mine and too close to the orebody, had considerable trouble from caving ground and was closed down and dismantled.

The new 3,000-ton smelter designed by Repath and McGregor has been operating since June, 1915. It is one of the most modern in the world, consists of a crushing and sampling plant, calcining plant, blast furnace, converter, and reverberatory departments, and a power house, together with coke and ore-storage yards and bins with a total capacity of 26,000 tons. Buildings are built of steel and concrete.

The crushing and sampling plant has an Allis-Chalmers 30x18" jaw-crusher, driven by a 50-h. p. motor; product passes up a long incline belt conveyor, capacity 2,400 tons daily, to top of sampling mill. This mill has three 20x10" Blake crushers, three sets of Allis-Chalmers crushing rolls, 54x24", 36x12" and 24x12"; two 4x14' Gates trommels and four Snyder samplers with final sample of 1 to 250. Crusher product goes over conveyor belts to storage bins for fines or to the calcining plant.

The calcining plant has six 21 $\frac{1}{2}$ ' Wedge furnaces, each with a daily capacity of 96 tons. The 7 hearths, 6 roasting and 1 drying, are lined with concrete. The plant is built so that it can be enlarged when required. Cooling blast is furnished by 1 or 2 No. 6 Sirocco, 3-oz. blowers, each having a capacity of 25,000 cu. ft. of free air per minute, driven by a 30-h. p. motor. Fumes pass to the dust chamber building, sides of brick and steel, roof of 24-gauge copper equipped with baffle plates, and then to the 400' stack. Calcines, as well as dust, are drawn into 15-ton cars, drawn by 10-ton electric locomotives.

The reverberatory plant has three 19x100' furnaces, placed at one end of the furnace building. Calcines, with oxidized ores, are fed to these furnaces. Slag is drawn off into Treadwell motor-tilted pots, drawn by an 18-ton electric locomotive, of which there are three.

The blast furnace plant has four 48x320" blast furnaces, designed by Repath and McGregor. Feed consists of mattes from the reverberatories, rich oxidized and sulphide ores, with some calcite. Gases go to a second

dust chamber, similar to the other, but with steel plate sides, before going to the 400' stack. Ore and flux for the furnaces is brought by 4 to 6 ton side-discharge cars. Reverberatory matte is poured hot.

The converter plant has four stands with five 12' shells of the Great Falls type, supplied by Allis-Chalmers Mfg. Co. Converters are basic, lined with Harbison-Walker magnesite. Tilting is done by 50-h. p. direct current motors. Copper is poured into two copper casting machines, each operated by a 20-h. p. direct-current motor. There is a 75-ton reheating furnace in connection with these. Slag is drawn into Treadwell pots and charged hot into the reverberatories together with rich blast furnace slag.

The power plant will generate only part of the electric current used, remainder being purchased from the Arizona Power Co. Current is received at 44,000 volts and stepped down to 2,200 volts. When the reverberatories are in operation waste heat from them will be utilized for 6 Stirling Type M boilers, 713-h. p. each, 2 to each furnace. Three Parker type water tube boilers, using fuel oil, are held in reserve. A pumping station, equipped with 2 pumps, on the Verde River supplies the water. The cooling system of the furnaces, compressors, and the condensing system of the steam units are taken care of by a central cooling plant and pumping station. There are 3 condensers, 2 Weiss and an Allis-Chalmers, and 5 Allis-Chalmers centrifugal pumps, driven by, motors.

There are 4 blowing engines, supplying the converters; a Southwork-Rateau-Smoot turbo-blower, capacity 24,000 cu. ft. free air per minute at 16 lbs. pressure, 2,500 r. p. m.; a Nordberg, Southwork and an Allis-Chalmers, with capacities of 21,000, 21,000 and 15,000 cu. ft. respectively. A Nordberg 2-stage compressor furnishes air up to 100 lbs. pressure, capacity 3,000 cu. ft. per minute. Air for the furnaces is supplied at 2½ lbs. pressure by 5 Roots blowers, two of 400 cu. ft., two of 300 cu. ft., and one of 224 cu. ft. Blowers are motor driven. A 16x32x36" Allis-Chalmers, tandem-compound engine operates one of the 400 cu. ft. blowers; a 3-cylinder Diesel engine operates one of the 300 cu. ft. blowers.

The electric generating units include 2 Parsons type steam turbines and generators; one is a 500-kva. Westinghouse unit, the other a 1,500-kva. unit made by Allis-Chalmers Mfg. Co., the former delivering current at 440 volts, the latter at 2,300 volts. Two Westinghouse synchronous 1,200-k. w. motor-generator sets take alternating current at 2,200 volts and deliver direct current at 250 volts for the electric locomotives, converter motors, cranes, etc. There are three 300-k. w., three 200-k. w. and three 50-k. w. transformers, also three 30-k. w. transformers.

The United Verde & Pacific railway, controlled by the company, has 28 miles of narrow-gauge line, traversing a very difficult country, connecting the mine and works with the Santa Fé, Phoenix & Prescott railroad at Jerome Junction. A standard-gauge railway, built 1912, by the Atchison, Topeka & Santa Fé R. R. Co., connects the new smelter at Clarkdale with its main line at Cedar Glade. For transportation between the mine and smelter another railroad, the Verde Tunnel & Smelter R. R. Co., has been built; it is operated as a separate organization.

Year	Production:Lbs.	Oz.	Oz.	Year	Lbs.	Oz.	Oz.
	Copper	Silver	Gold		Copper	Silver	Gold
1904.....	29,275,503	668,842	23,754	1911.....	33,167,987	461,145	15,239
1905.....	32,683,951	486,041	15,915	1912.....	31,565,539	484,222	15,082
1906.....	38,827,265	428,317	12,913	1913.....	35,334,694	641,074	20,666
1907.....	33,015,457	356,938	11,733	1914.....	32,448,170	646,572	21,400
1908.....	36,183,089	494,574	20,334	1915.....	45,127,832	902,880	28,221
1909.....	36,694,063	495,480	17,022				
1910.....	38,663,880	563,133	19,267				

It is proposed to work the surface and upper level orebodies with steam shovel, 1916.

In early years the United Verde made copper for 5 cts. or less a pound, if one deducts gold and silver values from the cost. The reported cost per pound of finished copper, after deducting gold and silver values, was 9.17 cts. per lb. in 1904; 9.27 cts. per pound in 1905; 8.69 cts. in 1906, and 10.54 cts. in 1907. Under average circumstances the cost may be figured as 9 to 10 cts. per lb. The United Verde mine has been lied about more industriously than almost any other mine in the world, especially in the literature sent out by new copper mining companies with stock for sale. The United Verde has erroneously been pointed out, as an example of blind luck, but the mine was taken by Senator Clark, when generally considered worked out, and it was developed, by cash and brains, into a magnificent copper mine, the credit being due to the keen mining sense and business acumen of Senator Clark and not to chance. The mine is one of the best copper mines of the world, with many years of large and profitable production ahead.

Company also owns the Copper Giant mine, Wm. Neagle, supt., near Hackberry—acquired in 1913. It is developed by 500' shaft, with various levels which show silicious ore carrying 2-7% copper with small gold-silver values. A concentrating plant will be erected if further development warrants it.

UNITED VERDE EXTENSION MINING CO.

ARIZONA

Office: 233 Broadway, New York. **Operating office:** Prescott, Yavapai Co., Ariz. **Mine office:** Jerome, Yavapai Co., Ariz. **Officers:** James S. Douglas, pres. and gen. mgr.; George E. Tener, v. p.; Louis E. Whicher, v. p.; Chas P. Sands, sec.-treas.; preceding with W. J. Maloney, Paul Armitage, Harold Pierce, Archibald Douglas and Andrew J. Pickrell, directors; David P. Morgan, supt.

Inc. 1902, in Maine, as a reconstruction of the United Verde Extension Gold, Silver & Copper Mng. Co. **Cap.**, \$3,000,000; shares \$10 par. Reorganized in Delaware, cap., \$4,000,000; shares \$10 par; and again reorganized 1912, and cap. reduced to \$750,000, shares 50c par. In this reorganization, approximately 360,000 shares were set aside for exchange, on a share for share basis for old shares outstanding; about 40,000 shares were issued in liquidation of debts; 150,000 shares were issued to Jas. S. Douglas for services; 50,000 shares were sold to Mr. Douglas for \$25,000 cash; 400,000 shares were optioned to Mr. Douglas and his associates with the right to purchase all or a part of this block at par value at any time prior to June 15, 1915; and 500,000 shares were reserved for treasury purposes. **Federal Trust Co.**, Boston, registrar; **State Street Trust Co.**, Boston, transfer agt. Shares are listed on the Boston curb, traded on New York Curb. Annual meeting, 3rd Tuesday in Feb.

Receipts 1915, were \$540,058 and expenses \$336,661, made up from:

Sale of ore.....	\$458,017.43	Operating expenses	\$175,606.57
Sale of stock.....	50,000.00	Construction expenses....	53,562.60
Miscellaneous	5,040.73	Property & overhead expenses	83,068.23

Cash balance Feb. 10, 1916, was \$329,451 with \$160,000 still owing from ore shipped in 1915.

Dividends: an initial quarterly dividend of 50 cts. per share was paid August 1, 1916. Company reported late in June, 1916; cash on hand, \$793,882; due from ore shipped approximately \$1,000,000; it accumulated a larger surplus for purpose of development and building a smelter.

Property: 5 claims, patented, about 75 acres, known as the Little Daisy

Group, a two-thirds interest in the adjoining Florencia claim, and an option on 39 claims, 590 acres adjacent to the company's property on the S. and S. E. Payment of \$27,950 had been made Jan. 1, 1916, on a total price of \$130,000 for this tract.

The Jerome Verde option was relinquished June 15, 1915, as the 2,127' of development work from the Daisy shaft failed to disclose ore of commercial importance.

The early exploration work of the company was unsuccessful and an option was taken in 1913 on the Jerome Verde group, and a new shaft, the Edith, started 1,500' farther east, sunk to a depth of 1,200'. Verde Extension's development of the Verde ground was disappointing but in the company's own ground a large body of very rich chalcocite ore was encountered on the 1,200' level, Dec., 1914. This orebody was developed and worked during 1915, and the shaft was sunk to the 1,400' level. Feb., 1916, a drift on this level cut the downward extension of the bonanza orebody found on the 1,200' level.

Development: Aug., 1916, shows the orebody on the 1,400' level to be 250' wide and 300' long, with an average content of 10% copper. A raise being driven to connect with the 1,200' level is up 103' and shows an average of 14% copper. A 50' winze sunk from 1,400' level to be deepened to 1,600', shows an average of 11% copper, proving the downward extension of the orebody and indicating its probable extension to much greater depth. The development to date makes the mine as great a one as its more famous namesake.

History: original development was by an 800' vertical shaft, the Edith, on the Little Daisy claim, about 1,700' from the main shaft of the United Verde mine, with collar 450' lower. This shaft, after passing through 50' of iron stains, encountered copper carbonates, continuing for depth of about 150', succeeded by conglomerate, and from a depth of 425' to 578' passed through schist carrying copper sulphides and manganese. These old workings total about 5,000' but develop only a little ore of about 2% copper, 1 oz. silver and \$3 gold, on the 800' level. A 130' winze below this level was bot-tomed in decomposed schist, showing considerable copper.

Development: from Oct. 10, 1914 to Jan. 1st, 1916, includes 464' of drifts and crosscuts on the 800' level; 2,499' on the 1,100' level, 1,374' on the 1,200' level; 1,801' on the 1,400' level, in company ground, beside the 2,127' Jerome Verde work in that company's tract. No payable ore in commercial amount has, however, been found above the 1,200' level, though favorable indications exist.

The ore thus far developed lies on the northerly downthrown side of a big fault, with a drop of 650' or thereabouts, as shown by the limestone strata on each side of it. Its value can be judged from the fact that with limited hoisting capacity and packing the ore $1\frac{1}{4}$ miles on burros, 9,753 tons were shipped in 1915, of which 3,579 tons averaged 43.99% copper and the balance 17.6% copper.

Ore reserves: estimated about July 1, 1916, give 1,500,000 tons of 10% ore blocked out.

Equipment: includes an electric hoist and air compressors, and a $1\frac{1}{4}$ mile rope tramway to the railway line. Electric power is used throughout, current being taken from the Arizona Power Co. About 150 men are employed.

Production: by July, 1916, the company was shipping 7,000 tons of ore, averaging about 20% copper, per month, resulting in net receipts of \$350,000 monthly.

The extent of this remarkable orebody is as yet unknown, but it is evi-

dent the mine is of the first magnitude and that the property gives the stock a valuation of better than \$30 a share on present developments.

UNITED WESTERN MINES CO.**ARIZONA**

Oatman, Ariz. **Officers:** W. K. Ridenour, pres. and treas.; H. E. Woods, v. p.; W. P. DeWolf, sec.; with W. K. Ridenour, S. E. Vermilyea, E. H. Newland, H. E. Woods, M. Lines, directors.

Inc. in Arizona, **Cap.**, \$1,000,000; shares \$1 par; in treasury, 600,000. Listed on San Francisco and Los Angeles stock exchanges.

Property: 4 claims, 65 acres, one mile S. W. of Oatman, Mohave Co., crossed by main road connecting Gold Road and Oatman, and adjoining property of the United Eastern Company along what appears to be a continuation of the main ore zone of that property. Also owns the Oofy Goofy group and water rights 4 miles N. W. of Oatman, total 125 acres. Ore is free milling gold containing little silver. Pay ore occurs in shoots of undetermined extension. Development shows strong vein on the upper levels but below milling grade. On 505' level the vein is large, wet and reported to show milling values.

Development: comprises a shaft 500' deep with crosscuts at 200' and 500'. At the latter depth a heavy flow of water from the vein temporarily stopped work, 1916. **Equipment:** includes 50-h. p. hoist, compressor, buildings, etc.

Property a good prospect, but drifting alone can determine its value.

UNITED ZINC CO.**MISSOURI**

Office: 6 Beacon St., Boston, Mass. **Mine office:** Joplin, Mo. **Officers:** L. R. Greene, pres.; W. I. Bullard, v. p.; H. P. Mason, sec.; H. C. Young, treas.; the foregoing and F. R. Tibbets, R. B. Young, C. A. Dingey, G. H. Nolte, G. T. Fletcher, directors.

Inc. 1899, in N. J.; re-inc., 1904, in Maine. **Cap.**, \$450,000 Com. and \$482,425 Pfd.; Com. \$5 par; Pfd., \$25. No bonded debt. Puritan Trust Co., Boston, transfer office; Old Colony Trust Co., Boston, registrar. Annual meeting, January, Portland, Me. Traded in on Boston curb.

Property: 3,800 acres developed and producing, in Joplin district, Mo. and in Kansas. Ores are zinc and lead.

UNITED ZINC SMELTING CORP. WEST VIRGINIA & MISSOURI

Office: 115 Broadway, New York. **Officers:** W. Kenefick, pres.; R. A. Cowles, v. p.; Arthur Day, v. p. and treas.; the foregoing and A. L. Davis, M. M. Pearlman, C. M. Pynchon, H. Raymond, W. F. Reis, B. Lissberger, directors.

Inc. Apr., 1916, in New York. **Cap.**, 600,000 shares without par value, but offered for subscription at \$12.50 per share. No funded debt. Bankers Trust Co., New York, transfer agent. Equitable Trust Co., New York, registrar. Listed on New York Curb.

Controls through stock ownership all of the assets of the Pearlman Co., Inc., and the Clarksburg Zinc Co., and a substantial majority of the common shares of the Kenefick Zinc Corporation. The Pearlman Co., Inc., owns a large zinc mill and refining plant at Clarksburg, W. Va., comprising 3,648 retorts with capacity of 30,000,000 lbs. of spelter per year, to be increased by the addition of 1,824 retorts; a pottery plant with a capacity of 300 retorts per day; a power plant and a refining plant with a capacity of 15,000,000 lbs. of spelter per year; all the capital stock of the Clarksburg Zinc Co.; owns patents, controls brands and trade-marks.

The Kenefick Zinc Corporation is the largest producer of zinc concentrates in the Joplin, Mo., district, the capacity of its mines and mills being 25,000 to 30,000 tons of concentrates per year. The United Zinc Corpora-

tion has offered to exchange $1\frac{1}{4}$ shares of its stock for each common share of the Kenefick Zinc Corporation.

Properties operated by the U. Z. Corporation are the Media Mining Co. and the Electrical Zinc & Lead Mining Co., north of Webb City; the Coyote Mining Co., and the Airedale Mining Co., west of Joplin; and the Milan Mining Co., at Prosperity. To this list will be added the new mine on the Muskingum land. This lease adjoins the Coyote mine on the north and practically the same run of ore is to be worked. Drilling on the Muskingum lease showed sheet-ore beginning at a depth of 181', continuing to 195'. Assays of the drill clippings gave an average of $3\frac{1}{2}\%$ blende and lead, from which a mill recovery of almost 3% can be expected, which is about the saving being made by the company's Coyote and Airedale mines. In June, 1916, three drill strikes were reported, two exceptionally good, on a 26-acre lease of the Muskingum Mining Co.'s land, one mile west of Joplin. Construction of a 350-ton concentrating plant has been started.

Plans are being prepared for the construction by the United Zinc Corporation of an acid plant for the manufacture of by-products.

UNITY GOLD MINES CO.

IDAHO

Offices: % Underwriters Idaho Mines Syndicate, 120 Broadway, New York and Boise, Idaho. **Officers:** Jas. H. Hawley, pres.; L. M. Hart, v. p.; George C. Luebbers, sec.; George W. Fletcher, treas.; J. A. Czizek, mgr.; above are directors.

Inc. April, 1916, in Del. **Cap.**, 500,000 shares; \$5 par; outstanding 200,000 shares. Security Transfer & Registrar Co., New York, transfer agt. and registrar. Listed on New York Curb.

Property: 2 groups of claims, 120 acres, including the Little Giant and Charity mines, in the Warren mining district, Idaho Co., 40 miles from a railroad. Has been idle for several years. Claims said to cover 2 distinct veins for 4,500' along the outcrop. In addition company owns a millsite and $4\frac{1}{2}$ miles of ditches and pipe lines with water rights. **Ore:** is gold in a series of parallel quartz veins.

The Little Giant, said to have yielded \$1,000,000 in the past is claimed to show an orebody 4' wide and 50' thick, proven for 120' east of the shaft, that will assay better than \$40 per ton, with \$20 dump ore. **Development:** by tunnels and shallow shafts. No work below the 200' level. Present management is driving a tunnel to cut the veins 400' below present workings; estimated time to complete this tunnel, 9 months from March, 1916. The Charity mine has been developed by a 100' shaft and shallow tunnels. Plans continuing a tunnel that will cut the vein 100' below present workings and building a 10-stamp mill. No estimate of ore reserves given.

Property is a prospect.

UNIVERSITY MINES, LTD.

ONTARIO

Is a subsidiary of the La Rose Consolidated Mines Co., which see.

U. P. R. MILLING & MINES CO.

COLORADO

Robt. L. Martin, agent, 310 Quincy Bldg., Denver, Colo. **Property:** the Gregory-Buell group of mines at Central City and the Buell concentrator. Mines have vein with gold and silver-bearing copper ores, developed by 700' shaft, equipped with steam hoist and air compressor. The mill has 45 stamps and handles about 130 tons daily. Operating, 1915-16.

UTAH-APEX MINING CO.

UTAH

Office: 79 Milk St., Boston, Mass. **Mine office:** Bingham Canyon, Utah. **Officers:** R. F. Haffenreffer, Jr., pres.; J. J. Murphy, v. p.; C. G. Schirmer, sec.-treas.; H. M. Burton, asst. treas.; W. L. Creden, mgr.; preceding with Louis Ross, C. M. Brewer and J. W. Saladine, directors. V. S. Rood, supt. **Inc.** May, 1902, in Maine, as a merger of the Copperfield Mining Co. and

York Mining Co. **Cap.**, \$3,000,000; increased 1906, from \$2,500,000; shares \$5 par; issued 528,200 shares. **Bonds:** \$500,000, authorized, at 6%, convertible; outstanding 26,000, Dec. 1, 1915. Company absorbed the Highland Boy, Petro, Minnie and Phoenix mining companies. Federal Trust Co., Boston, registrar; Paul Revere Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in September.

For fiscal year ending Sept. 1, 1915, gross ore sales and royalties were \$848,820, with mining, development and milling costs of \$577,323, leaving a gross mining profit of \$271,497. Company ended year with \$171,063 cash on hand. After payment of dividend July 1, 1916, there was \$500,000 cash on hand.

Net earnings for quarter ended May 31, 1916, were \$417,948, compared with \$202,719 in previous quarter, and \$65,011 in preceding quarter.

Dividends: initial quarterly dividend, 12½c, paid Oct. 1, 1915, increased with dividend No. 4 to 25c, paid July 1, 1916.

Property: 33 claims, 254 acres, including the York, Copper Field, Petro, Highland Boy Consolidated and Phoenix groups, adjoins the Utah Consolidated on the S. and W., on York hill, Carr Fork canyon. **Geology:** claims show limestone and quartzite, carrying the Parnell, Petro, York and Andy bedded veins. These veins are cut by several fissures which have been more or less developed. The Dana, the principal orebody, is apparently a contact deposit between quartzite and limestone, showing an ore-shoot standing vertically, without disseminations in the contact, up to 15' in width and 500' in length on the 4th level. The mine primarily is a producer of high-grade lead ore, but has considerable copper, and some zinc; all ores carry silver and gold values with an excess of iron, giving low smelting charges. First-class ores carry about 2% copper, and \$6 to \$8 combined gold and silver values per ton; the second class copper ores carrying about \$3 per ton in combined gold and silver values. First-class lead ores carry 35 to 50% lead, with silver and gold values, and second-class lead ores range 7 to 14% in lead tenor, with small gold and silver values.

Development: by 3 shafts and 6 tunnels, with about 63,000' of workings. The main working shaft is down to the 1,300' level. The tunnels, known as the Parnell, Minnie, Smilax, Andy, Andy No. 2 and Parvenu, are spaced at 200' vertical intervals, and are connected by incline blind shafts, with electric hoists, on the Parnell vein, which is estimated by the company to be 5' in width and to be mineralized for about 1,000' in length and to 2,000' in depth. The Andy tunnel develops 3 ore-shoots, on the Parnell vein. The Parvenu tunnel, which is the principal working, is about 1 mile in length, cutting the Parnell vein with a back of about 2,200'. Since the decline in the copper market 1907, attention has been devoted mainly to silver-lead ore. A silver-lead orebody opened in the Parvenu tunnel, having a maximum thickness of 100', with a width of better than 100', and length undetermined, shows direct-smelting ore of 15 to 20% lead, with 3 to 5 oz. silver per ton, and excess of iron, estimated to carry net values of \$8 to \$10 per ton. Mine output for 1915 was 35,095 tons crude shipping ore, 77,792 tons milling ore and 5,372 tons copper ore. Cost per ton mining for 1915 was \$3 as compared with \$3.25 in 1914.

A 3,000' Bleichert aerial tram, not in present use, runs from the portal of the Andy tunnel to a loading station. Ore is shipped over a spur track of the railway line of the Utah Copper Co.

Equipment: includes two 15-drill air compressors and 2 electric hoists, 1 of which is a double-drum Davis hoist installed at the 7th level station in the Parvenu tunnel.

The old Phoenix mill at the mouth of the Parvenu tunnel was dis-

mantled and a new 200-ton mill built 1909, on the same site. The new mill is said to effect a concentration of 4 into 1, with a saving of about 77% of assay values. In 1914, company increased the capacity of the concentrator to about 350 tons daily, and in 1915 a flotation equipment was added. The mill treated an average of 312 tons per day for the year ending Aug. 31, 1915; 35,825 tons of concentrates were recovered. Average cost of milling was 72.2c per ton as compared with 79.8c the previous year.

Company has contracts with U. S. Mng. & Sm. Co. and American Sm. & Ref. Co. for daily shipments of 300-400 tons lead-zinc ore and lead ore and concentrates respectively. Employs 400 men.

Production: for 1915 was 32,000,000 lbs. lead, 2,400,000 lbs. copper, 4,000 oz. gold and 560,000 oz. silver. By March, 1916, the monthly output had reached 4,000,000 lbs. lead; this rate was being maintained in July.

Management plans putting the shaft through to surface, thus opening 650' of new ground and hoisting to surface in the future.

1916 earnings to June 1 have averaged \$120,000 per month, being as follows: Jan., \$96,009; Feb., \$82,036; March, \$107,936; April, \$152,307; May, \$162,476. The company's phenomenal profits are largely due to the increased price of the metals produced and cannot continue indefinitely.

Property considered promising, and earnings should continue even at normal metal prices.

UTAH-ARIZONA GOLD & COPPER MINING CO. ARIZONA

Idle Office. 625 Dooly Bldg., Salt Lake City, Utah. Mine near Chloride, Mohave Co., Ariz. Heber S. Cutler, pres.; J. F. Shelley, v. p. and gen. mgr., Shelley, Idaho; John W. Geiger, sec.-treas.; preceding officers, W. J. Burton, Geo. F. Shelley and M. Thomas, directors.

Inc. Nov. 11, 1907, in Arizona. **Cap.**, \$1,000,000; shares \$1 par; assessable; issued 961,023. Annual meeting, second Tuesday in September.

Property: 60 claims, unpatented, about 1,200 acres, and a 20-acre mill site, in the Weaver district, 18 miles N. W. of Chloride, the nearest rail point, shows quartz veins traversing granite and mica-schist, carrying gold-copper ore. Property includes the Golden Gate mine, developed by 2 incline shafts of 125' and 135', on parallel veins, and several short tunnels, with total of about 2,000' of workings. **Equipment:** includes a 5-stamp mill, idle since 1914.

UTAH BALTIMORE CONSOLIDATED CO. UTAH

Officers: J. P. Evans, pres., 408 S. 13 E. St., Salt Lake City, Utah; J. M. Williams, v. p.; C. A. Doe, sec.-treas.; J. T. White, W. D. Williams, directors.

Inc. in 1916. **Cap.**, \$1,000,000; shares 5c par; no indebtedness.

Property: 10 claims, 5 in Beaver Co., Utah, known as the Mollie Pitcher group, 5 in the Rocky district, known as the Bill Williams group. Mollie Pitcher group has a 100' shaft in vein of copper ore, said to be 60' wide and of shipping grade. Loading station on R. R. about a mile from mine.

UTAH BELLEVUE MINES CO. IDAHO

Bellevue, Idaho. **Officers:** A. W. Kelley, pres. and mgr.; T. H. Saxman, v. p.; L. H. Goulet, sec. and treas.; with J. E. Naylor and M. Cullinson, directors. **Cap.**, 500,000 shares; in treasury, 165,000. No bonded indebtedness.

Property: 3 claims in Wood River district, Blaine Co., Idaho, said to show silver, lead, zinc ore. Developing in 1915.

UTAH CENTENNIAL MINING CO. UTAH

Pleasant Grove, Utah. **Officers:** J. E. Thorne, pres.; L. L. Nelson, v. p.; D. Noble, sec. and treas.; J. W. Thorne, J. E. Thorne, C. Thorne, L. L. Nelson, directors.

Inc. 1907. Cap., 1,000,000 shares; par 5c; outstanding 250,000 shares; assessable. Annual meeting in April.

Property: 10 claims in American Fork Canyon, American Fork district, Utah Co. Fissure vein carries gold, silver, lead, copper ore. Developed by a 450' tunnel. Property is a prospect undergoing development.

UTAH CONSOLIDATED MINES CO. OF TINTIC. **UTAH**

Office: 425 Atlas Bldg., Salt Lake City. T. R. Cutler, pres.; H. J. Fitzgerald, sec.-treas. **Inc. in Utah.** Cap., \$1,000,000; shares \$1 par; non-assessable; all issued. Listed in Salt Lake City.

Property: 100 acres in Tintic mining district, shows silver-lead ore. Developing in 1916.

UTAH CONSOLIDATED MINING CO. **UTAH**

Office: 42 Broadway, New York. **Operating office:** 608 Dooly Block, Salt Lake City, Utah. **Mine office:** Bingham Canyon, Utah. **Officers:** R. H. Channing, Jr., pres.; Adolph Lewisohn, v. p.; C. N. King, 2nd v. p.; Sidney Chase and Maxwell Woodhull, directors; A. H. Melin, sec.-treas.; Frederick Cowans, gen. mgr.; A. S. Winther, supt.; T. S. Van Wagoner, purch. agt.

Inc. 1903 in New Jersey. Cap., \$1,500,000; shares \$5 par. Is a reconstruction of Utah Consolidated Gold Mines, Ltd., a British corporation that in turn succeeded the Sevier Gold Mines, Ltd., Oct., 1896. Property of the Utah Consolidated Mining Co. is 2,490 shares of the 2,500 shares of the capital stock of the Highland Boy Gold & Copper Mining Co., of New Jersey, the latter corporation holding direct title to the Utah properties. The company also owns 8,250 shares of stock of the Anaconda Copper Mng. Co., stock derived from sale of Internat'l S. & R. Co. Shares are listed on the Boston and Salt Lake stock exchanges. Annual meeting, first Tuesday in April.

The company's total income for 1915 was \$2,611,240, with surplus of liquid assets over liabilities of \$1,128,122. Net earnings were \$1,038,637 in 1903, \$1,164,348 in 1904, \$1,887,385 in 1905, \$2,835,008 in 1906, \$1,179,412 in 1907, \$326,312 in 1908, \$154,263 in 1909, \$65,348 in 1910, \$438,430 in 1911, \$603,923 in 1912; \$636,470 in 1913, \$565,665 in 1914, \$1,128,122 in 1915; estimated at \$2,250,000 for 1916.

Dividends:

1903.....	\$3.20	1908.....	\$2.00	1913.....	\$1.50
1904.....	3.00	1909.....	2.00	1914.....	2.00
1905.....	3.50	1910.....	.50	1915.....	2.00
1906.....	5.00	1911.....	.50	1916.....	1.50
1907.....	7.00	1912.....	1.50		

1916 dividends: 75c in April, 75c in June, 50c being regular and 25c extra; 75c in September.

Total dividends to July 1, 1916, \$40.64 per share, or \$12,192,000. Current earnings are about \$6 per share.

Property: 43 claims, patented, 404 acres, known as the Highland Boy group, in Carr Fork canyon, 2½ miles from Bingham canyon. The Highland Boy mine was a considerable producer of silver-lead ore, 1870-90.

In 1915 the Bingham Copper Boy group adjoining the Utah Cons. on the north was purchased for \$18,747. Property promising but undeveloped.

Geology: property has 6 ore deposits which are replacements of limestone beds, 150 to 300' thick, with quartzite above and below. These beds dip from 25 to 45° N. and the rocks are cut by a series of porphyry dikes that are nearly vertical and run N. E. The ore deposits form well-defined shoots with E.-W. strike and N.-E. pitch. They are large, varying up to 100' in width and 100 to 200' in length, and are separated by barren limestone; the largest orebody so far developed is said to be 320' in extreme

horizontal width and 340' in length. An ore-shoot carrying galena was found in the lower workings in an extension of the Yampa limestone. The predominant ore of the mine carries chalcopyrite, with some bornite and chalcocite, associated with pyrite in a limestone gangue.

In 1915 lead ore averaging 1' to 12' wide was drifted on for 50' and is said to average about 30% lead, 11 oz. silver, .06 oz. gold and 8% copper.

Development: the Highland Boy mine is opened by an old 900' shaft, and 7 tunnels, of 1,000 to 2,600' length. No. 7 tunnel, 700' below the crest of the mountain, is 2,600' in length and is the main avenue of extraction, all tunnels being connected, and ore milled, through chutes, to the bottom tunnel. There are 2 blind shafts, deepest 500', starting from the 700' level, with large electric hoists, raising ore to that point for extraction by the electric haulage plant in No. 7 tunnel. The ore breaks easily and is extracted by the top-slice caving system, ore is broken mainly on contract.

New openings were 20,510' in 1913; 19,778' in 1914; 19,890' in 1915.

Ore reserves: estimated at end of 1914 as 256,321 tons of 1.9% copper ore and 50,365 tons of 16.48% lead ore; at end of 1915: 266,700 tons of 1.9% copper, \$1.00 gold and 0.69 oz. silver ore and 43,500 tons of 16.20% lead ore with 80c gold, 4.96 oz. silver and 0.7% copper.

A 12,700' aerial tram leads from the portal of No. 7 tunnel to ore bins on the Rio Grande Western railway. There is a subsidiary aerial tram, crossing Carr Fork canyon, used for handling lumber and mining supplies.

While the great orebodies of the mine are worked out, the property is far from exhausted and development work is keeping pace with ore extraction.

Company mined 207,119 tons of 2.22% copper ore and 65,129 tons 15.16% lead ore in 1915, the latter containing 2.92 oz. silver per ton and 0.47% copper. Lead ore averaged \$12.51 per ton gross or \$8.46 net, deducting smelting charges, etc.

Production:

	Lbs. Copper	Lbs. Lead	Oz. Silver	Oz. Gold
1915.....	8,836,091	17,777,604	370,985	19,387
1914.....	7,584,391	14,588,276	284,196	15,528
1913.....	7,710,668	19,208,063	378,960	14,172
1912.....	6,506,814	8,734,398	230,004	14,042
1911.....	9,162,023	3,311,939	160,366	16,730
1910.....	7,489,471	.....	154,321	14,802
1909*.....	10,043,900	.....	.....	.....
1908*.....	10,648,243	.....	.....	.....
1907.....	13,987,557	.....	390,296	34,554
1906.....	18,533,974	.....	457,812	42,001
1905.....	17,264,474	.....	374,685	28,290
1904.....	13,553,483	.....	.....	.....

Exploration work for 1916 includes sinking the Incline shaft 400' deeper and starting a new level; diamond drilling on the 7th level; opening up the sulphide copper ore-shoot on the 13th level and a lead orebody in the western extension of same level.

Company has capable management, and though no estimate of the life of the property is warranted, it is believed the mineral bearing area will be profitably productive for a decade more.

UTAH CONSOLIDATED MINING & MILLING CO. UTAH

Idle. Office: 424 Atlas Blk., Salt Lake City, Utah. Mine office: Mammoth, Juab Co., Utah. Officers: S. S. Jones, pres.; H. S. Cutler, v. p.; Hart J. Fitzgerald, sec.-treas.; preceding with Hon. Reed Smoot, A. N. Holdaway and Hugh J. Cannon, directors, at last accounts.

Inc. March 10, 1907, in Utah. Cap., \$250,000; shares 25 cts. par; non-assessable. Shares listed on the Salt Lake and San Francisco exchanges.

Property: 6 claims, patented, near the Sioux Consolidated and Colorado mines, developed by a 500' shaft, with 2 levels opened. Part of the property is worked by lessees, who secure a small production.

UTAH COPPER CO.

UTAH

Office: 600 McCornick Bldg., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake Co., Utah. **Works office:** Garfield, Utah. **Officers:** Chas. M. MacNeill, pres.; Col. Daniel C. Jackling, 1st v. pres. and managing director; Col. Chas. Hayden, 2nd v. pres.; Chas. K. Lipman, 3rd v. pres.; Spencer Penrose, sec.-treas.; K. R. Babbitt, gen. counsel; John K. MacGowan, purch. agt.; other directors, Murry Guggenheim, S. R. Guggenheim, S. W. Eccles, William Loeb, Jr., W. Hinckle Smith, John Hays Hammond, Wm. B. Thompson, Frank A. Schirmer, Eugene Meyer, Jr., Kenneth K. McLaren and Robert C. Gemmell, gen. mgr.; F. G. Janney, mgr. of mills; John M. Hayes, asst. sec. and cashier; J. D. Shilling, supt. of mines; F. G. Janney, Jr., gen. supt. of mills; H. C. Smith, supt. Magna plant; T. A. Janney, supt. Arthur plant; H. C. Goodrich, chief eng. of mines; C. F. Jennings, asst. purch. agt.

Inc. June 4th, 1903, and reorganized April 30th, 1904, in New Jersey. Cap., \$25,000,000; originally \$4,500,000; shares \$10 par; cap. successively increased Oct., 1905, to \$6,000,000; Feb., 1907, to \$6,600,000; Jan., 1908, to \$7,500,000; Jan., 1910, to \$25,000,000; issued \$16,244,900. The new stock issue 1910 amounted to \$8,282,240, of which \$3,100,000 in stock was given for the property of the Boston Consolidated Mining Co.; \$4,445,120, or 445,512 shares, were given for 1,000,152 shares of Nevada Consolidated Copper Co.; \$734,370, or 73,437 shares, were sold for cash, at a premium of 400%, for \$50 per share, and 275 shares were issued for the conversion of \$5,500 of bonds at par. Shares are listed on the New York, Boston and Paris stock exchanges. D. A. Crockett, 165 Broadway, New York, and American Trust Co., Boston, transfer agents; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, registrars. Annual meeting, fourth Friday in April.

Comparative General Balance Sheet: Utah Copper Co. and Bingham & Garfield Ry. Co.

Assets:						
	Property and Equip.	Def. Chgs. to Oper't'ns	Invest's	Copper in Transit	Other Current Assets	Total
1915...	\$25,359,919	\$6,444,346	\$5,087,899	\$8,675,199	\$6,777,122	\$52,344,486
1914...	24,777,736	5,385,204	5,061,008	3,755,997	1,285,954	40,265,899
Liabilities:						
	Capital Stock	Current	Reserve for Deprec.	Surplus from Sale of Sec't's	Earned Surplus	Total
1915..	\$16,244,900	\$2,228,252	\$1,796,970	\$8,290,620	\$23,783,743	\$52,344,486
1914(a)	16,244,900	1,056,794	1,125,349	8,290,620	13,522,736	40,265,899

(a) Bonds outstanding in 1914, Bingham & Garfield Ry. Co., \$25,500.

UTAH COPPER COMPANY

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK

87 Milk Street, BOSTON

Comparative Income Account:

	Operating Revenue	Operating Expenses	Net Profit	Optg. Profit	Total Income	Total Deducts	Balance Dec. 31
1915....	\$27,155,944	\$12,132,109	\$15,023,834	\$17,920,443	\$7,457,778	\$23,498,074	
1914....	16,222,456	10,230,293	5,992,163	8,730,422	5,403,667	13,035,408	

Earnings and dividends on stock, per share:

	(a) 1916	1915	1914	1913	1912	1911	1910	1909	1908
Earned.....	\$17.43	\$11.03	\$5.34	\$5.37	\$5.35	\$3.96	\$3.46	\$2.93	
Paid.....	5.50	4.25	3.00	3.00	3.00	3.00	3.00	2.00	\$1

(a) \$17.43 covers 1st quarter; \$5.50 covers 6 months. Present rate, \$6 per share per annum, payable quarterly, March 31st, etc. Total dividends paid to 1916, \$39,625,980.

The working capital March 31, 1916, was \$16,000,000.

The company controls the Nevada Consolidated Copper Co., owning slightly more than 50% of the outstanding stock, having exchanged its own stock on the basis of 1 share of Utah for 2¼ shares of Nevada. The company controls, through stock ownership, the Bingham & Garfield Railway Co., described later. During 1910 the Utah Co. absorbed the Boston Consolidated Mining Co. and the Shawmut Consolidated Copper Co.

History: in 1862 General P. E. Connor was stationed at Fort Douglas, Salt Lake City, in command of the Third California Infantry, a regiment of volunteers largely recruited from experienced California prospectors and miners. General Connor believed that the prosperity of Utah would be enhanced by immigration from the outside. He therefore encouraged exploration for minerals in the State and freely gave iurloughs to his miner soldiers, in order that they might do the necessary prospecting. As a result, mineral was discovered in Bingham Canyon early in the fall of 1863, and it is probable that it was not long after this date until the first prospecting was done in what is now called the "Bingham copper porphyry." This prospecting consisted of a tunnel, afterwards called "Soldier Tunnel," driven into the copper bearing porphyry for a distance of 200' on the westerly side of main Bingham Canyon, and on property now owned by the Utah Copper Co.

The mining property now embraced in the holdings of the Utah Copper Co. had been known to be copper-bearing for many years, but was supposed to be too low-grade to pay and was not taken up for active development until the organization of the original Utah Copper Co. in 1903. Previous to that time, any work done was in hunting for the rich copper ore that is found here and there in the seams of the rock and in the fissures and fault planes. In the spring of 1903, the Utah Copper Co. acquired a controlling interest in the property, and began the construction at Copperton of a 300-ton experimental concentrating mill. The work at the mine was commenced in November, 1903, and the mill began its operations in April, 1904.

The early development of the mine was designed along the lines of properly opening up the ground for the application of what is known as the "caving system of mining," and until June, 1907, all the ores extracted were derived from development work and by the application of that system. The underground mining operations at the Utah Mine were discontinued permanently September 18th, 1912, and those at the old Boston Consolidated on March 31st, 1914, so that now all the mining is being carried on by steam shovel operations.

Property: the Utah Copper Co. has the largest developed orebody in the world, its proven tonnage exceeding that of the Rio Tinto, its nearest copper competitor, and even exceeding the proven tonnage of the greatest of the enormous iron mines of the Mesaba range, or the developed tonnage of gold ore of all the combined mines of the Witwatersrand. Not only has the

Utah Copper Co. the largest body of developed ore of any mine, but it also is the greatest ore producer, measured by tonnage, of any mine of any metal.

The entire mineralized area of the property is covered by a thickness of about 115' of low-grade and oxidized material that cannot be profitably treated by standard methods of concentration. At the inception of development, information as to the comparative thickness of capping and ore was very meagre, but as the work progressed it was readily seen that a system of mining, much cheaper than by caving, could be applied, and it was determined to adopt the use of steam shovels and remove the oxidized overburden entirely, leaving the sulphide ore uncovered, so that it could also be handled by steam shovels at a very low cost. This character of work was commenced in August, 1906, and has since been prosecuted vigorously so that by the end of the year 1915, there had been removed from the property 33,795,410 cubic yards of capping and 42,548,023 dry tons of ore.

The maximum quantity of capping and ore ever handled in one day was 70,243 tons, and the maximum ever handled in any one month was 1,998,116 tons. The ore production from the property of the Utah Copper Co. has increased from 300 tons a day in July, 1904, to an average of over 26,000 tons daily, during the last half of 1915.

Geology: orebodies consist of an altered silicious porphyry, containing small grains of copper minerals, very uniformly disseminated throughout the mass, both in fracture seams and in the body of the rock, and averaging about 1.45% copper, 0.12 oz. silver and 0.014 oz. gold. The primary copper mineral is chalcopyrite, but as a result of the oxidization of this mineral and the secondary deposition of others, practically all of the sulphide minerals of copper are now present, the predominating one being chalcocite. There are three zones in this deposit, as follows: the oxidized zone, about one-third of which contains carbonates of copper in sufficient quantity to render the material payable by leaching with a dilute solution of sulphuric acid; second, the zone of secondary enrichment, in which is found all of the concentrating sulphide ore of commercial value; and third, the zone of primary material, which is too low-grade to be profitable by any method of handling and treatment at present known.

Acreage: total area of lode mining claims in Bingham is 741.69 acres, of which 11.73 acres are outlying fractional claims and 729.96 acres is the group of adjacent claims lying on both sides of Bingham Canyon above the town, and where the mine is located, and within the boundaries of which development has shown that at least 226 acres contain mineralized porphyry of commercial value. The entire porphyry area has not yet been developed; and the maximum thickness of the orebody in the 226 acres has not been fully demonstrated, but calculations show that previous to January 1st, 1916, there had been developed in the property 390,000,000 tons of ore, averaging 1.447% copper, of which quantity 270,000,000 tons were classed as fully developed, and 120,000,000 tons as partially developed. There was mined from the entire property prior to Jan. 1, 1916, a total of 43,684,700 tons of ore averaging 1.453% copper; total reserves remaining, 346,315,300 tons, averaging 1.446% copper.

Development: in making the calculations to determine the tonnage of ore and its average assay, there were used 56,714 assays, representing 26,870' of diamond drill and churn drill holes, 291,018' of drifts, raises and winzes, and 16,630 linear feet of steam shovel cuts, or a total of 334,518' of development work. The orebody, as at present developed, has a maximum length of a little over one mile, and a maximum width of more than one-half mile. Further development of the property will add materially to its ore reserves.

The total area of land other than lode claims owned by the company is 6,662.3 acres, consisting of 1,201.87 acres near the mouth of Bingham Canyon, part of which was formerly used in connection with the operation of the Copperton Plant, 684.52 acres in Utah and Davis counties and 4,775.91 acres at the Magna and Arthur plants. Of this last acreage, approximately 2,340 acres are now included within the area upon which the tailings are being impounded.

The porphyry deposit on the westerly side of the canyon is being worked by steam shovels. There are 24 steam shovel levels from "A" to "W" inclusive, the levels being named alphabetically, beginning with "A" at the elevation of the railroad tracks in the bottom of the canyon and extending to "W" level near the top of the mountain; also one level below "A," called Sub "A." Each of these levels is connected with the bottom or main level, with standard gauge railroad tracks constructed on 4% grades, so that the steam shovels load the ore directly into railroad cars which are hauled by 50-ton saddle tank engines to the main yard and assembled into trains to be transported to the mills. From Sub "A" to "W" level, the difference in elevation is 1,506', and from Sub "A" level to the top of the mountain, it is 1,600'. The high face of ore extending from "A" to "F" level, across which intermediate levels have been cut out, has a vertical height of about 240'. From "F" level to "W" level, the difference in elevation between the levels varies from about 68' to 100', depending upon certain topographical conditions which control the elevations of the stripping lines extending from the steam shovel levels to the waste dumps.

No work has yet been done on the easterly side of the canyon, except development by drifts, raises, cross-cuts and churn drill holes, with a small amount of underground stoping.

Equipment: at the mine at the end of 1915, included 38 standard-gauge switching locomotives, 11 narrow-gauge switching locomotives, 1 standard-gauge Shay locomotive, all operated by steam; 16 Marion, 2 Bucyrus and 2 Atlantic type of standard-gauge steam shovels, 1 combination steam shovel and locomotive crane, 110 standard-gauge 12-yd. all-steel dump cars, 117 standard-gauge 6-yd. wooden dump cars, 144 narrow-gauge 4-yd. wooden dump cars, 50 standard-gauge 30-yd. all-steel side dump cars, 4 standard-gauge flat cars, 100,000 lbs. capacity, 1 engine tender, 4 Star drills, 7 Keystone drills, and 6 air compressors having a combined capacity of 8,000 cubic feet of free air per minute.

The problem is to remove the stripping from the ore and carry it to adjacent gulches to waste, and load the ore into railroad cars to be transported to the mills. The rock is broken by blasting before removal by the steam shovels, holes being bored by churn drills operated by steam, and piston drills operated by air. The holes are sprung and prepared ahead of the steam shovel operations, and are loaded and shot at such times as are required by the individual shovels on the different levels. An average of 1 pound of powder has been required to break down about 5 tons of rock ready for the steam shovel to load. There are 44.79 miles of standard-gauge track in and around the mines, 4.48 miles of narrow-gauge and 2.98 of three-rail track, a total of 52.25 miles, all owned by the Bingham & Garfield Railway Co.

The shovels and locomotives at the mine are operated by steam, but extensive use is made of electric power received from the Utah Power & Light Co. Buildings at the mine include machine and carpenter shops, car repair shops, compressor buildings, storehouses, office buildings, club house, boarding houses and other minor structures.

The Mills: company has had three mills, one at Bingham Canyon, now

dismantled, and two at Garfield, 20 miles from the mine. The 900-ton Coperton mill at Bingham Canyon, the first concentrator put up by the company, is fully described in volume VIII, Copper Handbook. It was closed permanently August 1st, 1910, and all machinery that was suitable was sent to the Arthur mill for remodeling that mill.

The finely disseminated copper glance necessitates fine crushing with the formation of slimes and a tailing loss of about .5% copper. Concentration is about 23 into 1.

The **Magna** mill, the first mill built at Garfield, stands on a 3,000-acre site 4 miles E. of the Garfield smelter and 1 mile E. of the Arthur mill. It is connected with mine and smelters by the Bingham and Garfield, Denver and Rio Grande, and San Pedro, Los Angeles and Salt Lake railways. The building is 505'x600' and contains two 3,000 ton units, each of 6 sections, each unit being 300'x505' in size, occupying a site of about 20 acres. The plant is so designed that 2 additional units of the same size can be added when desired. Milling was begun June, 1907, with 2 sections, and the 12th and final section of the mill was started in November, 1908. The ore bins of the Magna mill are of 25,000 tons aggregate capacity, with bins of 12,000 tons in the coarse crushing department and 13,000 tons in the fine crushing department.

The Magna mill handles 12,000 tons daily, and is divided, longitudinally, into 3 departments, for coarse crushing, fine crushing and concentrating.

The coarse crushing department consists of 2 sections having a capacity of 8,000 tons each in 24 hours. Each coarse crushing section is equipped with 2 No. 7½ gyratory crushers, 4 sets of 54"x20" Garfield roughing rolls, 4 elevators, 12 conveyors, 60 steel apron ore feeders, 7 motors and one 25-ton, 3-way, motor crane. In this department the ore is crushed dry to approximately ¾" in size.

The fine crushing department contains 36-6' Garfield Chilean mills, 24 sets of 37½"x15" Garfield rolls, 24 steel apron ore feeders, 24 elevators, 72-3'x4' impact screens, 12 motors, and one 15-ton, 3-way motor crane. In this department the ore is crushed dry to about 10 mesh of rolls, and wet to about 40 mesh by Chilean mills.

The concentrating department for the entire plant is built on 3 floors, and contains 22 roughing and 44 finishing No. 5 Wilfley tables, 122 Garfield roughing tables, 1104-6' vanners of suspended type, 83 Richards-Janney classifiers, 240-9' and 148-7' 60° conical settling tanks.

Miscellaneous buildings at the Magna plant consist of machine shop, thoroughly equipped for all repairs, boiler and blacksmith shop, warehouse, transformer house, pumping stations, ice house, carpenter shop, rigger shed, main office, and dormitory.

The reserve pumping plant No. 1, used in whole or in part when the main pumping plant No. 2 is out of primary water, is situated 1500' N. E. of the Magna mill, and includes a Nordberg triple-expansion condensing pump with capacity of 10,000 gal. of water per min.; 3 two-stage Jeanesville centrifugal pumps and 3 two-stage D'Olier centrifugal pumps driven by 450 h. p., 350 h. p., and 250 h. p. G. E. induction motors, and having capacities of 4,500, 3,500 and 2,500 gals. per min. respectively. These pumps, with a combined capacity of 31,000 gals. per min., pump through two 24" wooden stave pipe lines, each 1800' in length, against a 230' head into a 5,500,000 gal. concrete lined reservoir above the Magna mill. In addition to the above are three 3-stage Byron Jackson centrifugal pumps driven by 400 h. p. G. E. and two 250 h. p. Westinghouse induction motors, and having capacities of 3,000, 1,500 and 1,500 gals. per min. respectively, which pump through one line of pipe, 1,700' of which is 20", and 5,870' of 30"

wooden stave pipe line direct to a 2,000,000 gal. concrete lined reservoir above the Arthur mill, elevating the water 330'. The total combined capacity of this plant is 37,000 gals. per min.

The sources of supply for this station are springs at the plant developing 15,000 gals. per min. and through a canal which returns the water from the tailings pond, where both tailings and drainage water are impounded over an area of 1,000 acres. In time of low water, when the pond elevation is not sufficient so that the water will flow to the pumping station, it is lifted a maximum of 10' from the pond into the return canal by a 24" 20,000 gals. per min. Byron Jackson centrifugal pump, driven by a 60 h. p. G. E. induction motor.

The main pumping plant, called plant No. 2, is situated immediately east of the Magna Mill, and at the end of the Utah & Salt Lake Canal, which brings the water from Utah Lake, about 40 miles from the plant, and through which, at certain seasons of the year when the farms in Salt Lake county do not require water for irrigation purposes, all of the primary water for both the Magna and Arthur plants is received. The equipment in this plant consists of 2 single stage 10,000 gals. p. m. Worthington centrifugal pumps, each driven by a 150 h. p. G. E. induction motor, and one single-stage 5,000 gals. p. m. Worthington centrifugal pump, driven by a 75 h. p. Westinghouse induction motor, all 3 of which pump direct into the Magna 5,500,000 gals. reservoir through 700' of 30" wooden stave pipe line, against a 24' head; and 3 single-stage 5,000 gals. p. m. Worthington centrifugal pumps, each driven by 200 h. p. G. E. induction motor, 1 single-stage 3,000 gal. Byron Jackson centrifugal pump, driven by a 150 h. p. Westinghouse induction motor, all pumping direct to the Arthur mill 2,000,000 gal. reservoir through 6,300' of 30" wooden stave pipe line, against a static head of 120'. The total capacity of this plant to the Magna mill is 25,000 gals p. m., and to the Arthur mill, 18,000 gals. p. m., which is 70% more than is required by either plant.

The Arthur mill, about one mile west of the Magna mill, was built by the Boston Consolidated Mining Co., at a cost of upwards of \$1,500,000. It was remodeled to a capacity of 8,000 tons of ore daily by replacing the Nissen stamps with rolls and Chilean mills to correspond to the practice at the Magna mill and has 13 operating sections. The ore bins at Arthur have a capacity of 21,500 tons, 9,000 in the coarse crushing department and 12,500 tons capacity in the fine crushing department.

The coarse crushing department is in a separate building adjoining the coarse ore bins and is equipped with 3 No. 8 gyratory crushers, 4 sets of 72"x20" Garfield roughing rolls, 4 elevators, 14 conveyors, 102 steel apron ore feeders, 10 motors and one 25-ton, 3-way motor crane. This department has a capacity of 15,000 tons in 24 hours and the ore is crushed dry to approximately $\frac{3}{4}$ " in size.

The fine crushing department contains 26-6' Garfield Chilean mills, 26 sets of 37- $\frac{1}{2}$ "x15" rolls, 78-3'x4' impact screens, 26 steel apron ore feeders, 26 elevators, 26 motors and two 15-ton, 3-way motor cranes. In this department the ore is crushed dry to approximately 10 mesh by rolls and wet to approximately 40 mesh by Chilean mills.

In the concentrating department there are fifty-two 4-compartment, fifty-four 5-compartment and thirty-nine 3-compartment Richards-Janney classifiers, 156 Garfield roughing tables, 26 roughing and 34 finishing No. 5 Wilfley tables, 840-6' vanners, 14 elevators, 312-9' and 52-7', 60", conical settling tanks and 14 motors.

Miscellaneous buildings at the Arthur plant consist of sub-station, machine shop, boiler shop, oil house, compressor building, warehouse, car-

penter shop, foundry, pattern storage building, general office, telephone building and emergency hospital, dormitory, mess house, lumber shed, heating plant, assay office, time office, and scale house.

Electric power used at both the Arthur and Magna plants is taken from the Utah Power & Light Co.

The 13,000 h. p. steam-electric plant, 1,500' N. E. of the Magna mill was erected by the Minneapolis Steel & Machinery Co. The boiler plant has 20 Heine 419 h. p. water tube boilers, working under 175 lbs. steam pressure, equipped with American automatic stokers, having separate mechanical drives, of special design. There are two 26x50x48" Allis-Chalmers cross-compound Corliss condensing engines direct connected to 1,500 k. w. A. C. generators, and three 32x70x48" Nordberg cross-compound Corliss condensing engines direct connected to three 2,250 k. w. A. C. generators. There are 2 concrete smokestacks, 180' high, 12' inside diam. at the top. This plant has not been in operation since Feb., 1914.

The Utah Copper company employs 1,640 men at the mines, and 1,650 at the mills and shops at Garfield.

Bingham & Garfield Railway

Inc. July, 1908, in Utah. Cap. of \$6,000,000; shares \$100 par. Controlled by the Utah Copper Co., through ownership of the entire share capital. There is a \$2,500,000 issue of 10-year 6% bonds, convertible into stock of the Utah Copper Co. at \$50 per share, at any time after July 1st, 1914, of which \$2,498,500 had been retired up to December 31st, 1915, through sinking fund.

The main line from Garfield to the mines, including tracks to the smelter, Sand Spur, and the Carr Fork extension to the Apex Yard, is 26.28 miles. Yard and side tracks along the main line aggregate 21.80 miles. This together with tracks in and around the mine, and tracks not owned but operated over, makes 107.1 miles of track. The average grade for the entire line is about 2%; the maximum grade is 2.5%, with curves compensated .04 of a foot per degree of curvature. There are 4 tunnels with an aggregate length of 4,821', all driven 18' wide and 22' high; the longest being 2,085.1'. There are 3 steel viaducts with an aggregate length of 2,010', containing about 3,000 tons of steel; the longest, across Carr Fork, being 690' long and 190' high. Equipment of the line includes 4 Mallet articulated compound locomotives, each weighing 228.5 tons; 14 switching locomotives; 400 hopper-bottom steel ore cars; 50 drop-bottom side-dump steel general service gondola cars; 99 steel concentrate cars, making a total of 549 cars, each of 60-ton nominal capacity, with 10% excess allowance for overload; 6 steel flat cars of 50-ton capacity; 4 steel frame powder cars of 50-ton capacity; 3 wooden flat cars of 25-ton capacity; 4 caboose cars; 1 Jordan spreader; 1 scale-testing car; 2 business cars; 2 passenger coaches and 1-120-ton wrecking crane. There are now being built 100 additional hopper-bottom steel ore cars and 25 additional steel concentrate cars, all of which are of 60-ton capacity, with 10% excess allowance for overload.

The cost of the complete line was upwards of \$5,000,000. The first train load of ore, about 2,600 tons, was taken down the main line on September 14th, 1911, and regular passenger and freight service was started the following morning.

Production:

(a)	Tons Treated	Cost per Ton			% Cu.	% Rec.	% Cu. in Recr.	Lbs. Cu. in Recr. T. Ore	Net Prod. Lbs. Cu.	Cost-Cta. per Lb. (d)	Sell Price c
		Mine	Mill	Total (b)							
1918				\$					84,949,462		
1915	8,494,300	24.41	34.02	0.8624	1.43	64.13	19.17	18.39	148,397,008	7.56	17.679
1914	6,470,166	32.32	35.36	0.9550	1.42	64.04	18.19	18.82	115,690,445	8.131	13.256
1913	7,519,892	32.88	36.76	.9761	1.25	63.95	17.31	15.95	113,042,584	9.496	13.337
1912	5,315,321	42.33	41.68	1.1239	1.36	66.32	20.75	18.09	91,366,337	9.024	15.839
1911	4,680,801	44.79	41.68	1.1725	1.51	69.53	25.62	21.03	(c) 98,436,224	7.965	
1910	4,340,245	40.97	46.68	1.1738					(c) 85,644,511	8.069	

(a) 1916 figures for 1st half only. Net cost per lb. copper for 1st quarter, 7.19c, for 2nd quarter, 6.72c. (b) Includes transportation, all fixed, general, and maintenance charges. (c) Gross production. (d) After making allowances for smelter deductions, and crediting value of gold and silver recovered, but not including miscellaneous income.

Production in 1915 also included 371,712 oz. silver @ 49.880c and 36,760 oz. gold, compared with 325,352 oz. silver @ 55.545c, and 34,729 oz. gold in 1914.

Monthly output:

	1916	1915	1914	1913
Jan.	11,999,910	8,009,646	10,649,036	7,560,521
Feb.	11,849,972	8,202,467	9,492,898	7,819,900
March	12,714,651	10,203,882	12,704,220	8,504,040
April	14,557,282	12,015,148	13,133,779	9,834,894
May	15,950,215	14,053,765	13,616,993	10,312,695
June	18,000,000	14,730,912	13,268,106	11,637,949
July	20,302,228	14,641,009	13,768,958	9,849,043
Aug.		15,966,543	8,245,520	10,620,981
Sept.		14,159,289	6,672,194	11,817,428
Oct.		16,004,607	6,765,396	10,236,575
Nov.		13,722,723	6,668,049	11,121,078
Dec.		14,497,485	6,795,567	10,762,490

Increase of ore reserves for 1915 was 3,815,300 tons in excess of tonnage mined. Much additional ore can and will be developed.

Total amount of capping removed was 5,961,367 cu. yds. The total area upon which stripping operations has been conducted was 203 acres and the actual area stripped was 96.8 acres.

Practically all ore produced was mined by steam shovel at average mining cost of 24.4c per ton, of which 7.5c represents charges for stripping and .3c charges for development, leaving actual working cost, including proper proportion of all fixed and general charges, 16.61c per ton as compared with 22.62c per ton in 1914.

The directors have authorized construction of a leaching plant to treat the oxidized material, estimated at 40,000,000 tons. It is the intention to build this plant with an initial capacity of from 2,000 to 3,000 tons per day. For the purpose of furnishing acid for this plant, the company will participate equally with the Garfield Smelting Co. in financing construction and operation of an acid works near the smelter.

In June, 1916, the directors set aside \$2,500,000 and ordered the enlargement of the mills.

Improvements under way promise not only a continuation of production increases but further reductions in costs.

Utah Copper is still the brightest star in the Hayden-Stone-Jackling galaxy, and its aggressive and brilliantly competent management promise to keep the company in its present enviable position.

UTAH & EASTERN COPPER CO.

UTAH

Office: 127 Church St., New Haven, Conn. Operating office: 508 McCormick Bldg., Salt Lake City, Utah. Mine office: Dixie, Washington Co., Utah. Works office: Shem, Washington Co., Utah. Officers: Louis E. Stoddard, pres.; T. W. Farnam, sec.-treas.

Inc. 1901, in West Virginia. Cap., \$1,500,000, increased later to \$3,500,000; shares \$5 par, in \$2,000,000 preferred and \$1,500,000 common stock.

Property: 11 claims, patented, 220 acres, and a 40-acre smelter site, including the old Dixie mine, in the Tutsagubet or Cave Springs district, near Green river, showing 5 replacement deposits in limestone, 1 of 40'

estimated average width, carrying cuprite, azurite and massive malachite ores, said to give average assays of 15% copper. **Development:** by a 775' blind shaft, sunk from the breast of a 225' tunnel. This tunnel caved, 1905, and it was necessary to run a new tunnel, of 800', to reopen the mine. Old workings said to show about 100,000 tons of ore. **Equipment:** includes a small gasoline plant.

The company has 2 smelters, 1 worthless; the new smelter has a 100-ton water-jacket blast furnace, with water power, secured from the Santa Clara river, 2 miles distant, and a small auxiliary steam plant. The smelter is at Shem, about 50 miles from Acoma, on the Rio Grande Western railroad, the nearest shipping point, and transportation for 14 miles of the distance is by traction engine.

Production: 1,448,597 lbs. copper in 1904, 400,166 in 1905, and 391,779 lbs. in 1907. Property considered promising but is handicapped by lack of rail transportation. Worked by lessees, 1915, who shipped several cars of 30% ore.

UTAH LEAD & COPPER CO.

UTAH

Office: Kearns Bldg., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Utah. **Officers:** Carl Brandt, pres.; Harry M. Stonemetz, v. p.; J. P. McDough, sec., all of Boston. W. D. Bohm, manager.

Inc. Dec. 24, 1912, in Maine, as the successor of the Bingham Copper Co. **Cap.**, \$500,000; shares \$1 par. Debentures \$100,000, at 6%, convertible bonds; outstanding \$31,750. Federal Trust Co., Boston, transfer agent; Paul Revere Trust Co., registrar.

Property: 11 claims, patented, about 102 acres, on the eastern slope of Carr Fork Canyon. Company also owns a one-quarter interest in the Diamond Extension and a one-half interest in the Diamond claims adjoining.

The property shows 3 fissure veins, several bedded deposits of silver-lead ore and a fissure vein of copper ore of less promise. A big outcrop near the W. end line is said to have yielded considerable high-grade gold and silver ore with lead carbonates, to former owner.

Development: by 2 tunnels, longest 1,200', and 2 shafts on the Venice claim. There are about 3,000' of workings, showing ore below commercial tenor generally but with occasional streaks of ore assaying up to 70% lead and 15 to 30 oz. si' er. **F lipment:** includes a small air compressor.

Property has been idle for some time, but was planning to reopen. Aug., 1916.

UTAH LEASING CO.

UTAH

Newhouse, Utah. **Officers:** John H. Leavell, pres.; J. C. Dick, v. p.; D. R. Pingree, sec. treas., with F. W. Royer and Vivian P. Strange, directors. H. H. Adams, supt.

Company completed a 500-ton plant at Newhouse in 1915 to treat 1,000,000 tons of tailing from the old Cactus mine. The plant uses a Mineral Separation machine; other equipment includes two 8' x 48" Hardinge mills, and 2 Dorr classifiers.

Electric power is obtained from the Beaver River Power Co. at 44,000 volts, stepped down to 2,200 and 4,400 volts. Claims that an extraction of 80 to 85% is practicable.

UTAH METAL AND TUNNEL CO.

UTAH

Office: McCornick Bldg., Salt Lake City, Utah. **Officers:** Jas. E. Rothwell, v. p.; W. E. L. Dillaway, sec.-treas., 45 Milk St., Boston, Mass.; Walter B. Farmer, L. E. Stoddard, A. B. Martin, directors. Chas. H. Doolittle, mgr.

Inc. May 5, 1914, in Maine. **Cap.**, \$725,000; \$1 par, increased from \$500,000; Nov., 1914, to purchase Bingham-New Haven C. & G. Mng. Co.;

677,717 shares issued. **Debentures:** \$375,000 (\$129,250 retired 1916), due April 1, 1919. Commonwealth Trust Co., Boston, transfer agt. State St. Trust Co., Boston, registrar. Company acquired 214,589 shares out of 228,689 issued shares, Bingham-New Haven C. & G. Mng. Co., by exchange of share for share. Latter company has been paying dividends since 1906, with \$285,861 paid in 1915, and a total of \$960,493. Utah Metal has never paid dividends. Listed on Boston Curb; traded in on New York Curb. Stock sold at \$1 to \$10.50 in 1915.

Income of Utah Metal from Sept. 25, 1914, to Dec. 31, 1915, was \$383,637 and net profit carried to surplus, \$180,465. The two companies earned \$510,094 in 1915, excluding 5%, or \$69,200 set off for depreciation. For first quarter of 1916, the combined gross income of both companies was \$678,172 for ore and \$11,944 for water, and combined net earnings were \$367,527. Company purchased \$129,250 of its bonds, and had cash on hand and due for ore sold, \$961,827.

In first 6 months of 1916 net earnings were over \$600,000.

Company is a reorganization of the Utah Metal Mining Co., itself a consolidation of the Bingham Central, Bingham Standard and Bingham Metal Mining Co.

Property: is extensive, covering 3,539 acres, including 139 acres timber land, in Bingham district, adjoining holdings of Utah Cons. and Utah Copper Co. (Boston Con.) and extending across the range to Middle Canyon, on the Tooele side. The company's active asset is a transportation and drainage tunnel, cut 11,500' through and 2,300' below the crest of the range, from near Tooele to Bingham Canyon (Carr Fork). This gives direct short transportation to Tooele and Garfield and develops a large flow—600,000 gals. per day—of water sold to the Garfield mill of the Utah Copper Co.

The Bingham or Carr Fork holdings include the Bingham Central & Bingham Standard groups, an area in which the various mineral bearing limestone beds of the camp are cut by the Saginaw-Burning Moscow and Nast veins, and crossed by the Old Jordan fault. The claims on the Tooele side show similar limestones, cut by fissures, but the development work there has not thus far shown commercial orebodies, as it has on the Bingham side.

In Nov., 1914, the company started crosscut exploration from the big drainage tunnel at 8,200' from the Tooele portal. In March, 1915, 1,300' from the Bingham portal, the latter work encountered mineralized ground, and on upraising 70', an orebody 25' thick was cut. Drifting disclosed a second orebody E. of and above the first, and later a third orebody, already opened and mined by the Bingham New Haven Co., was cut. At present there are five productive orebodies on the combined properties. One copper ore shoot 300' below the B. N. H. tunnel has been proven for over 200'.

By purchasing control of the Bingham New Haven company, the two properties can be developed together, each mining its own ground from tunnel on the other's claims. It also gives the Utah Metal much needed tramway facilities saving 60c per ton on ore shipments, and the use of the B. N. H. mill. The Bingham New Haven property is described under its own title, although the company is now a subsidiary of Utah Metal.

Development: on Utah Metal includes besides the 11,490' transportation and drainage tunnel, and the workings therefrom, extensive tunnel development on the Bingham Central and Standard group, embracing the 700' Saginaw, 2,000' Whiteley, 2,000' Jeff Davis, 400' Deem, 950 Mtn. Maid, the Amelia and lesser tunnels, all showing ore at various points. On the Tooele side, the Middle Canyon group has one 5,000' tunnel, another 1,700' and a third 500' long.

The transportation tunnel is 8'x9' in the clear, double tracked, with a half % grade. It develops the mineral bearing limestone and veins at depths of 375 to 900' below any other workings.

Production: in 1915—	Gold Oz.	Silver Oz.	Lead Lbs.	Copper Lbs.
Utah Metal (7 mo.).....	10,297	150,446	4,956,183	299,554
B. N. H. (12 mo.).....	6,617	325,448	4,903,906	2,574,261

U. M. received 13.12 and B. N. H. 16.505c per lb. for copper, and U. M. 3.49c per lb. for lead, compared with 3.957c received by B. N. H. U. M. ore averaged \$18.242 per ton and B. N. H. \$11.975 per ton.

In January, 1916, B. N. H. produced 704,155 lbs. lead and 348,096 lbs. copper, at an estimated profit of \$103,824. The U. M. made a profit of about \$45,000, a cave-in at the copper stope having curtailed production for the month.

Company now has ample surplus for working capital, good mine equipment, a mill handling 225 tons ore daily, and should with proper development be able to pay dividends for some years to come.

UTAH MINERALS CONCENTRATION CO.

UTAH

H. Atkinson, mgr., Eureka, Juab Co., Utah. A. W. Parshall, supt. Owns 250-ton custom concentrating mill for local ores. Recently has milled tungsten ores.

UTAH MINING, MILLING & TRANSPORTATION CO.

UTAH

Moscow, via Milford, Beaver Co., Utah. Chas. T. Birchard, pres. and gen. mgr., at last accounts. Lands: include the Hub and Lady Bryan mines, latter bought 1909, of Mathew Cullen et al., S. of the Burning Moscow, 6 miles from a railway, in the Star district.

Development: by a 400' two-compartment main shaft, developing a vein variously reported as 2 to 30' in width, carrying silver-lead carbonates, and a bedded deposit in limestone showing high-grade cuprite, from which small shipments of ore have been made. Ore said to carry \$6-\$7 in silver and gold with heavy percentage of iron. Reported ready to begin operations at end of 1915.

UTAH-MISSOURI MINES CO.

MISSOURI

Neck City, near Joplin Mo., is operating the Ball and Colony mines, the former showing rich lead-zinc ore at 185 to 200 feet depth in diamond drill holes. The Colony is an old mine already developed by a shaft. Company is putting up mills on each tract.

UTAH ORE SAMPLING CO.

UTAH

Office: Provo, Utah. **Officers:** Jesse Knight, pres.; E. P. Ellison, v.-p.; Arthur Stallings, sec.; A. W. Gates, gen. mgr.; preceding with W. L. Mangum and J. W. Knight, directors; W. E. Evans, supt. at Murray; F. Burgner, supt. at Silver City; M. A. Snow, supt. at Park City, Utah. Cap. \$200,000.

Company owns and operates ore-sampling mills at Murray, Park City, Silver City and Sandy, with combined capacity of about 500,000 tons of ore annually.

UTAH-RELIANCE MINING CO.

UTAH

Office: 408 South State St., Salt Lake City, Utah. **Mine office:** Ibapah. Tooele Co., Utah. **Officers:** J. G. Bywater, pres.; D. B. Tripp, v.-p.; Richard B. Shepard, sec.-treas. and gen. mgr.; preceding with W. A. Langford and Samuel Divett, directors.

Inc. 1908 in Utah. **Cap.**, \$5,000; shares 1 ct. par; assessable; issued, \$3,000, fully paid.

Property: 8 claims, unpatented, 160 acres, about 45 miles from a railway, showing porphyry and limestone. **Development:** by a 175' tunnel and a 100' shaft, latter showing ore assaying up to 16% copper, 4 oz. silver and 40 cts. gold per ton.

UTAH-UNITED COPPER CO.**UTAH**

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. **Mine office:** Milford, Beaver Co., Utah. **Officers:** A. J. McMullen, pres.-gen. mgr.; Chas. A. Weaver, sec.-treas.; preceding with Arthur B. Gattrell and Jas. E. Edmunds, directors. D. P. Rohlfing, engr.

Inc. 1908 in Utah, as a merger of the Wasatch M. & M. Co. and Skylark Copper M. & M. Co. **Cap.**, \$600,000; shares 1c par; assessable; issued \$75,000, with \$30,909 assessments levied to March, 1913. Annual meeting, second Monday in October.

Property: 14 claims, 2 patented, a 10-acre mill site and a patented water right, including the Skylark and O. K. groups, in the Beaver Lake district, 6 miles from a railway and 12 miles W. of Milford. Claims show limestone, monzonite and granite cut by fissure veins and carrying contact deposits between monzonite and limestone. **Development:** one vein reported to average 20' in width, is opened by 5 shafts, deepest 470', and by several tunnels, longest 250'. The ore is reported to average 2% copper and to carry small silver, gold and lead values. The ore minerals include cuprite, melanconite and azurite together with chalcopyrite and marcasite in a ferruginous gangue. Drifting on 470' level is reported to have disclosed some high-grade copper ore, 1915.

Equipment: includes 25-h. p. hoist, compressor and 3 buildings.

UTAH-YERINGTON MINING CO.**NEVADA**

Provo, Utah. John Roundy, pres.; C. W. Reese, v.-p.; Heber C. Jex, sec.-treas.; A. G. Gutheil and Jos. Wirthlin, directors.

Inc. 1907 in Utah. **Cap.**, \$100,000; shares 10 cts. par; assessable.

Property: 14 claims, 3 patented, lying E. of the Mason Valley mine, and next to the Butte-Yerington Copper Co. are said to show copper, silver, lead ore. Expected to operate property in 1916.

UTICA GOLD MINING CO.**CALIFORNIA**

Office: care of Hobart & Lane Estates, Merchants Ex. Bldg., San Francisco, Cal. Fred J. Martin, supt., Angels Camp, Calaveras Co., Cal.

Property: 9 claims, covering Dead horse lead, a N. W.-S. E. vein dipping 70° N. E. Vein has ore 60' thick, averaging \$3.60 per ton. Also Gold Cliff mine on westerly split of the main Mother Lode.

Geology: the Gold Cliff and Utica veins are about 3,000' apart on the surface, converging somewhat in their southern trend, and also in depth. Development tends to show that within a short distance from the bottom of the present workings, these two veins will unite as one large one. On the 2,750' level the pitch of the Utica vein, at or near the surface, is 60° to the east, while at the 2,400' level it has a pitch of 70°. The Gold Cliff, on the other hand, at or near the surface, has a pitch of 55° to the east, and at the 1,900' level has changed to 40°. The present lower workings of the Utica show the vein at that point to be about vertical.

Development: on the Utica vein to depth of 2,400' by vertical shafts; the 1,470' cross shaft being main working with 700' winze below 1,400' level and a 1,600' connection on 1,500' level, to 2,400' level of Gold Cliff shaft.

Equipment: includes the Utica 60-stamp mill, 20 stamps operating on Utica ore proper, with 85% extraction and the 40-stamp Gold Crown mill making a 90% extraction. Total costs, \$2.15 per ton.

See Calif. State Mining Bureau report 1913-14, Mines & Min. Res. of Calaveras Co., pp. 81 and 110.

A new strike on the 1,600' level made in June disclosed 18" to 20" of bonanza, or specimen ore, showing coarse free gold, the vein averaging \$1,200 per ton. New work on the 1,800' level is expected to disclose the downward extension.

UTICA MINES CO.**BRITISH COLUMBIA**

Office: C. F. Caldwell, Kaslo, B. C. **Officers:** G. H. Aylard, pres.; C. F. Caldwell, v.-p., with J. D. Chalin, W. M. Archibald, W. D. Miller, G. Hartin, C. B. White, mgr., directors.

Property: silver, lead, zinc holdings in Slocan district, B. C. Operating

profits, 1915, \$14,796. Quick assets, March 31, 1916, \$21,533. Shipping 50 to 100 tons lead and zinc concentrates monthly. Claimed March 31, 1916, there was enough ore in sight to maintain the output for at least another year.

UTOPIA MINING & MILLING CO.**WYOMING**

Centennial, Albany Co., Wyo. Lee Van Voorhis, pres.; Jas. McCune, v.-p.; P. L. Holtum, sec.; P. H. Milburn, treas.; Bernard Holtum, gen. mgr. Inc. 1898 in Wyoming. Cap., \$1,000,000; shares \$1 par; nonassessable; issued, \$875,000. Annual meeting, third Tuesday in August.

Lands: 2 claims, 30 acres, unpatented, in the Centennial district. The property shows 2 contact veins between diorite and schist, of which 1 averaging 6' in width, is reported to have given assays of 3% copper, 4 to 20% zinc, up to 63 oz. silver and \$44 gold per ton. Ore minerals are mainly chalcopyrite, sphalerite, and pyrites.

Development: by tunnels of 250', 600', 175', 300', and 1,200', with about 2,600' of workings, all in ore.

Equipment: includes a small electrical installation, with electric drill, and 6 buildings. Reopened in 1913; nothing heard from it since.

UVADA COPPER CO.**NEVADA AND UTAH**

M. M. Johnson, mgr., Pioche, Lincoln Co., Nev. Inc. 1915 (by F. C. Richmond, pres., Richmond Machinery Co., 117 W. Second St., Salt Lake City, Utah) to take over property of the Day Bristol Cons. Mines Co. Company is the operating company of the International & Intercontinental Mng. & Ref. Co., which see.

Initial dividend of 1c a share paid, Sept., 1916.

Property: 15 miles west of Pioche, includes the May Day, Hillside, Tempest, Gypsy, Vesuvius, National, Inman, Tempest, Oregon Short Line, Iron and Day mines. The Day mine comprises 5 claims on the opposite side of the mountain and was needed in order to drive a tunnel through the mountain, giving direct access to the railroad.

Ore is a mixed sulphide carrying silver, lead, copper and some zinc, occurring in limestone cut by fissures.

Development: by 2 old shafts, the 700' Gypsy and 500' May Day, both out of commission in 1915. A shaft, being put in condition, July, 1916, will be the main working shaft and will be connected with the 500' level. Old workings exceed 10,000'. In 1916, new work included mining ore on the 300', 350' and 450' levels and sinking a winze from 500' to 630' level. A 9,000' tram carries ore from mine to railway.

In May, 1916, the Day Bristol was shipping about 25 tons of lead and copper ore daily to the Garfield smelters. June production was 29 cars, about 1,160 tons.

Company also owns the Montana group of claims in the Tintic mining district, Utah.

UVADA TUNGSTEN CO.**NEVADA**

Care A. V. Taylor, Dooly Block, Salt Lake City, Utah. Is reported to have taken over the Pilot Knob group near Osceola, Nevada. (See Pilot Knob.)

Property: 5 claims, Pilot Knob group, 2½ miles south of Osceola, Nevada, shows quartz veins in limestone, overlying quartzite, underlain by granite. Ore carries tungsten.

VALDEZ GOLD CO.**ALASKA**

Formerly known as the Cameron-Johnson Gold Mining Co., which see.

VALENZUELA COPPER MINING CO.**ARIZONA**

Dead. R. I. P. Mine near Benson, Ariz. See Vol. XI, Copper Handbook.

VALLEY FORGE MINING CO.**MONTANA**

O. F. Newkirk, Rimini, Mont., sec. Operates gold, silver, lead, zinc property in Ten-Mile district, 14 miles W. of Helena. Developed for several years and in January, 1915, shipped ore at a profit of \$4,000. Erection of concentration plant in 1916 to treat 25,000 tons low grade dump ore is planned.

VAN ANDA COPPER & GOLD MINES CO., LTD.**BRITISH COLUMBIA**

Inactive. H. W. Treat, gen. mgr. and L. Goodacre, trustees; Jas. Raper, agt., Van Anda, B. C. Company presumably still alive but not operating.

Property: 20 claims, crown granted, 840 acres, including the Copper Queen and formerly the Cornell mines has been bonded from time to time to various operators who have held it for short periods. Property was under option to the Granby Cons. M. & S. Co., Ltd., in 1914, but option not exercised.

The Cornell mine has lenses of rich ore, mainly bornite, with some chalcopyrite along a diorite limestone contact. The deposit has one main ore-shoot, 150' long and 30' wide and two lesser shoots. No commercial ore has been found below the 360' level, though extensive drifting was done on the 460' level. The Copper Queen ores are similar in character and occurrence. See Texada Id., B. C., by R. G. McConnell, Geol. Survey Canada Memoir 58, 1914, pp. 56-64.

The Copper Queen shaft is 600' deep with a winze 240' deep on the 500' level.

VAN DYKE COPPER CO.**ARIZONA**

Miami, Ariz. **Care:** Hoval A. Smith, gen. mgr.; Cleve W. Van Dyke, pres. Inc. August, 1916, in Ariz. **Property:** 8 claims lying south of and adjacent to the Inspiration and Miami properties at Miami, Ariz.

VAN ROI MINING CO.**BRITISH COLUMBIA**

Controlled by Le Roi No. 2, Ltd., Rossland.

Office: F. A. Labouchere, sec., 535 Salisbury House, London, E. C., Eng., formerly a large producer of silver, lead, zinc concentrates, in Slocan district, B. C., but ceased operations 1914. Stock owned in England.

VANADIUM COMPANY OF AMERICA

See American Vanadium Co.

Control of company bought Aug., 1916, by Kuehn Loeb & Co., New York, the Cassatt Co. of Philadelphia, J. Leonard Replogle, Chandler Bros. & Co., and Harrison Williams. The reorganized corporation will have a capital of \$13,500,000 instead of \$700,000 of the old company; \$5,000,000 will be preferred, \$6,000,000 common and \$2,500,000 6% short term notes will be issued. Old stockholders receive \$1,000 a share, \$650 in new stock and \$350 in notes. The old stock is said to have cost \$200 a short time ago, the reorganization being one of the juiciest melons Wall Street has ever known.

VANCOUVER ISLAND MG. & DEV. CO., LTD. BRITISH COLUMBIA

Presumably dead.

Company has done no mining or prospecting in several years, and, at last accounts, was engaged in lumbering. Former mine holdings described Vol. XI, Copper Handbook.

VANGUARD GOLD-COPPER CO.**OREGON**

Mine near Kerby, Josephine Co., Ore. C. E. Phillips, mgr. Inc. 1910. **Cap.**, \$1,000,000, shares \$1 par. **Lands:** 7 miles W. of Kerby, are said to carry gold-copper ore. Idle.

VASCO MINING CO. (Tungsten.)**COLORADO**

Subsidiary of Vanadium Alloys Steel Co., Latrobe, Pa. J. A. McKenna, v. p. and gen. mgr., Voegtle Bldg., Boulder.

Acquired property in the Nederand district in Fall of 1915, and remodeled the old Boyd mill for concentration of tungsten ores which are both mined and purchased. The ore is ferberite occurring in veins in pegmatite or granite. Mill equipment: crusher, rolls to $\frac{1}{4}$ ", trommel jigs, stamps for jig tails, classifiers for jig hutches and battery pulp, Card and Wilfley tables, Monell slimers.

Holdings Apr., 1916, include 15 operating mines, shipping 8-10 tons concentrates weekly. Two mills have been built and another is in process of erection.

VEKOL MINING CO.

Dead. Described in Vol. XI, Copper Handbook. Property is being worked, 1915, by M. M. Carpenter, lessee.

VENTURE HILL MINING CO.**ARIZONA**

Office: 1515 Shatto St., Los Angeles, Cal. Jas. G. Scarborough, pres.; Mrs. Carrie G. Taylor, v. p.; Wm. R. Uber, sec-treas. Inc. 1900 in Arizona. Cap., \$3,000,000, shares \$1 par. Lands: 6 patented claims, 110 acres, 2 miles S. of Jerome, show 2 fissure veins, claimed to average 4.7% copper, 6.5 oz. silver and \$4 gold per ton, in oxide and sulphide ores, developed by shafts of 65' and 87' and tunnels of 205' and 457'. Idle since 1904, and out of funds. Reported in June 1916, that property had been taken over by the Verde Combination Copper Co., which see.

VERDE COMBINATION COPPER CO.**ARIZONA**

Jerome, Ariz. Reported in June, 1916, that this company had been incorporated in Ariz. by Jas. M. Layman, Robt. E. Moore and K. D. Washburn of Jerome. Cap., \$1,000,000; shares 50c par; fully paid; non-assessable.

Property: holdings reported to include property of the Pittsburgh & Jerome Copper Co., the Venture Hill Mining Co., the Black Hills Copper Co., described under their respective titles, the Verde Cons. Copper Co., the Muscal group, and two fractions.

The last attempt in 1914 to finance the company by a bond issue resulted in failure and all the officers resigned, Aug. 3, 1914. On Dec. 30, 1915 suit was filed in Superior Court by bondholders to foreclose trust deed.

VERDE GRANDE COPPER CO.**ARIZONA**

Idle since Feb. 1909. Jerome, Yavapai Co., Ariz. J. C. Scott in charge of property. Inc. Sept., 1906 in Arizona. Cap., \$8,000,000; shares \$1 par; issued, \$5,700,000. Company endeavored, Aug., 1910, to float a \$20,000 bond issue, among its shareholders, but only \$2,000 was subscribed, which was returned, but in a second attempt, made 1912, about \$5,000 was raised for which 3-year bonds, at 6 per cent were issued; outstanding \$4,976.

Property: 9 claims 5 patented, 125 acres, on the southern slope of Smelter hill, the United Verde being on the opposite slope, about a mile distant, lands being located on a precipitous hill. Claims show diabase, diorite, slate and schist, carrying stringers of argentiferous and auriferous azurite, chalcocite and chalcopyrite, of good assay tenor, but not in commercial quantities, occurring mainly in schist. The management believed that the lands carry an extension of the United Verde orebody. Development: by an 838' shaft and 3 tunnels, with about 2,000' of workings.

Equipment: includes a steam plant, with a 60-h. p. hoist, good for 1,500' depth, and an 8-drill Ingersoll-Rand air compressor. There are 8 buildings, including a 40x44' power house, 12x18' carpenter shop and 12x14' smithy, with a bunk house and a mess house.

VERDE QUEEN COPPER CO.**ARIZONA**

Reported in Smythe's *Obsolete American Securities* Vol. XI, 1911 "New Jersey charter void 1906, for non-payment of taxes."

At a stockholders' meeting held in Jersey City, N. J. May 6, 1916, dissolution of the company was approved. It was decided to make a distribution of part of its assets consisting of 1,000,000 shares of Jerome Verde Copper Co.'s stock; holders of Verde Queen stock to receive in partial liquidation 200 shares Jerome Verde stock for each share of Verde Queen stock.

Property of the company was taken over in 1906 by the Jerome Verde Copper Co.

VERDE QUEEN MINING CO.**ARIZONA**

Pantano, Prima Co., Ariz. P. M. Hilton, sup. Lands: in central part of Empire mining district, about 12 miles from Pantano, and 15 miles W. of Benson, show silver-lead and copper ores, developed by a 280' 2-compartment shaft, from which a little lead ore was shipped to the El Paso smelter. Equipment: includes gasoline hoist. Idle for several years.

VERMONT COPPER CO.**VERMONT**

Office: 576 Fifth Ave., New York. Mine office: South Strafford, Orange Co., Vt. G. E. Parks, sec.; G. M. Heckscher, mgr.

Inc. 1906, in Arizona, as successor of Elizabeth Copper Co. **Cap.**, \$1,000,000, and since has taken over the Strafford Mining Co. and the Sharon Power Co.

Property: 12 miles from Pompanoosue, the nearest rail station, includes the old Elizabeth mine, opened 1793, for magnetic pyrites, and operated early in the nineteenth century by the Vermont Copperas Co., which is said to have made, at one time about 6,000,000 lbs. of copper yearly, beginning a small incidental production of copper about 1830, when it was found that the mine carried an average of about 3 per cent copper, in the form of chalcopyrite disseminated in pyrrhotite.

Geology: the orebody is a thin lens of pyritic ore in foliated mica-schist, wedging out at the bottom. The lens has been mined for 700' in length and is reported, by the management to have been opened up for more than 2,000' in length, ranging from 50 to 100' in width, of which 8 to 10' is ore. Management estimates upwards of 1,000,000 tons of pyritic ore in sight, consisting of pyrrhotite and pyrite with small amounts of chalcopyrite. Diamond-drill borings, made 1909, have shown ore to continue for 200' depth below the present workings. **Development:** by a 1,340' tunnel with back of 225', and a 200' incline blind shaft. The dumps carry about 50,000 tons of discarded ore of which large portions are estimated by the management to average 1.75 per cent copper.

A hydro-electric power station on the White river, equipped for 500 h. p. formerly transmitted current 9 miles to the mine and works. There also is a small steam plant and an air compressor at the mine.

The reduction plant at the mine included a mill and smelter, the former using the Rowland magnetic separation process. The smelter has a 300-ton blast furnace in which semi-pyritic smelting was tried, but abandoned 1908, for heap roasting.

After an idleness of several years operations reported to have been resumed June 1916, under management of Professor George Guess of the University of Toronto.

VERNAL MINING CO.**NEVADA**

Office: 351 Bullitt Bldg., Philadelphia, Pa. Mine office: Goldfield, Nev. **Officers:** M. Schamberg, pres.; E. S. Van Dyke, treas.

Inc. in Arizona. **Cap.**, \$1,500,000; shares \$1 par; increased 1915 from \$1,000,000. Central Trust and Savings Co., Philadelphia, transfer office. Listed on San Francisco and Salt Lake City Exchanges.

Property: 2 claims, in Diamond district, Goldfield, is developed for a few hundred feet, partly by lessees. Has shipped in a small way.

VERNON MINING CO.**COLORADO**

Office: W. L. Fleming, pres., 50 Broad St., New York; C. L. Horton, vice-pres.; Louis DeWolf, sec.-treas.; A. G. de Golyer, mgr., Ironton, Colo.

Inc. in Delaware 1916. **Cap.**, \$1,000,000; shares \$1 par; 550,000 shares outstanding; 490,000 issued to syndicate subscribers.

Property: 3 claims, 1 patented, 31 acres, located at timber line (11,000'), in the Red Mountain mining district of Western Colorado, about 7 miles from Ouray.

Claims show 3 well defined fissure veins in altered andesite. The Beaver vein has not been prospected. The South Dakota vein lying between the Vernon and the Beaver is traceable for several thousand feet and shows an outcrop that is 50' to 80' wide. This vein is parallel to and about 150' from the Vernon; the dip being opposed the two veins should unite at about 300' in depth. The veins carry gray copper ore with high silver-copper values, in well-defined ore shoots. The South Dakota vein has a shoot 175' long, that will average 5' in thickness opening to a width of 20' in stopes above the tunnel level where the ore averaged 12 per cent copper.

44 oz. silver and \$2.80 per ton in gold. The Vernon vein shows a width of 3' of high-grade silver-copper ore in a drift at the bottom of a 48' shaft.

Development: on the South Dakota vein consists of a 100' incline shaft and a 175' tunnel, giving a back of but 50'.

Equipment: includes machine drills, electric hoist, compressor, etc. Management plans sinking South Dakota shaft to the 300' level, crosscutting to the Vernon vein and opening up stoping ground.

Property meritorious; management good.

VESUVIUS MINES CO.

OREGON

Frank J. Hard, supt., Bohemia, Lane Co., Ore. **Property:** the Vesuvius group of claims, has about ½ mile of workings, showing veins with gold-silver-copper ores. Developed to 300' depth by tunnels and stopes. **Equipment:** includes water, steam and electric power and 10-stamp mill.

VICEROY MINING CO.

ARIZONA

Office: Janesville, Wis. Mine near Patagonia, Santa Cruz Co., Arizona. **Officers:** Frank H. Baack, pres.; M. G. Jeffris, v.-p.; M. O. Mouat, sec.-treas., Janesville, Wis. Inc. Oct., 1912. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; issued, \$600,000.

Property: 8 claims, unpatented, 164 acres, in the Tyndall district, 20 miles N., N. W. of Patagonia, shows a number of fissure veins, traversing porphyry or following contacts between diorite and porphyry and dipping 45°. The vein is said to range from 6 to 75' in width. Ores are principally silver-bearing, but show occasional bornite and a little lead ore above the water level, reported to carry from 16 to 199 oz. silver per ton.

Development: by shafts of 40' and 100' with about 400' of tunnel workings in leached ore.

Idle for lack of funds, but company planning to resume operations, 1916.

VICKSBURG GOLD AND COPPER CO.

UTAH

Mine near Milford, Beaver Co., Utah, leased June 1916 to United States Mines Operating Co. **Property:** 5 claims in Star district, covering 4,000' of limestone belt cut by ore-bearing fissures. **Development:** shallow, but ore shipped May, 1916. Property will be equipped with machinery.

VICTOR & BELLE CROWN MINING CO.

ARIZONA

Wenden, Yuma Co., Arizona. **Officers:** J. E. Matteson, pres. and gen. mgr.; F. C. Piper, v.-p.; J. H. Matteson, sec. treas.; B. J. Quinn, cons. engr.; at last accounts.

Property: 10 claims, 180 acres, in the Harcúvar mountains, 8 miles N. of Salome, the nearest rail point. Claims are said to have a vein of 5 to 7' width, a 30 to 36" paystreak, giving assays of 15 to 20% copper and \$15 to \$20 gold per ton. **Development:** includes shafts of 80', 35', and 450', and tunnels of 755', 165' and 230', aggregating about 1,200' of workings. **Equipment:** includes gasoline power. Idle.

VICTOR CONSOLIDATED MINING CO.

UTAH

Office: P. O. Box 1225, Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. **Officers:** J. S. Wells, pres.; A. W. McCune, v. p.; J. A. Groesbeck, sec.; W. S. McCornick, treas., with J. H. Brown, directors. Vivian McCune, gen. mgr.

Inc. 1903 in Utah. **Cap.**, \$375,000; shares 50 cts. par; all issued; assessable, with 5 assessments levied and fully paid. Stock is listed on the Salt Lake Exchange.

Property: 5 claims, 38 acres, patented, including the Victor and Boss Tweed mines, carrying gold and lead-silver-bearing copper ore, developed to depth of 800'. The company is idle and the mine has been in the hands of lessees since 1909. Shipments reported to run 7% copper and 8 oz. silver per ton.

VICTOR GOLD MINING CO.

COLORADO

Property ordered sold at receivers sale, Sept. 11, 1916, at Nogales, Ariz. Cripple Creek, Colo. Controlled by Moffatt-Smith estates. Owns the Victor mine, with reported production of \$2,250,000 to 1900. Operated 1916.

under lease by A. Osberg. Mine had been inactive for many years and was supposedly exhausted when present lessees began operations.

Main shaft 1,000' deep, has 14 levels. For geology of district see U. S. G. S. Prof. P. 54.

Production: in 1915 varied from 200 to 500 tons monthly, of milling ore yielding \$10 to \$20 per ton.

VICTOR MINING AND SMELTING CO.

MEXICO

Office: 315 Schultz Bldg., Columbus, O. Mine address: Cananea, Sonora, Mex. Officers: S. D. L. Jackson, pres.; M. F. Cole, v. p.; F. P. Jackson, sec.-treas.; preceding with J. S. MacLean, W. H. Sartain, C. Thornton, Chas. Schindler and C. A. Stillwagen, directors; W. A. Woodlief, fiscal agt.

Inc. May 9, 1905, in Arizona. Cap., \$1,500,000, increased 1907, from \$1,000,000; shares \$10 par; issued, 90,000 shares. Title to property is held through the Guerrero Mining Co., legalized in Mexico. Annual meeting, second Monday in January.

Lands: 47 pertenencias, in 2 groups in the Magdalena district, about 12 miles S. W. of Cananea. The property shows fissure veins in granite-porphry intruding sedimentary rocks. The veins are strong and well defined, very silicious and high in iron content.

Development: by a shallow shaft and 5 short tunnels, with a total of about 1,500' of workings, showing high-grade copper ore with small gold and silver values, in 2 veins of about 4' and 70' width, the wider vein showing evidences of considerable leaching. The mine has no power or equipment. Property closed down in 1914 owing to revolutionary disturbances in Mexico.

VICTOR POWER & DEVELOPMENT CO.

CALIFORNIA

J. H. Sharpe, pres., Red Bluff, California. C. D. Jackson, mgr. Owns the Midas mine, Gold Hill, Bonanza and other properties in Harrison Gulch, Shasta Co., Calif. The Midas alone is credited with a total production of \$8,000,000. Main shaft is 1,300' deep. Equipment: includes 20-stamp mill, cyanide plant, hoist, etc.

Production: 3 months ending March 1, 1915, from mines, \$20,000, from cyaniding tailings, \$27,000. Capacity of mill is to be increased to 200 tons, and hydro-electric power will supplant steam.

VICTORIA CONSOLIDATED MINING CO.

UTAH

Controlled by Bingham Mines Co.

Office: 404 Dooly Blk., Salt Lake City. Mine at Eureka, Tintic district, Juab Co., Utah. Officers: H. H. Green, pres.; Harold P. Fabian, v.-p.; with A. L. Hoppaugh, R. E. Mark and Chas. C. Dey, directors. J. R. Brain, sec.-treas., Provo. Imer Pett, gen. mgr.; Wm. Owens, supt.

Inc. March 7, 1899, in Utah. Cap., \$70,000, shares 10c par; \$49,985 issued. Has paid \$207,500 dividends to 1916.

Annual meeting first Monday in January. Gross earnings in 1915 were \$11,724 and net operating gain \$2,407.

Property: 7 patented claims, 50 acres, includes the Snowflake and Victoria mines at Eureka. Ore is gold-silver-lead with some copper, occurring in chamber deposits in limestone. Pay ore occurs in shoots and streaks of variable size, up to 100' in width.

Development: includes 1,200' shaft with 2,500' of workings. Has compressor, added 1913, 112 h. p. hoist, and uses electric power.

Production: 7,455 tons in 1912; 12,552 tons in 1913; 8,763 tons in 1914; 3,071 tons in 1915; a total of 58,806 tons. Shipments in 1915 averaged 9.06% lead; 12.40 oz. silver; .242 oz. gold. The Victoria mine has been the main producer.

VICTORIA COPPER MINES CO.

NEVADA

C. W. Reynolds, supt., Dolly Varden, Nevada. Officer: F. A. Strehlke, sec., Goldfield, Nev. Property: the Victoria mine, an old copper producer now reopened and equipped.

VICTORIA COPPER MINING CO.**MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Victoria, Ontonagon Co., Mich. **Officers:** Fred H. Williams, pres.; Chas. D. Hanchette, v. p.; Jas. P. Graves, treas.; preceding with Willard S. Martin and A. W. Chester-ton, directors; Sydney S. Millett, sec. and transfer agent; George Hooper, supt., J. C. Butler, mine supt.; Chas. D. Hooper, mill and power supt.; G. A. Braun, Jr., engr.; A. R. Penberthy, clerk and purch. agt.

Inc. Jan 16, 1899 in Michigan. **Cap.**, \$2,500,000: shares \$25 par; all issued; paid in, \$15. Last assessment \$1, April 15, 1914. Shares listed on the Boston Stock Exchange. First National Bank, Boston, registrar. Annual meeting fourth Monday in February. Company ended 1915 with quick assets of \$134,769 and account payable, \$22,489.

Property: 2,389 acres mining lands, in Secs. 19, 20, 29, 30 and 31, T. 50 N., R. 39 W., and Secs. 24, 25 and 36, T. 50 N., R. 40 W. This tract has an extreme E.-W. width of 2 miles, and a N.-S. length of $2\frac{3}{4}$ miles, lying just W. of the Ontonagon river. It is practically all on the mineral belt, only about 100 acres lying on the eastern sandstone. The tract may carry the western extension of the amygdaloidal bed under development by the Lake Copper Co. Neighboring mines, all idle for many years, are the West Minnesota on the N., National on the E. and Tremont-Devon on the W. The lands are well timbered, with an inexhaustible supply of good sandstone for building purposes. Nearest railroad is the C. M. & S. P., at Rockland. 3 miles distant.

The first known attempt at Lake Superior copper mining was made in the winter of 1770-71, on what is now Victoria property. In 1849, the property known then as the Cushin, was opened on a line of prehistoric pits containing masses of native copper, one weighing upwards of a ton. The name was changed 1850, to Forrest, and property reorganized 1858, as the Victoria Mining Co. Under these titles the property made 373,279 lbs. fine copper at a loss of about \$180,000. The mine was operated regularly, on a small scale, 1849-55, and thereafter spasmodically. It was unwatered 1883, but remained idle until work was begun March 1, 1899, by the present company.

Geology: the mine is located on a high and steep hill, notwithstanding which the solid rock is covered with heavy sand and clay drift. The Forrest amygdaloid bed, on which the mine is opened, is 5 to 80' wide, averaging about 12', but of very irregular width and dip, and very buncy in contents. The average strike is N. 66° E., and dip 61° N. W., the lode having about 2 miles of outcrop on Victoria lands. The formation is much disturbed at surface, the bed being irregular in dip, but widening at depth, with more regular walls. The lode is low in average grade, but fairly regular in copper contents, carrying low-grade stamp rock, with best values near the hanging wall.

Development: the old mine was opened by 5 shafts, deepest, 300', located at irregular intervals, with levels spaced at 55 to 65'.

The Victoria, or, No. 2 shaft, which was chosen for new operations, was enlarged to 2 compartments, and a third compartment was added, 1916, 16' E. of the skipway. The two skips will work in balance. The shaft is 2,655' deep, bottomed below the 26th level. Levels between the 4th and 24th have been opened at regular intervals of 100', below the 23rd at intervals of 150', with drifting on all levels. The total drifting on the Forrest bed, tributary to No. 2 shaft, was 45,270' at the end of 1915, and in addition there are 8,068' of crosscuts.

Short drifts have been opened from these crosscuts on various beds, but without much encouragement. The total openings tributary to No. 2 shaft are 58,769' and the mine was estimated, 1914, to show 300,000 tons of stamp rock, with 300,000 tons blocked out for stopping.

The productive part of the mine tributary to Victoria or No. 2 shaft, is on the Forrest bed, an epidotal amygdaloid having an average width of 4' to 12', widening to 80', at one point. Walls are quite regular, but where

crush zones occur, the mineralization extends into the walls, giving an occasional maximum of 50' width of ore. The footwall bed underlying the Forrest, at a depth of 2 to 12', is well mineralized in places, carrying occasional masses from 100 lbs. to 3 or 4 tons in weight, but is very bunched, copper occurring mainly on the foot, with considerable epidote on the hanging. Underlying this epidote bed, at a distance of 60', is a 6' amygdaloid showing much epidote and allied minerals, with a little stamp rock. Stopes opened on all levels from the 4th to the 22nd inclusive, give fairly uniform results.

The copper shoot developed by this shaft is 1,000 to 1,500' wide, with a slight rake to the S. W. The ore stoped is low in average grade, but fairly regular in contents, with main values in stamp copper. All levels down to the 17th are connected by winzes, giving ventilation and safety.

Development: 1915, included 2,947' of drifts, with a total of 3,454' of new work and 7,595 cubic fathoms stoped. The mine uses 35 power drills.

An exploratory shaft, 2,600' E. of No. 2, was sunk, 1907-1908 to depth of 121' with some drifting and crosscutting, which met with small encouragement, and work was stopped.

No. 6 shaft, 3,455' E. of No. 2, was started Dec., 1909, to develop the eastern end of the property, previously explored by diamond-drill borings. This shaft has three compartments, with 2 skipways, designed for 6-ton skips and is 886' deep. There are 1,490' of drifts and crosscuts, showing broken and faulted ground, barren of copper, excepting for about 100', a short distance W. of the shaft.

The mine also has 419', 150' and 724' crosscut tunnels, the latter showing the contact between the Keweenawan trap beds and the eastern sandstone with several amygdaloidal beds exposed on which 176' of drifting gave a little encouragement.

Considerable diamond drilling has been done N. of the Forrest bed, a total of 15,292' of holes having been drilled, in 2 cross-sections, disclosing several beds that may warrant future attention.

No. 2 shaft has a new shaft house, equipped with a duplex Nordberg hoist, good for 5,000', and a 5-ton traveling crane for handling skips, man cage and timber.

The rock house has storage bins for stamp rock and waste, with chutes, loading gates and air lifts, and there is a pneumatic hammer for mass copper.

The power house is equipped with a 20x48" duplex-cylinder hoist, having a single conical drum of 8' minimum and 12' maximum diam. with 11' face, carrying 3,000' of 1½" rope, raising 4-ton skips, and equipped with an automatic safety stop and throttle closing device. The boiler house is for heating purposes only. A steam power plant is being added to use as a reserve when water supplying the hydraulic plant is low.

Buildings at No. 2 shaft include machine and carpenter shops, smithy, changing house hospital, warehouse, general store, mine office, boarding house, 76 dwellings, sawmill, lath, shingle and planing mill. Water for domestic use and fire protection is pumped from a well having a storage tank about one-half mile from the mine.

Hydraulic Plant: a large water power has been developed from Glenn Falls, on the W. branch of the Ontonagon river, about 1 mile from the mine, at a cost of \$440,593, to Dec. 31, 1912. This is the best natural water power of the Lake Superior copper district, the stream dropping about 110' on the company's property, by a series of small falls, between which are numerous rapids, with sandstone bottoms. The company utilizes 72' of this drop. Power is developed by means of a dam, canal and hydraulic air compressor.

The dam is 225' between abutments, has an extreme height of 24', is 14' wide at the bottom and 8' at the top, and has a 320' main section with wings of 100' and 160', giving a total length of 580', built with an arch up-stream. It is provided with two 44" flush gates, for drainage and flushing out silt, a log chute, waste weir and sand fence.

The canal diverting water from the dam is 4,800' long, 10' deep at the head gates, with a bottom slope of 1" in 100'. At the end the canal opens out in a forebay, at the extreme end of which the compressor shafts are located. The canal is equipped with drainage gates, slush gates, overflow weirs and submerged measurement gates.

The 3 intake shafts of the compressor are 5' in diameter, spaced 19' from center to center. The shafts were sunk through solid sandstone, by means of 5" preliminary holes, bored to the required depth of 343', then enlarged from 5" to 5' in diameter.

The shafts, lined throughout with concrete, formerly drew air through 5,000 special $\frac{3}{8}$ " tubes. This proved unnecessary as the water falling down each shaft sucks air with it and this air is carried through 280' of air chamber cut in the rock at the bottom of the shaft. A water seal at the intake end is formed by $\frac{3}{8}$ " steel shells, firmly concreted into the bottom of the shafts. The air chamber is 281' 6" long, and 18' wide, with minimum of 21' and maximum of 26' height, having a maximum capacity for 80,264 cu. ft. of compressed air. The water seal at the upflow end is formed by an arch of rock, 40' long, below which a tunnel 10' high leads to the upflow shaft, which is 16x18' in section, sunk at 72°, with a vertical depth of 271', leading to surface, where the water is again discharged into the river. The power head developed is 72', and the pressure head 271', giving a maximum air compression of 117 lbs. per sq. inch. Imprisoned air, carried down the shafts by suction and swept along the tunnel in bubbles, by the rushing water, is released in the chamber where the constant accession of bubbles causes compression, escape backwards being prevented by the $\frac{3}{8}$ " steel shells connected in the shafts. The chamber, known as the compressor, is connected with a 12" pipe line to mine and mill. Extra pressure is relieved by a safety or blow-off pipe.

The Taylor hydraulic-pneumatic plant was completed, March 1906, furnishes 4,000 to 5,000 h. p. under a full head of water, and has shown an efficiency of 82% under test. It is the largest single-unit air compressor in existence, and the fifth installation of the sort in the world. It is possible to operate 1, 2 or 3 of the inlet shafts, if so desired, with corresponding variation of energy developed, but only 1 unit is in regular use. The compression is automatic, practically isothermal, and the air as delivered is unusually dry.

An extensive topographical and hydraulic survey of the company's lands and the watershed made 1909, by the J. G. White Co., of New York, shows that an average of 15,000 h. p. can be developed on the western branch of the Ontonagon river, but the expense of development necessarily will be large. During the drought of 1910, the water supply fell far below normal and additional storage for water was secured on the western branch of the Ontonagon river, near the outlet of Lake Gogebic.

The mine and mill are connected by a 4,800' tram line, in 2 sections, the upper with 6%, and the lower with a 12% grade. A stationary double-sheave hoist, at the top of the incline, serves to pull the empty cars up the steeper grades, but otherwise trains are operated by gravity, in counterbalance.

Mill: the stampmill, on the bank of the river, near the hydraulic works, has a single 24x24" Allis-Cuyahoga stamp. The stamp of 650 tons daily capacity, has $\frac{3}{8}$ " mortar screens, and all oversize above $\frac{1}{2}$ " is run to a set of 16x36" Traylor rolls. The washing floor contains 22 Hodge jigs, 5 Wilfley tables, 6 Card tables, 1 Standard table, hydraulic separators and settling tanks. Machinery is driven by a 12x12" piston-valve engine. The mill went into commission June, 1906, tailing losses running only 0.1 to 0.15% copper. Extraction is about 81%. Mineral (concentrate) formerly smelted by the Calumet & Hecla Co. is now smelted by the Quincy smelter at Ripley, thereby effecting an appreciable saving in transportation.

Year	Ton R'k Stamped	Lbs. Cu. p. Ton	Cost p. Ton. (a)	Copper Prod. lbs.	Cost p lb. cts
1915	133,984	11.1	\$1.46	1,499,695	15.66
1914	139,862	10.6	1.41	1,486,242	16.0
1913	137,163	10.4	1.42(b)	1,428,693	16.5
1912	131,955	9.3	1.32	1,224,911	17.41
1911	126,894	10.2	1.20	1,303,331	13.01
1910	122,497	9.0	1.17	1,164,564	13.04
1909	118,605	9.0	1.48	1,062,218	17.09
1908	109,015	11.8	1.56	1,290,040	14.34
1907	95,035	12.7	1.71	1,207,237	15.8
1906	39,185	13.9		546,334	18.7

(a) Mining and Milling. (b) High cost due to the labor strike and high footage, 7,428', of development.

Tonnage costs are low, but finished copper costs are high, owing to the exceedingly low average tenor of the rock stamped which is only about 0.65%, and returns would be absolutely ruinous, and the mine hopeless, were it not for the great advantage that the property enjoys through the cheapest power that is had by any copper mine in this or any other district. It is obvious that the Victoria needs 15 cent copper to break even on its present basis of production. With the larger ore supply procurable through the new skipway in No. 2 shaft, even the present phenomenally low average cost will be bettered, and the Victoria placed in a position to handle rock of lower average grade than perhaps any other mine in the Lake Superior district. The company's holdings are extensive, exploratory work is being conducted with vigor, and the management has displayed both courage and good judgment in its operations.

VICTORIA GOLD MINING CO.

UTAH

Care Mrs. R. S. Robertson, treas., 1076 E. 2nd South St., Salt Lake City, Utah. Dr. A. A. Kerr, pres.; E. W. Hall, v.-p.; M. G. Robertson, sec.

Property: 8 claims, patented, near Gemini mine at Tintic. **Development:** 500' incline shaft and 400' tunnel opening up a large body of manganese iron ore carrying lead values. A new tunnel is to be driven in 1916-17 to open a new find.

VICTORIA MINING AND SMELTING CO.

NEW MEXICO

Bankrupt. Holdings bought by C. J. Boyd of Los Angeles at sheriff's sale, Dec., 1915. **Property:** 2 groups, 1,000 acres, 20 miles apart, the Southern group between Organ and San Andres Mts.; the other in Plomo district, San Andres range, 35 miles N. E. of Las Cruces. Claims which show large bodies of silver-lead ores of milling grade will be opened and developed in 1916.

VICTORY COPPER MINING CO.

ALASKA

Inactive. **Office:** 817 Alaska Bldg., Seattle Wash. **Mine office:** Ketchikan, Gravina island, Alaska. **Officers:** M. McTernan, pres.; E. D. Fisher, v.-p.; Maurice D. Leehey, sec.; J. R. Kelley, treas. **Dr. C. O'Connor, C. J. Cronin and E. F. Tiernan, directors. Inc. March, 1901, in Washington. Cap., \$1,500,000, shares \$1 par; non-assessable; fully issued. Annual meeting, first Monday in September.**

Property: 14 claims, 9 patented, 260 acres, on Seal bay, Gravina island, 22 miles S. of Ketchikan, extends from sea level to 4,000' above the beach. Lands show granite, greenstone and limestone reported to be cut by 11 veins, of which 4 were developed. The main vein is estimated by management to average 22' in width carrying chalcopyrite with quartz gangue and to assay about 5% copper, 19% sulphur, 19% iron and 52% silica, with \$2 per ton in combined gold and silver values. **Development:** by 2,100' tunnel, intersecting 11 veins.

VIENNA-INTERNATIONAL MINING CO.

IDAHO

807 Bank St., Wallace, Ida., care R. A. Marshall. Reported in June, 1916, that Frank C. Bailey and associates of Spokane had obtained control of the company. **Officers:** F. V. Phinney, pres.; Robt. A. Marshall, sec.

treas.; F. C. Bailey, gen. mgr., Robt. Mack, supt., with A. B. Livingstone, W. B. Lively and D. Rosenbaum, directors. Annual meeting called for Sept. 5, 1916, at Wallace.

Property: 6 claims, 3 patented, and a mill site, near the mouth of Flora gulch, on Placer creek, 6 miles S. of Wallace, shows banded shales and quartzites of the middle part of the Newland formation, striking N. 50 to 60° W., and dipping 70° S. Principal vein has a quartz-siderite ore-body, 3 to 5' wide with strike almost E.-W. and vertical dip. Ore on the dump shows galena, pyrite and chacopyrite in a quartz-siderite gangue of too poor a grade to be profitably concentrated.

Development: by a 400' shaft, and 2 tunnels of 700'. New management plans unwatering the shaft, sinking to 500' and drifting on the 400' and 500' levels.

VINCENT GREEK GOLD & COPPER CO.

OREGON

Austin, Grant Co., Ore. Burton Miller, pres.-gen. mgr.; Ernest Blackwell, v.-p.; Nellie H. Miller, sec.-treas., and J. S. Edwards, directors.

Inc. Dec. 5, 1907, in Oregon. **Cap.**, \$200,000; shares \$1 par; issued 100,002 shares.

Property: 100 acres, in the Greenhorn district, 5 miles N. W. of Austin, on the S. V. R. R., shows a strong vein, traceable 1,500', said to average 14' in width and 3.5% copper.

Development: by a 25' shaft and 215' tunnel being driven 600' with back of 400'. In Feb., 1916, a 20' vein of copper ore was opened in this tunnel. There are 3 buildings. Mine has no power equipment.

VINDICATOR CONSOLIDATED GOLD MINING CO. COLORADO

Office: 603 Symes Bldg., Denver, Colo. **Mine office:** Independence, Colo. **Officers:** A. J. Zang, pres.; I. T. Snyder, v.-p.-gen. mgr.; G. S. Wood, sec.-treas., with A. F. Zang and Chas. Sigel, Jr., directors. G. A. Stahl, asst. sec.; H. P. Nagel, Jr., supt. of mines; A. R. Minner, supt. of mills; T. H. Sheldon, pur. agt.

Inc. Nov. 20, 1896, in Colorado. **Cap.**, 1,500,000 shares; \$1 par; all issued; non-assessable; no bonded indebtedness. Annual meeting 2nd Thursday in February. International Trust Co., Denver, transfer agent and registrar. Listed on Colorado Springs Stock Exchange.

Rumored July, 1916, that the company is to combine with the Cresson, the Golden Cycle Mining Co. and United Gold Mines, the Cresson having been bonded for \$4,270,000 as a preliminary step.

General Balance Sheet:

	Property	Equip.	Secur.	Cash	Miscel.	Total
Assets—						
1915	\$2,436,751	\$105,330	\$179,289	\$286,495	\$ 54,229	\$3,062,094
Liabilities—						

	Cap. Stk.	Bills Pay.	Surplus	Other	Total
1915	\$1,500,000	\$340,000	\$1,220,918	\$1,176	\$3,062,094

Comparative Income Account:

	Mine Receipts	Mine Expense	Oper't'g Profit	Other Receipts	Divi- dends	Other Deduc.	Surplus for Year
1915....	\$1,969,646	\$703,783	\$1,265,862	\$84,302	\$225,000	\$1,046,939(a)	\$78,225
1914....	636,568	335,708	300,860	10,818	270,000	60,521	(d)18,843

(a) Includes notes paid, \$910,000. (d) Deficit.

Dividends: 1900, 17½%; 1901, 15½%; 1902, 23%; 1903, 16%; 1904, 9%; 1905, 13%; 1906, 12%; 1907, 13%; 1908, 15%; 1909, 7½%; 1910, 1911, 1912, 1913, 12% each; 1914, 18%; 1915, 15%; 1916 to May 1, 6%; total, \$3,652,500.

Property: a number of patented claims, about 130 acres, at Independence on Bull Hill, Cripple Creek district, Teller county. Owns 95% of stock of Christmas Gold Mining Co. and bought the mine of the Golden Cycle Mining Co., 43.5 acres, purchased March, 1915, for \$1,300,000, fully paid April, 1916. Property includes former holdings of the Keystone Mng. & Mlg. Co. Owns La Bella plant, near Golden Cycle dumps, to

be used as a flotation plant. Also owns tungsten ground in Nederland district, Colo.

Geology: the plateau on which Cripple Creek is located is mainly made up of a red granite. Breaking through this is a "plug" of volcanic breccias and tuffs composed of phonolite, and including many granite fragments torn off and carried up from below. This volcanic core is cut by dikes and intrusive masses of syenite and phonolite, and latest of all the basalt dikes.

The ores occur in veins which follow a system of steep fissures, the veins being mere fissures with a central film or streak of ore filling and an impregnation of the wall rock on both sides. The low-grade ores are formed by mineralization of the country rock adjacent to such narrow seams. Most of the veins occur in sheeted zones ranging in width up to 40'.

The gold occurs chiefly as the telluride calaverite, with but little silver, but associated with it there are small quantities of iron, copper, zinc and molybdenum sulphides. The gangue is either quartz and fluorite with some carbonate or merely altered rock. The greatest horizontal extension of any pay shoot thus far opened, is about 1,300'. Such pay shoots are many and usually vary from 4'-40' in length. The vertical extension has not yet been reached in some shoots. For detailed geology see U. S. G. S. Prof. Paper No. 54; "Nature of Ore Deposits," by Beck and Weed, or Lindgren's "Mineral Deposits."

The gold content of the ore from the Vindicator and Golden Cycle mines in 1915, averaged \$23.73 per ton; of the ore shipped by lessees, \$16.57 per ton.

Development: by Vindicator shaft, 1,650' deep and Golden Cycle, 2,200'; linear extent of workings, about 400,000'. Mining methods, filled stope and square sets.

Upon completion of the Cripple Creek Drainage Tunnel, pumping costs, \$41,273 in 1915, will be greatly reduced. On Jan. 1, 1916, the heading was about 8,290' from the Golden Cycle shaft, advancing about 300' per month.

Mine equipment: includes two hoists, Sullivan electric and Ingersoll-Sargent compressors; 3 electric triplex 175-h. p. pumps. Power is steam and electric.

Concentrating mill employs crushers, rolls and screens, and treats 300 tons daily. A 10-ton experimental flotation mill has been in operation more than a year and plans for 300-ton equipment are under way.

Production: for 1915 was 218,487 tons crude ore which yielded 125,397 tons shipping ore; gross value, \$2,164,669; net, \$1,718,022. Lessees shipped 49,188 tons; gross value, \$815,183; net, \$546,364. Received net royalties from lease operations, \$251,624.

Operations in first half of 1916 were largely on the Middle vein system of the Vindicator, an immense orebody being opened for stoping from the 12th to 18th levels. Only a small part of the work necessary on the 19th and 20th levels of the Golden Cycle has been completed.

VINDICATOR MINES & TUNNEL CO.

COLORADO

Property near Idaho Springs, Colo., leased May, 1915, to Gold Standard Leasing Co., financed by Casper, Wyo., and San Francisco capitalists. Mine said to carry the Tom Tuck vein, 6' wide, with porphyry hanging-wall.

VINEGAR HILL ZINC CO.

WISCONSIN

(Owned by Mark Manufacturing Co.) **Office:** Platteville, Wis. W. N. Smith, mgr.; J. McCulloch, gen. supt. Operates Blackstone, Rundell, North Unity, Hodge, Graham, Treganza, Martin and Kittoe mines in Platteville district. Ships galena and blende concentrates, also marcasite, containing 44% sulphur. Has a roaster at Benton, Wis. In 1915-16 the company developed rich "runs of ore" in the Martin, Treganza and Kittoe mines at Benton. The Kittoe concentrator jigs out 300 tons concentrate weekly.

VIPOND MINE.

ONTARIO

See Porcupine Vipond.

VIPONT MINING CO.

UTAH

Address: H. G. McMillon, 649 E. S. Temple St., Salt Lake City, Utah. W. A. Wilson, mgr. Company owns 800 acres in Ashbrook district, in N. W. corner of Box Elder Co., developed by 5,000' of workings from which much ore was formerly shipped.

VIRGIN COPPER CO.

PENNSYLVANIA

Last address: 12 West Bldg., York, Pa. Mine office: Charmian, Franklin Co., Pa. John H. Dechert, pres.; Chas. E. Wills, v.-p.; Clarence A. Wills, sec.; Harry S. Wiest, treas. Lands: about 1 mile N. of Charmian, in the Blue Ridge mountains, near the Maryland state line, show ore carrying native copper, with silver and gold values said to give assays of \$25 to \$600 per ton. Development: by 215' shaft sunk at 47°. 4 diamond drill holes, of 165 to 800', were bored, 1907. Equipment: includes small hoist and compressor. Is considered an unpromising venture. Idle.

VIRGINIA-CAROLINA CHEMICAL CO.

General office: Richmond, Va. Corporate office: Jersey City, N. J. Officers: S. T. Morgan, pres.; E. B. Addison, 1st v.-p.; S. D. Crenshaw, v. p.-sec., with C. G. Wilson, N. S. Weldrum, Henry Walters, Harry Bronner, L. Oudin, A. J. Hemphill, Alvin W. Krech, C. I. Stralen, S. H. Miller and Geo. W. Wetts, directors. S. W. Travers, treas.; E. T. Orgain, aud.

Inc. Sept. 12, 1895, in New Jersey. Cap., authorized, \$38,000,000 Com. and \$30,000,000 8% cumulative Pfd.; increased May 12, 1914, from \$20,000,000; shares \$100 par; outstanding \$27,984,400 Com. and \$20,011,800 Pfd. The \$9,988,200 unissued Pfd. stock is reserved to provide for conversion of the 10-year 6% debentures. Annual meeting, first Wednesday in Sept. New York Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Listed on New York and Richmond Stock Exchanges.

Bonded debt: \$12,900,000. First Gold 5's dated Nov. 2, 1908; due Dec. 1, 1923. \$4,862,000 10-year 6% convertible gold debentures dated May 15, 1914, due May 15, 1924.

Balance sheet, year ending May 31, 1916, showed assets: \$87,982,270, which included current assets of \$34,719,690, compared with \$36,288,060 the previous year. Current liabilities were \$7,437,833, compared with \$9,641,578 the previous year.

Income account for fiscal year ending May 31, 1915, showed net earnings of \$5,427,467, compared with \$4,979,949 the previous year. Dividends absorbed \$1,600,472. Surplus for year, \$2,486,275, compared with \$1,638,967 the previous year.

Company was formed to consolidate a number of manufacturers of fertilizers, acids, chemicals, and kindred products. It owns and operates large pyrite mines, producing a large portion of the pyrite used by it in manufacturing sulphuric acid; in addition it has foreign potash, sulphur, and other properties. Controls the Sulphur Mining & Railroad Co., which sec.

VIRGINIA CONSOLIDATED GOLD MINING CO.

IDAHO

Idle. Office: 123 Atlas Blk., Salt Lake City, Utah. Mine near Baker, Lemhi Co., Idaho. L. M. Byers, pres.; W. A. Byers, sec.-treas. and gen. mgr.

Inc. 1904, in Idaho. Cap., \$500,000; shares \$1 par.

Lands: 15 claims, 11 patented, 300 acres, in the Sand Creek district, 5 miles from a railroad, show slate, granite and porphyry, with 8 fissure veins, said to average 2' in width and to be traceable 6,000', carrying chalcopryrite and galena, assaying up to 7% copper, 2 oz. silver and \$25 gold per ton. Mine is reported to have 6,000' of workings, with 10,000 tons of ore in sight. Equipment: includes a 3-stamp mill. Mine is being operated under lease by the Lemhi Gold Mining Co.

VIRGINIA COPPER MINE.

Office: care Richard Lamb, 90 West St., New York. **Mine address:** High Hill, Halifax Co., Va. **Property:** the High Hill mine, 1,617 acres, in the Virgilina district, developed by 8 shafts of 140 to 300' depth, with about 1 mile of workings. Mine shows 2 veins giving assays up to 5.9% copper, 2 oz. silver and 80 cts. gold per ton. Ores are highly silicious, the gangue containing about 87% silica, which precludes smelting and wet process concentrating.

Property was formerly operated by the Virginia Copper Co., Ltd. **Equipment:** includes a 350-h.p. steam plant. Idle several years, but plans resuming operations in 1916.

VIRGINIA MINING CO.

Controlled through stock ownership by General Chemical Co. Operates the Gossan pyrite mine at Monarat, Carroll Co., Va.

VIRGINIA QUARTZ MINE.

Owned by White Gulch Mining Co., which see.

VIRGINIA SMELTING CO.

Office: 131 State St., Boston, Mass. **Works office:** West Norfolk, Norfolk Co., Va. **Officers:** W. E. C. Eustis, pres.; A. H. Eustis, v.-p.; F. A. Eustis, sec.-treas.

Inc. Nov. 10, 1909, in Maine, as successor of Eustis Smelting Works. **Cap.**, \$1,000,000; shares \$100 par; nonassessable; in \$500,000 preferred and \$500,000 common stock. Annual meeting, first Tuesday in October.

Company owns the Eustis Smelting Works, or Norfolk smelter, located on tide water, near Norfolk, with railroad facilities to all points. The location is favorable for custom smelting, as more coal is shipped from this vicinity than from any other center in North America and traffic commands favorable freight rates on return cargoes. The location also insures the best coke for metallurgical use, on advantageous terms. Ore received by vessel is unloaded by machinery into standard railway cars, with facilities to set aside any desired portion into a sample car, standing on a separate track. The unloader has a maximum capacity of 1,000 tons in 24 hours. Railroad cars containing ore are hauled by locomotives upon trestles, whence ore and coke are dumped into storage bins having capacity for 25,000 tons of ore, and if necessary, the works can store 50,000 tons of ore.

The smelter has a single water-jacket blast furnace, of 600 tons daily capacity, using sea water for the jackets. The plant does a general custom business, treating ores from Sherbrooke, Quebec, and ores from El Cobre mine of the Cuba Copper Co., the iron in the Sherbrooke ore fluxing the silicious Cuban ores. The works contain 2 Dwight-Lloyd sintering machines; one operates on copper material in connection with the blast furnace, and one treats the leached residues and pyrite cinder to produce sinter, which is shipped to pig iron blast furnaces; a Ramen-Beskov chloridizing furnace, a leaching and precipitating plant, and a large gas washing plant. Experiments with the MacKay Copper Process Plant for depositing electrolytic copper from leaching solutions have been conducted for about a year. The management is not yet certain whether it will continue the electrical precipitation of copper.

The smelting department of the works is operated under a lease on a royalty basis, by the Norfolk Smelting Co., a New York corporation.

VIRGINIA ZINC & CHEMICAL CORPORATION, LTD.

Offices: 27 William St., New York and Bristol, Va. **Officers:** John T. Williams, pres.; John T. Williams, Jr., v.-p.; M. Graf, sec.-treas., with R. T. Greene, directors.

Inc. Dec., 1911, in Va. **Cap.**, \$2,500,000; shares \$25 par; outstanding \$1,300,000.

Owens mining properties in Georgia, Kentucky, North Carolina, Tennessee and Virginia, furnishing materials for the manufacture of chemicals used in the paint, paper and rubber business. Has a chemical plant at Bristol, Va.

VIRTUE MINES DEVELOPMENT CO.**OREGON**

Jas. K. Romig, treas., Baker City, Oregon. George W. Field & Co., Boston, bonded property early 1916 for \$50,000.

Property said to have produced \$3,000,000, but has been idle for nearly 15 years. (See Min. Res. of Oregon Vol. 1, No. 8, Dec., 1914, p. 130.)

VIVIAN MINING CO.**ARIZONA**

Office: Merchants' National Bank Bldg., Los Angeles, Calif. **Mine Office:** Oatman, Ariz. **Officers:** E. M. Ross, pres.; G. A. Hancock, v.-p.-gen. mgr.; E. A. Olson, sec.; the foregoing and E. P. Thom, C. Leonhardt, R. Deving, directors. Farmers & Merchants National Bank, treas.

Inc. in Cal. **Cap.**, \$500,000; shares \$1 par; assessable; outstanding 410,292. No bonded indebtedness. Annual meeting, first Saturday in July.

Property: 11 claims, 183 acres, 2½ miles W. of Oatman, Mohave Co. **Development:** 450' shaft; workings 5,400'. **Equipment:** two Fairbanks-Morse 40-h. p. oil engines; steam compressor; 8-h. p. hoist, electric light plant, buildings, etc. Developing, 1916.

VOLCANCILLOS MINES.**MEXICO**

Mine office: Avenida Borbon No. 6, Autlan, Jalisco, Mex. Carolina Blake, mgr. **Property:** 28 pertenencias, 70 acres, and a 10-acre mill site, with 100 sq. miles of timber lands, held under a government concession in the Cacoma district, including the Volcancillos and adjoining mines. The Volcancillos group, 12 miles W. of Autlan, shows diorite-porphry dikes, with contact deposits 5 to 80' wide, the largest one containing chalcopryrite ore assaying 4 to 15% copper, 4 oz. silver and nearly \$5 gold per ton.

Development: includes a 300' two-compartment shaft with about 1,000' of workings and several tunnels, 1 having a back of about 150' but still in the oxidized zone. The mine is estimated by the management to show about 100,000 tons of ore. The ore deposit, discovered 1860, was opened by Edward Blake, was operated under bond and lease for a while by the Cacoma Mining & Smelting Co., but reverted to Mr. Blake and still remains in his family.

Equipment: includes a steam plant with 40-h. p. hoist, good for 1,000' and a 10-ton mill and smelter, now abandoned. The ore from the Volcancillos is sold to the local Indians, who have been metal workers from time immemorial. The natives buy the crude ore, paying 4 cts. per lb. for the copper content. They crush and concentrate the ore, smelting the concentrate in little furnaces, making copper cakes which are skillfully fashioned into pots, kettles and other articles.

VOLUNTEER MINING CO.**UTAH**

Milford, Beaver Co., Utah. **Officers:** W. C. Albertson, pres. and gen. mgr.; W. H. Havenor, v.-p.; S. G. Cole, sec.; H. E. Havenor, treas., asst. sec. and engr.; preceding with Geo. Havercamp, directors.

Inc. in Utah. **Cap.**, \$50,000; shares 10 cts. par; nonassessable; issued \$25,550. Annual meeting, second Monday in May.

Property: 6 claims, unpatented, 600 acres, in the North Star district, 7 miles from the S. P. L. A. & S. L. R. R. Claims show contact deposits between limestone and intrusive porphyry. The mine has only two 12' pits and a 70' tunnel. Company reported March, 1916, to be operating a lease on the north end of the Lakeview Mining Co.'s property.

VULCAN MINES & SMELTER CO.**COLORADO**

Office: 302 Century Bldg., Denver, Colo. C. H. Mace, supt., Iola, Colo. **Officers:** Robt. G. Ainsworth, pres.; C. H. Mace, v.-p.; Chas. P. Mety, sec.-treas.; above with W. W. Mace, Geo. E. Bermont, John R. Rowland and F. J. Greenwald, directors.

Inc. Nov. 3, 1915, in Colo. **Cap.**, \$100,000; shares \$1 par; 75,000 issued. Stock transferred at company's office. Annual meeting in November.

Property: 9 patented claims, 95 acres, in Domingo mining district, Gunnison Co., said to show gold-silver-copper ore in fissure veins. Ore is a sulphide occurring in sericitic schist. The orebody strikes E.-W. and

dips N. 80°. Old workings and dumps said to have a considerable tonnage of ore averaging 1 oz. gold; 4 oz. silver and 2½% copper per ton.

Development: by 700' vertical shaft with 5,000' of underground workings. **Equipment:** includes steam power, hoist, and 50-ton hot blast copper matting furnace, installed in 1916. Mine credited with production of \$200,000 under former ownership.

VULCAN MINING CO.

WASHINGTON

Formerly the McKinley Mining Co., which see. **Office:** 1723 Cincinnati St., Spokane, Wash. Mine at Orient, Stevens Co., Wash. **Officers:** H. M. Gibson, pres.; P. Lewis, v.-p.; A. O. Stuberg, sec.; P. Larsen, treas.; preceding with J. D. Grimes, directors.

Inc. July, 1914, in Wash. **Cap.**, \$1,500,000; shares \$1 par; assessable.

Property: 7 claims, 4 miles N. E. of Rock Cut at 2,850' elevation, said to show 3 northwest veins with gold-silver-copper ores.

Development: on No. 1, a gold-silver vein, includes a 148' shaft, with 42' crosscut, 53' shaft and 570' tunnel, 300' below the surface. Crosscutting in 1916 on the 570' tunnel level to tap the main orebody. No. 2 vein is developed by 4 prospect shafts, a 37' tunnel and 100' incline. The third vein is opened by a 75' shaft.

VULCAN MINING, SMELTING & REFINING CO.

NEVADA

Cherry Creek, White Pine Co., Nev. J. H. Leishman, mgr. **Inc.** in Wyoming. **Cap.**, 2,500,000 shares.

Property: 15 patented claims, 300 acres, in the Hunter district, about 30 miles from Ely, the nearest rail point, shows copper, iron and silver-lead ores occurring in fissure veins in monzonite and limestone. Developed by 300' and 500' shafts and 2,600' tunnel, with a total of 2,000' underground workings. **Equipment:** includes hoist, compressor and steam power. Lessees produced 65 tons of ore in 1915, averaging \$38 per ton.

VULTURE MINES CO.

ARIZONA

Wickenburg, Ariz. **Officers:** Robt. Mackay, pres.; F. W. Rockwell, v. p.; R. T. Sewall, sec., Boston; A. McLean, treas.; the foregoing and A. R. Mackay, F. M. Kimbark, E. I. Marvell, J. B. Sullivan, Jr., directors. Spencer Hutchinson, cons. engr.

Cap., 600,000 shares; par \$5; all issued. No bonded indebtedness. 35 Congress St., Boston, Mass., transfer office. R. T. Sewall, registrar. Annual meeting, June 1.

Property: 31 claims, 11 patented, 618.2 acres, 15 miles S. W. of Wickenburg. The quartz vein in schist contains gold, with some galena and pyrite, dips 37° and strikes N. 85° E. Pay ore occurs in shoots, the main orebody being 35' by 300'. Mine is worked by back stoping and waste filling through two inclined shafts 765' and 595' deep. Greatest depth of workings, 1,239'; linear extent, 25,000'.

Equipment: includes Ottumwa hoist; gas and steam engines; Sullivan compressor; Cameron pump; 700' tramway; 125-ton stamp mill with concentrating machinery.

Ore: treated, 1912, 19,689 tons; 1913, 33,174; 1914, 36,348; 1915, 29,968 tons. No recent financial statement has been made. For ten months, 1913, ore averaged \$20.54 per ton; recovery, \$17.40 per ton; total value, \$429,416.

WABUSKA COPPER MINES CO.

NEVADA

Dead. See Minnesota-Nevada Copper Mines Co.

WADE MINING CO.

MISSOURI

Officers: Evan W. Buskett, treas., Joplin, Mo.; John L. Fay, pres.; C. E. Benton, v. p.; Frank J. Bane, sec., all of St. Louis, Mo.

Property: lease of Gilt Edge Mining Co., on 120 acres of ore land, 2 miles E. of Tipton Ford, said to carry lead-zinc ore. **Development:** shaft and drill work. Plans to erect mill.

WAGNER AZURITE CO.

NEVADA

Dead. Company became financially involved in 1913, after borrowing \$60,000 from stockholders for the erection of a mill and leaching plant,

the latter proving unsuccessful. The noteholders brought suit, getting judgment for the amount due and succeeded in obtaining control of the property in 1914. The Ideal Copper Co. was incorporated and the mine is described under that name.

WAH-CHANG MINING & SMELTING CO.

CHINA

Branch office: 2283 Woolworth Bldg., New York. K. C. Li, mgr. Is the leading mining and smelting company in China. In 1915, sold from 700 to 800 tons of antimony monthly in the United States and practically controls antimony market of the world. Also smelts tin and produces tungsten, lead and zinc ores.

WALCOTT COPPER MINING CO.

WYOMING

Walcott, Carbon Co., Wyo. W. C. Sammons, pres.; F. A. Raynor, v. p., at last accounts. Inc. 1907. Cap., \$1,000,000. Property: the Elkhart mine, 7 claims, near Elk mountain, is said to have an 80' shaft that shows a good sized orebody of about 3% copper. Equipment: includes a small steam plant and hoist. Long inactive and probably dead.

WALDO SMELTING & REFINING CO.

OREGON

Office: P. O. Box 64, Colorado Springs, Colo. Mine office: Takilma, Josephine Co., Ore. Officers: Spencer Penrose, pres.; J. A. Hull, treas.; preceding officers, J. A. Hayes, Wm. T. Tutt, directors. E. C. Tucker, supt. Inc. Dec. 3, 1901 in Colorado. Cap., \$3,000,000; shares \$100 par. Is closely affiliated with the Takilma Smelting Co.

Property: 20 claims, patented, 400 acres, with a mill site and 650 acres of placer ground, near the Queen of Bronze mine, about 40 miles from the S. P. R. R. The claims show several fissure veins said to average 10' in width and to carry sulphide ores averaging 12% copper and \$3 gold per ton. Development: by shaft and 3 tunnels. The Copper King shaft, about 200' deep, has an 80' level showing a good orebody. The 700' Lyttle and the 400' No. 2 tunnels, on the same claim, are also said to show good orebodies. The 310' Cowboy tunnel connects with the incline shaft 160' below surface and was planned to be extended to intersect the known pay-shoots. Management considered good and property promising.

WALDORF CONSOLIDATED MINING CO.

COLORADO

Succeeded by Imperial Consolidated Mining Co., which see.

WALKER MINING CO.

CALIFORNIA

Office: 331 D. F. Walker Bldg., Salt Lake City, Utah. Mine near Portola, Plumas Co., Calif. Officers: Jos. R. Walker, pres.; G. L. Bemis, v. p.; John F. Cowan, gen. mgr.; preceding with M. S. Browning, directors.

Inc. 1913 in Arizona. Cap., \$1,250,000; shares \$1 par; issued \$750,000. Stock is listed on the Salt Lake Exchange. Control of company is said to have been purchased, 1913, by the Cowan-Browning interests of Salt Lake City and Ogden.

Property: 34 claims, 10 patented, heavily timbered, with good water power available, in an unorganized district, 18 miles N. E. of Portola, on the Western Pacific railroad. The claims show altered diorite with a big gossan outcrop up to several hundred feet in width, running N. W. across several claims. This is underlain by a vein estimated to be 27' to 60' wide. A shallow zone of oxidation is succeeded by sulphide ore, carrying secondary sulphides, but mainly chalcopryrite, estimated by the company to average 6% copper and 3 oz. silver per ton.

Development: by 35' and 70' shafts. The 70' shaft has a 27' crosscut at the bottom said to show an orebody with an 8' paystreak assaying up to 4.5% copper, 3 oz. silver and \$1 gold per ton, the balance of the crosscut in ore of about 2.75% copper with small gold and silver values. Company claims to have 30,000 tons ore blocked out. Drilling has disclosed copper ore over a large area, for 65' to 350' in depth.

Reports, in July, 1916: development by shaft 125' deep with level at 65' extended 300'. Adit for drainage, 600' long, cut a 22' vein at 150' depth, directly beneath the main shaft.

Equipment: includes a small steam plant with a 20-h. p. hoist and several mine buildings. Company has recently built a 100-ton flotation mill.

Production expected to begin in August, 1916, as soon as aerial tram to mill is in operation.

Reported July, 1916, that company is being sued by J. C. Gladden for \$200,000, alleged to be due under an agreement with J. R. Walker.

In August, 1916, the property was purchased by Anaconda Copper Mng. Co., through its subsidiary, International Sm. & Ref. Co. Purchase price said to be \$670,000.

WALKER RIVER COPPER CO.

NEVADA

Office: 45 Broadway, New York, and Yerington, Nev. Officers: David Provost, pres.; Wm. H. Alexander, v.-p.-mgr.; Wm. Gelder, sec.-treas., with Maxwell M. Upsom and M. Clinton Mason, directors. John H. Banks, cons. engr. George H. Cogswell, supt., Yerington, Nev.

Inc. June, 1915, in Nevada. Cap., \$1,000,000; shares \$5 par; outstanding \$750,000 Com. and \$22,000 Pfd. In treasury \$228,000 Pfd., 7% cumulative. Transfer office: 15 Exchange Place, Jersey City, N. J. Registrar & Transfer Co., New York, registrar. Annual meeting, first Monday in June.

Property: 15 claims, 250 acres, including mill site, near Yerington, Lyon Co., shows a low-grade porphyry copper deposit said to cover an area 1,000'x4,800' s6 far as drilled. Ore: is said to assay Cu, 3%; S, 0.5%; SiO₂, 72%; Fe₂O₃, 5%; Al₂O₃, 11%; CaO, 2%; MgO, 1%.

Development: 175' vertical shaft and a 900' tunnel through the orebody. Drilling is said to have proved the orebody to extend to 500' depth. Present work is done by quarrying. Ore reserves: management claims 550,000 tons 2½% ore proven by drilling and surface and underground work.

Equipment: a 400-ton leaching plant is being built and will use the "Midland" wet chloride process.

Production: in 1915 lessees shipped 5,000 tons of 3 to 5.9% copper ore. Total production to date, 10,000 tons.

Company plans drilling an additional 200 acres during the next year. Property has been examined by Louis A. Wright and John H. Banks.

WALLA WALLA COPPER MINING CO.

WASHINGTON

Office: Walla Walla, Wash. Mine office: Keller, Ferry Co., Wash. Jasper King, supt. Property: 1 milé N. E. of Keller, in the southern half of the old Colville Indian reserve, shows a vein of 30' estimated width, partially mineralized with gold-copper ore of fair assay value. Developed by an open-cut shaft and tunnel. Reported in June, 1916, that company has struck a large body of high-grade copper ore, and is working 3 shifts.

WALLACE MINING, MILLING & REALTY CO.

IDAHO

M. R. Evans, mgr., Wallace, Idaho. Property: 9 claims on Placer creek, alongside of city limits of Wallace, said to show a big vein with scattered galena ore.

Development: by 1,500' tunnel advanced 300' in 1915. Is equipped with electric power, compressor, etc.

WALLOWER MILL

MISSOURI

Built in 1914 by F. C. Wallower to treat lead and zinc ores of Prosperity Camp, Joplin district. Capacity, 300 tons per 10-hour shift. Equipment: 100-h. p. electric motor, 16" crusher, rolls, screens, jigs, classifiers, Deister tables and slimers. Operated steadily in 1915, and mine work in connection has opened another shaft in 1916 in order to supply the mill with ore.

WALNUT CREEK MINING & MILLING CO.

ARIZONA

Kingman, Mohave Co., Ariz. C. E. Worton, pres.; R. P. Wheelock, mgr. Property: 9 miles S. of Kingman, shows a 14" vein of gold and silver-bearing copper ore. Reported under development in 1915-1916.

WANAKAH MINING CO.

COLORADO

John T. Roberts, Jr., gen. mgr., Ouray, Colo. Operates the Bright Diamond, Ironclad and Memphis group of properties north of Ouray, Ouray Co., and the pyritic smelter leased from the Brown Mountain Co. for two years. Operations have been intermittent, the 200-ton matting furnace having a capacity far in excess of the ore supply of the district.

Opened as a custom smelter March 1, 1914; only 1,489 tons of ore was received during the remainder of the year.

Reported in June, 1916, that the Wanakah mine was being reopened preparatory to 6 months' development work. It is claimed that mine is not more than 25% worked out.

WANDERING JEW MINE

ARIZONA

Comprises a group of four claims in the Lyndall district on the W. slope of Santa Rita mountains, near Alto, Santa Cruz Co., Ariz., owned by M. & L. Lulley and R. R. Richardson. Operated under bond and lease by E. B. & W. E. Holt and M. L. Kaiser of Nogales. First shipments made, February, 1916.

Development: to 100' depth by 2 shafts, 300' apart, drifts and crosscuts aggregating about 2,000' of workings. Country rock is gray diorite. Vein varies from 6" to 4' in width and contains argentiferous galena. About half the deposit is said to be shipping ore, the rest, concentrating grade. Ore is galena from the surface down, but in places contains a little copper carbonate and chalcopryite.

WAR EAGLE CONSOLIDATED MINES CO.

COLORADO

Cripple Creek, Colo. **Officers:** T. Scott, pres.; F. J. Cannon, v. p.; W. H. Malone, sec.-treas.; the foregoing and M. A. Skinner, S. J. Burris, M. E. O'Bryan, T. Annear, directors. T. R. Countryman, cons. engr.

Cap., 5,000,000 shares; par value not reported; in treasury, 4,000,000, to be used in acquiring and developing additional property. Financed by T. M. Pettigrew & Co., Denham Bldg., Denver.

Property: originally 17.3 acres, since increased to 41 acres, in Cripple Creek district, upon which in January, 1916, there was a bond of \$50,000, due in 3 years. **Development:** mostly by lessees; very little work done since 1903.

Official statements have to do mostly with past performances of surrounding properties, and efforts seem to be confined to the sale of stock.

WAR EAGLE GOLD & COPPER MINING CO.

MONTANA

Property: 3 claims, 7 miles S. of Alhambra, in Warm Springs gulch, Jefferson Co., Mont., shows strong fissure veins in granite. Values occur in paystreaks in soft altered granite, the ore consisting of pyrite and a little chalcopryite, whose value is mainly in gold.

Development: by a 300' tunnel, planned to intersect the vein at about 1,500' and give a back of about 500'. Presumably idle.

WAR EAGLE MINE

BRITISH COLUMBIA

Rossland, B. C. See Consolidated Mining & Smelting Co. of Can.

WARDWELL & OSBORNE COPPER MINES CO.

ARIZONA

Osbornes Well, via Parker, Yuma Co., Ariz. **Officers:** at last accounts, Edw. S. Osborne, pres. and gen. mgr.; Chas. W. Wardwell, v. p.-treas.; Fred W. Morrison, sec. Inc. in Arizona. **Cap.,** \$1,000,000; shares \$1 par.

Property: 9 claims, 120 acres, 4 miles N. W. of the Consolidation Copper Mines Co., in the Seneca district, 7 to 10 miles E. of Parker by good wagon road. Claims show an extensive gossan consisting largely of specular iron. **Development:** by a number of shallow pits, shafts and tunnels. A 143' incline shaft shows ore said to assay 4 to 32% copper and 75 cts. to \$9 gold per ton. There is also a 400' tunnel, showing a vein 8 to 28' wide, carrying ribs of rich oxidized ores alternating with streaks of leached and barren limestone, the rich ores being claimed to average 15% with maximum of 42% copper. The mine has about 1,100' of workings. No recent returns secured.

WARREN REALTY & DEVELOPMENT CO.

ARIZONA

Office: 1400 Alworth Bldg., Duluth, Minn. **Mine office:** Warren, Cochise Co., Ariz. **Officers:** T. F. Cole, pres.; Chas. A. Duncan, 1st v.-p.; Chas. d'Autremont, Jr., 2nd v. p.; Frederic R. Kennedy, sec.; preceding with Chester A. Congdon and Capt. Jas. Hoatson, directors; Henry B. Paul, treas.; John C. Greenway, gen. mgr.

Inc. June 29, 1905, in Arizona. **Cap.,** \$900,000; shares \$15 par; issued

\$840,000; fully paid. Controls, jointly with the Calumet & Arizona Mining Co. and Copper Queen Cons. Mining Co., the Warren Co., a corporation capitalized at \$665,000 that owns the town site of Warren, the public utilities therein, and the Bisbee & Warren street railway. Annual meeting, second Tuesday in April.

Property: about 1,800 acres, covering the town of Warren, in the district of that name, includes the Cunningham group and former holdings of the Calumet & Cochise Development Co., 3 claims of the latter group being of mineral value. Considerable diamond drilling was done, 1907-08, with 1 hole 3,200' deep vertically, said to be the deepest in the United States.

The Lone Star shaft, started 1905, on the Lone Star claim, $2\frac{1}{2}$ miles S. E. of the Junction shaft of the Superior & Pittsburgh, has 3 compartments and is 844' deep, sunk in limestone throughout. Development to the N. indicates that ore-bearing ground cannot be expected at much less than 2,000' depth. Property valuable, with a possibility of making a mine when developments on surrounding tracts have proven the ground.

WARRIOR COPPER CO.

ARIZONA

Office: Brown Bldg., Philadelphia, Pa. **Mine office:** Black Warrior, Gila Co., Ariz. **Officers:** Spencer D. Wright, pres.; Geo. H. Buchanan, v. p.; D. H. Paris, sec.; H. S. Hopper, treas., with Ernest L. Tushin, W. H. Francis, Philip Godley, Alfred S. Elliott, W. W. Doughten and Thos. D. Martindale, directors.

Inc. March 10, 1905, in Delaware, as successor of Black Warrior Copper Co., Amalgamated, which came to grief. **Cap.**, \$1,600,000; shares \$10 par; in \$750,000 cumulative 7% preferred stock and \$850,000 common stock. **Bonds:** \$100,000, issued \$41,000, at 6%, with interest paid.

An option on the property, given 1909, to the Warrior Development Co., was relinquished Oct., 1911, and suit was thereupon entered against that company for failure to observe the terms of the agreement. This suit was decided in favor of Warrior Copper Co. in 1915.

Property: 50 claims, 46 patented, about 850 acres, including the Black Warrior group and the Lost Gulch group, near the Inspiration mine. The principal property is the Black Warrior mine, a producer since 1904, located about 7 miles N. W. of Globe.

Geology: the Black Warrior property shows slightly altered schist, dacite tuff, diabase and conglomerate, the greater part of the area being covered by schist, which is the oldest formation. The diabase occurs as intrusive dikes, and the dacite is a surface flow over both schist and diabase. The Black Warrior vein is a fault zone 30 to 60' wide, filled with crushed mineralized dacite for about 300', with a breccia of schist and some diabase below. The vein has a generally E.-W. trend, and W. pitch. The ore averages about 50 to 60' in width, though a width of 100' is shown at a number of points. This property includes the Montgomery group, with the Montana and Dadeville mines, developed by tunnels of about 1,000' and 1,200' length, developing extensive bodies of copper silicates and hydrated copper oxides of excellent average value.

Development: the Black Warrior mine is developed by the Winnie shaft, 500' from the western boundary, and tunnels of about 1,000' and 1,200' length, opening the mine to a depth of 300', with 5 levels spaced at 50' intervals. The mine has yielded a large tonnage of high-grade ore, giving assays of 6 to 25% copper, between the 200' and 300' levels. Considerable churn drilling was done, 1910-11, 1 hole in the vicinity of the Winnie shaft being sunk 506' in schist, showing mineralization, and a 580' drill hole proved the existence of chalcopryite, disseminated in schist, though not of commercial value. The western portion of the property was tested without favorable results by churn drill, May, 1911.

The Lost Gulch claims show a highly altered monzonite-porphry covering the larger part of the area, with extensive outcrops of dacite and limestone and smaller ones of diabase, general geological conditions being much the same as at the Black Warrior.

Equipment: includes a steam plan, burning petroleum. Buildings include an assay office, engineering office, smithy, carpenter shop, several dwellings, and a 300-ton shipping bin.

A portion of the property has been leased to Messrs. Fisk and Snell, who are operating the plant under the name of the Southwestern Leasing & Development Co., and shipping about 100 tons of 6% ore daily. Production is mainly from the 200' and 300' levels.

The old mill and mill site at Warrior P. O., about 1½ miles E. of the mine, was sold, 1912, to the Inspiration Consolidated Copper Co.

WARRIOR DEVELOPMENT CO.

ARIZONA

Office: 1500 Alworth Bldg., Duluth, Minn. Edward C. Congdon, David L. Fairchild, Henry B. Hovland, S. R. Kaufman, J. E. Rotthaus, Harvey P. Smith and Jas. Wanless, trustees.

The company held a \$1,250,000 three-year bond and lease, dated Oct. 9, 1909, on the Black Warrior and Lost Gulch groups of the Warrior Copper Co., which was relinquished Oct., 1911, after a payment of \$100,000. The company became involved in litigation with the Warrior Copper Co., based on the allegations that all monies realized from the sale of ore were not accounted for, and that the mine workings and the mill were handled contrary to the provisions in the agreement. The suit was decided in favor of the Warrior Copper Co. in 1915. The Warrior Development Co. was dissolved in 1915 and assets amounting to \$49,556 in cash and \$50,000 in Rainbow Lode Development Co. stock were distributed among the stockholders.

WARWHOOPE MINING CO.

IDAHO

Probably dead. See Vol. XI, Copper Handbook. Formerly at Larson, Idaho.

WASA (or Hollander) GROUP

MONTANA

Is a property promoted by Makeever Bros., 170 Broadway, New York City, and Journal Bldg., Boston, Mass., whose promotions, including El Favor, Mexico; Royal Basin, Montana; Alaska Gold Belt, Alaska, have been and are still unfavorably regarded. The public is asked to subscribe to shares in an Exploration Syndicate at \$1 a share, with bonus of 4 shares of pooled stock of a corporation to be formed to take over the Hollander, or Wasa group of claims near Hall, Granite Co., Mont.

The group is said to carry the Wasa vein with zinc-copper ore, which Makeever Bros.' engineer, Walter Neal, calculates as 300' wide. Pictures of diamond drill cores and a report by Albert McLease, 1914, are furnished as proof of the worth of the property.

It is to be hoped that the very optimistic statements made about the property come true.

WASATCH BONANZA MINING CO.

UTAH

Officers: Burdell Davis, pres., Provo, Utah; Wm. Davis, v. p.; Brigham Johnson, sec.-treas.; J. M. Buckner, Geo. A. Storrs, directors. **Inc. May, 1916, in Utah. Cap., \$10,000; 1c par.**

Property: 4 claims, the Mayflower group in Decker Canyon, near Charleston, Wasatch Co., Utah.

WASATCH KING MINING CO.

UTAH

Property sold for taxes and company dead. See Vol. XI, Copper Handbook.

WASATCH MINES CO.

UTAH

Office: 722 Judge Bldg., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake Co., Utah. **Officers:** H. G. Williams, pres.; B. F. Kay, sec.-treas.; C. H. Gibbs, mgr.; J. E. Beveridge, supt.

Inc. 1913, as a merger of the Columbus Consolidated Mining Co., Flagstaff Copper Co., and Superior-Alta Mining Co. Cap., \$1,000,000; shares \$1 par; issued 297,083 shares. The consolidation of these properties was effected on the basis of 160,000 shares for Columbus Consolidated Co., 100,000 shares for Flagstaff Co., and 40,000 shares for Superior-Alta. Stock is

listed on the Salt Lake Stock Exchange. McCornick & Co., Salt Lake City, registrar.

Annual report as of Nov. 1, 1915, showed cash on hand, \$3,643; accounts receivable, \$10,428; current liabilities, \$2,996.

Property: 52 claims, about 930 acres, and mill sites at Tanner's Flat and at the mouth of Little Cottonwood Canyon, on the E. flank of the Wasatch mountains. Claims show a number of fissure veins cutting limestone, shale and quartzite, also numerous bedded contact deposits between limestone and quartzite. The bedded deposits contain the principal orebodies. Occasional highly mineralized shoots are found ranging from 30 to 100' in width, several hundred feet long, and carrying up to 11% copper, 18% lead, 15% zinc, 66 oz. silver and \$4 gold per ton, but ore is generally pockety and mainly below payable tenor. Ores are carbonates at and near surface, succeeded by sulphides at depth.

The Flagstaff group carries several ore deposits, one of which is said to range up to 300' in width and to be traceable 2,000'. Developed by the 5,000' Tom Moore tunnel. This tunnel also cuts 6 smaller veins and has a 450' crosscut to the N. E., with about 13,000' of workings. Other workings include the 500' Burgess tunnel, 1,200' Burnswood tunnel, 1,200' Flagstaff tunnel, and the 700' Flagstaff shaft. The mine was a considerable producer of silver-lead carbonates in early days.

The Columbus Consolidated group shows a vein, known as the Braine fissure, of about 12' average width, opened by 2 tunnels, 1,250' apart, on practically the same level. A strike of rich zinc ore was made on the Relief claim, above the Columbus tunnel in June, 1915; the vein was reported to show 3' of ore assaying from 35 to 40% zinc, 2½ oz. silver and 11% lead.

Developed by 5 shallow shafts and 4 tunnels, including a drainage tunnel, 4,000' down the canyon, planned to unwater the Columbus and adjoining properties, with about 3 miles of workings. The Holland and Columbus tunnels are connected on the Braine fissure, the first-named with electric traction. The output is divided into copper, silver-lead and concentrating ore. The mine is wet and has a 600-gal. pump.

Shipments in 1916 assayed from 34c to 70c gold; 8 to 51 oz. silver; 5 to 6% lead; 5 to 14% copper; 6 to 14% excess iron per ton, yielding from \$20 to \$60 per ton.

A Pelton water wheel works under a head of 494', taking water through a 20" and 22" steel pipe line of 4,500' length, developing 660 h. p., which is transformed into electricity by two 300-kw. dynamos and carried to the mine by a 4½-mile transmission line. At the mine there are four 25-h. p. hoists good for 600' each, 10-drill Nordberg and two 5-drill Ingersoll-Sergeant air compressors, a machine shop and a sawmill.

The 150-ton concentrator is equipped with a Gates gyratory crusher, 2 sets of Rogers rolls, six 3-compartment jigs and 7 Wilfley tables, the mill putting about 4 or 5 tons into 1. A cyanide unit was installed in 1915.

Development work above the tunnel level done during 1915 proved disappointing and the management plans concentrating all energy on the deep drainage tunnel to be driven 5,000' about 500' below the present lowest workings and which will make economical and profitable mining at depths possible. Company derives sufficient funds to cover operating expenses from the sale of electric power and compressed air to most of the mines in the district.

WASATCH UTAH MINING CO.

UTAH

Office: Kearns Bldg., Salt Lake City. Mine office: R. D. No. 4, Landy, Utah. Officers: F. L. Palmquist, sec.-treas.; J. L. Kraft, L. Moody, A. W. Manz, J. Hyldahl, E. Tressing, Asa Bacon, J. W. Reihman, directors.

Inc. October, 1902, in Nevada. Cap., \$1,000,000; shares par \$1; assess-

able; all issued. **Bonds:** authorized \$100,000; issued \$35,000. Annual meeting, second Monday in June.

Property: 51 claims, 14 patented, known as the Consolidated Jefferson mine, 9 miles from railroad, near mouth of Little Cottonwood Canyon; also 40 acres dumping ground. Mine has two systems of veins; a narrow E.-W. fissure in horn blende schist with high-grade gold, silver and copper ore, and a large N.-S. quartz fissure about 8' wide containing ore running from \$2 to \$5 gold per ton, which is all milled.

Development: by adit at level of top of mill by glory-hole method through 500' stope.

Equipment: includes compressors, buildings, experimental 5-stamp mill with Wilfley and vanner, large mill with crusher, Chilean mill, plates and Pierce amalgamator. All machinery electrically driven; power furnished by Utah Light & Railway Co.

WASHINGTON COPPER MINING CO.

MICHIGAN

Office: Calumet, Mich. Mine near Delaware, Keweenaw Co., Mich. Chas. A. Wright, Jr., sec.-treas.; Thos. F. Cole, Spencer R. Hill, G. G. Hartley and Thos. Hoatson, directors.

Inc. in Michigan. Cap., \$2,500,000; shares \$25 par; issued \$1,500,000. Is controlled, through ownership of a majority of issued stock, by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March. **Property:** 1,050 acres, on the western shore of Mosquito lake, on which desultory work has been done at intervals in the past. Idle since 1901.

WASHINGTON-IOWA COPPER MINING CO. WASHINGTON

Idle. Lands: on the eastern fork of Silver creek, 2 miles above Mineral and 14 miles N. W. of Index, adjoin the Edison Mining & Development Co., and both properties are worked under one management. Claims are said to show 5 veins, carrying complex ore, consisting of chalcopyrite, galena, sphalerite and pyrite, with quartz gangue. **Development:** by the 1,200' Bonanza crosscut tunnel.

WASHINGTON LAND & MINING CO.

MISSOURI

Address: W. Maclay, mgr., Bliss, Mo. **Officers:** A. L. Shapleigh, pres.; J. D. Filley, v. p.; R. W. Shapleigh, sec.; the foregoing are directors. **Inc.** about 1880 in Missouri. **Cap.,** \$50,000; \$100 par; all issued.

Owens 6,250 acres lead and baritic lands in Washington Co., operated on royalty basis.

WASHINGTON MINE

COLORADO

P. M. Tyler, mgr., Breckenridge, Colo. An old-time property on Nigger Hill, near Breckenridge, Summit Co., operated under lease by Tyler & Myers after many years idleness. Ore treated in 20-stamp mill and silver, lead and gold concentrates shipped.

WASHINGTON MINE

MONTANA

See Angelica Mining Co.

WASHINGTON MINES DEVELOPMENT CO.

MEXICO

Office: Douglas, Ariz. **Mine office:** Washington Mine, via Huepac, Sonora, Mex. **Officers:** F. O. Bostwick, pres.; Geo. Cass, v. p.; Albert Sames, sec.-treas.

Inc. 1911 in Arizon. **Cap.,** \$1,500,000; shares \$10 par; issued 130,000 shares.

Property: 27 claims, patented, 76 acres, with options on 200 acres additional in the Arizpe district, 60 miles from Nacozari, the nearest rail point. Claims show several big "pipe" ore deposits composed of brecciated rhyolite in dacite. Ore is reported to average 3.2% copper, 0.35% tungstic acid; 1.5 oz. silver and 25 cts. in gold.

Development: by 3 tunnels and 2 air shafts with a total of about 6,000' of workings said to show 600,000 tons of ore blocked out for stoping. Company plans development at depth by sinking a winze from No. 2 tunnel level, 313' below the outcrop, and expects to add 4 additional levels to the workings with the funds in hand.

Equipment: includes a small steam plant with hoist good for 500' and

50-ton concentrator. A mill is being erected in 1916 to treat tungsten ores.

Property promising but needs railroad transportation for profitable working.

WASHOE COPPER CO.

MONTANA

Dead. See Vols. VIII and XI, Copper Handbook.

WASHOE REDUCTION WORKS

MONTANA

Owned by Anaconda Copper Mining Co., at Anaconda, Mont., and described under that title, with names of head officials of the operating staff.

The following list gives the names of the departmental heads:

	Dept.	Supt.	Foreman
Conv. & Cast.....	Pat Dalton.....		P. C. Kelly T. Mulligan J. Nagle
Boiler Shop.....	John Casey.....		C. Olson H. P. Rygard L. B. Crosswhite P. J. McIntyre Joe Hedge John Turner A. Thorson
Local Trm. & Wg.....	W. H. Nutting		Thomas Ryan C. S. Clark Al. Clark
Concentrator	W. A. Estabrook.....		Wm. Brinton John Templeman
Blast	H. S. Ware.....		P. E. Keaney
Surface	W. C. Caldwell.....		Martin Johnson Norman Flint Ben Brush Enoch Olson G. Gordon
Foundry	W. N. Tanner.....		J. E. McDonnell C. Bardon J. A. Dragstedt
Stock Bins.....	Thos. Marron.....		Barney Marror
Leaching Plant.....	H. W. Aldrich.....		J. H. Saville
Reverberatory.....	Ed O'Brien.....		Mike Corcoran
Briquette	H. S. Ware.....		J. D. McCarthy
Oil Flotation and Re grinding.....	Ralph Hayden.....		Martin Skarr K. McKenzie John Kinvig
Masons	A. N. Jette.....		James Foster
Roaster No. 2 and McDougall.....	J. K. Murphy.....		Neil Beaton James Moran
Coal Dust.....	W. L. Warford.....		Mike Murphy
Lab. Samp. Mill.....	Joe Conrady		Thos. Logan
Zinc Concentr.....	S. S. Rodgers.....		Joe Conrady W. Hayes T. W. Hayes
Zinc Electro.....	J. O. Elton.....		E. E. Anderson Ed. Graybeal
Elect. Dept.....	L. E. Jones.....		H. J. Brady
Machine Shop.....	Al Campbell.....		L. D. McPherson E. S. Gregory
Paint Shop.....	James Sweeny.....		J. Sweeny
Lead Burning.....	G. C. Detrich.....		Joe Manning
Water Works and Street Ry.....	H. W. Johnson.....		M. Doyle August Didzum

The Washoe reduction works at Anaconda will have an increasingly varied output in future years. Besides copper, zinc and arsenic, it has an experimental bismuth plant; the sulphuric acid plant turns out 150 tons of 60° acid per day, since July 1916, part of it to be used in the new dynamite factory under construction at Browns Gulch and the rest for the zinc and copper leaching units of the Washoe plant itself, this output being insufficient to meet the outside demand.

Phosphoric acid will be manufactured from phosphate rock brought from the company's land near Melrose, if the experimental plant to be started in 1916 proves successful; superphosphate could be made but will not stand railway freight charges, whereas the phosphoric acid could go into eastern markets. The building and fire brick plants have already been mentioned.

In the treatment of tails from the concentration plant, leaching has proven a trifle cheaper than flotation methods, owing to the fact that leaching tailings carry about 0.08% copper as compared with 0.13% in the flotation tailings. The difference, though it is only a pound of copper per ton, is important where 10,000 tons a day are treated.

WASHOUGAL GOLD & COPPER MINING CO. WASHINGTON

Idle. Washougal, Clark Co., Wash. F. A. Mabee pres.; John Scharboarer, v.-p.; J. B. Jordan and T. A. Altman, secretaries; Dr. Otta Sutter, treas., at last accounts. Inc. 1902 in South Dakota. Cap., \$1,000,000, shares \$1 par.

Lands: 560 acres, held on a 30-year lease, from the state, near Mt. St. Helens, in the Bald Mountain district, on the upper Washougal river, show several vertical fissure veins in granite, one of which, averaging 6' thick, is developed by an 1,800' tunnel exposing ore, estimated to average 5% copper, 15% lead and zinc, 2 to 70 oz. silver and \$1 to \$15 gold per ton.

Equipment: includes gasoline hoists and a 3-drill Sullivan air compressor. Had a 25-ton concentrating mill, 1912. Presumably defunct.

WASP NO. 2 MINING CO. SOUTH DAKOTA

Address: D. A. McPherson, pres., 1st Nat'l. Bank, Deadwood. E. Manion, mgr., Lead, S. D., R. Craig, mill supt. A close corporation, most of the stock still held by original 14 stockholders.

Inc. November, 1901, in S. D. Cap., 500,000 shares; \$1 par; all issued. Original purchase of land paid for from sales of ore. Voluntary assessment of \$50,000 in 1911 to replace mill destroyed by fire. To October, 1914, dividends paid totaled \$451,966.

Property: includes the Alma Fraction and Wasp claims at Flatiron, long famous for low cost mining and milling of low-grade ore. Wolf-ramite occurs along fissures in flat Cambrian quartzite.

Development: by open cuts, steam shovels stripping 20' of waste which overlies an ore bed 20' thick. The total mining cost is \$1.661 per ton. Milling cost is \$0.591 per ton.

Equipment: a new mill for concentrating low-grade tungsten ores, crushes to $\frac{1}{8}$ " by rolls, recrushes in smaller rolls, grinds by ball mill and treats coarse in jigs, sand on Wilfleys and slime on canvas tables. Three grades of concentrates produced, 65%, 45% and 35% tungstic acid.

Production: in 1914, 176,140 tons ore, average value \$2.015 gold and 0.287 silver per ton, returned \$1.533, at a cost of \$1.287 per ton. In 1915, costs increased and operations were curtailed until shipping and milling of tungsten ores added new profits.

From May, 1915 to March, 1916, company shipped 184 tons ore, averaging 45% tungstic acid.

WATT MINE

NEVADA

Owned by Austin Goldfield Mining Co., and operated by H. Lemaire, under lease, several shipments being made in 1915.

Property: the Cambrian or Todd claims on N. side of New York canyon, Reese River district, Lander Co., Nev. **Development:** 300' inclined shaft with 3 levels. Vein in dark quartzite ranges from 4" to 12" wide and consists of white quartz containing tetrahedrite, pyrite, chalcopyrite, and

some blende and galena; dip 25° to 45° N. E.; strike N. 45° W. Ore shipped is said to average about \$125 per ton chiefly silver. **Equipment:** includes a 25-h. p. gasoline hoist.

WAYNE DEVELOPMENT CO.**ARIZONA**

Idle. Property: near Quijotoa, via Weldon, Pima Co., Ariz., includes 49 claims, partly patented, 980 acres and three mill sites, total 1,020 acres, in the Quijotoa district, 40 miles from the Red Rock-Silver Bell railroad. Claims show mineralized zones between granite and andesite carrying several orebodies, one of which is said to be 200' wide and characterized by gold ores. The other orebodies show copper ores containing malachite near surface, succeeded by chalcopryrite, mixed with lead and zinc sulphides beneath the oxidized zone. The ore is reported to average 10 to 30% copper and 5 to 70% lead.

Development: by 1,800' crosscut tunnel, long abandoned, 7 shafts of 60 to 330' depth and about 10 tunnels, longest 430' with total workings of about 4,500'.

Equipment: includes steam and gasoline engines, aggregating 500-h. p. at the mine and mill, two 45 h. p. hoists, good for 700' depth, Fairbanks-Morse and Leyner air compressors, with 17 buildings. The 100-ton stamp mill and concentrator has 30 gravity stamps and a 250-h. p. engine, 4 Blake and Samson crushers, one 50-ton Elspass centrifugal crusher and 3 Standard tables. Long inactive and probably defunct.

WEDGE COPPER CO.**NEVADA**

Luning, Nev. H. H. Hunter, managing director, Lovelock, Nev. Mark Walser, H. O. Howard, directors. Knute Freitag, cons. engr. Inc. March, 1916, in Nevada. **Cap.**, \$1,000,000; \$1 par.

Property: 6 claims, 8 miles from Luning, Mineral Co., is developed by crosscut tunnel cutting copper ore at 800' depth. Said to show 2' of 2% ore in a 6' vein.

WEDGE MINING & MILLING CO.**UTAH**

Office: 1102 W. 7th South St. Salt Lake City Utah. Mine near Marysvale. **Officers:** E. P. Mowers, pres.-gen. mgr.; N. W. Sonnedecker, v.-p.-supt.; M. L. Grovenor, sec.-treas.; the foregoing, E. J. Schenck and K. D. Schenck, directors. **Cap.**, \$300,000; shares \$1 par; all outstanding.

Property: near head of Bullion canyon, 14 miles W. of Marysvale, Piute Co. is said to show a gold-bearing quartz fissure vein in latite; dip 15° S. E. strike N. E.-S. W. Orebody varies from ½" to 20" in width. Mine has been developed and worked chiefly under lease. Workings include a shaft, 150' adit and 65' of drifts. Shipments are of high-grade ore only.

WEEDON MINING CO., LTD.**QUEBEC**

Office: 31 South St., New York. L. D. Adams, mgr., Weedon, Que., Canada. In 1915 acquired the property of the East Canada Smelting Co. at Weedon, from the Precious Metals Corporation of New York. Is developing zinc properties in Quebec and has erected and is operating an electrolytic zinc plant at Welland, Ontario.

Property: comprises 375 acres in Wolf Co., has in 5 years produced 174,000 tons of cupriferous pyrite ore, mined for sulphur as well as copper. Average assays 3.65% copper, 40.8% sulphur, trace lead, 0.77% zinc, 0.5 oz. silver, and 20c gold; market price about \$9 per ton. Ore occurs in lenses in schist. Main orebody is 570' long, 40' to 45' maximum thickness, with dip 45° N. E. and course N. 37° E. **Ore reserves:** September 1, 1914, about 200,000 tons.

Development: by 2 shafts, 100' and 350' deep, and by 4 tunnels, 530', 570', 330' and 100', with 300' of crosscutting. **Equipment:** includes 2 hoists, 3 compressors, one electrically driven with 1,600 capacity, shops, buildings, etc. Company has a mill, with flotation unit, using Gen. Naval Stores flotation oil.

Transportation to railway, 3½ miles, is by aerial tramway and cost is under 7c per ton. Mining costs, 1912, \$2.12 per ton. Estimated production of copper, 1912, 1,957,241 lbs.; 1913, 3,000,000 lbs.

WEIMER COPPER CO.**IDAHO**

Office: care Jesse Knight, Provo, Utah. Mine near Dubois, Fremont Co., Idaho. Property: 18 claims, 360 acres, on Birch Creek, in Skull canyon district, shows a crushed zone 100 to 200' thick between quartzite and limestone, which carries high-grade ore in pockets and in cross fissures, of 3' to 2' width, running at right angles to the main contact deposit. Development: by an open cut and 2 tunnels of 300' each. Idle for several years.

WELLER GOLD MINING CO.**COLORADO**

J. C. Weller, mgr., Telluride, Col. Operates the Ballard mine near Telluride, San Miguel Co. Employed 15 men and was shipping bullion twice a month, in 1915. Equipment: includes pipe-line, tramway, 10-stamp mill fitted with plates and concentrating tables.

WELLINGTON MINES CO.**COLORADO**

Office: Grand Avenue Temple, Kansas City, Mo. Mine office: Breckenridge, Colo. Officers: J. W. Oldham, pres.; J. H. Harkless, v.-p.; C. Charpoit, sec. and treas.; the foregoing and F. J. Dean, C. Histed, W. B. Burget, directors. R. M. Henderson, gen. mgr.

Inc. June 12, 1906, in Ariz. Cap., 10,000,000 shares; \$1 par; non-assessable; all outstanding. Company office in Kansas City, transfer office. C. Charpoit, registrar. Annual meeting, 1st Monday in June.

Gross earnings, year ending December 1, 1915, \$605,741; from sales of ore, \$603,883. Operating expenses, \$188,522; profit, \$458,443. Dividends for the year, \$300,000.

Property: 15 patented claims, 75 acres at Breckenridge, is said to show lead and zinc sulphide ore in a fissure vein in diorite; dip 60° S.; strike N. 50° E. Pay ore occurs in shoots and is said to give average assays of 3% lead, 18% zinc, 23% iron, 15% silver.

Development: by one vertical and inclined shaft, and several tunnels, longest 1,800'. Greatest depth of workings, 850', total linear extent several miles. Orebody is mined by stullng method.

Equipment: includes double-drum electric hoist, 500' compressor, a number of pumps, 1,800' tramway, all electrically driven. There are two mills, a concentrator, and a plant for roasting and magnetic separation. Capacity, 120 tons daily. Lead concentrates shipped, 1915, averaged 42%; zinc concentrates, 47%.

Production: for 1915 was 10,000,000 lbs. zinc. Costs per ton: mining, developing and trammng, \$2.332; milling, \$2.732; hauling concentrates, \$0.241; office and general, \$0.631; total \$5.94 per ton of crude ore.

General manager's report shows a material reduction of ore reserves during the year, actual tonnage being sufficient to supply the mills for 8 or 10 months.

In spite of the abnormally high prices of metals and apparently prosperous conditions, dividends amounted to only 3% of the capitalization, without allowances for depreciation and amortizations. The position of the stock has not been improved by its use as a bait to lure investors into the stock-juggling schemes of Harry J. Newton. It would be interesting to know whether this well known manipulator actually controlled the shares offered the public, and whether he acted with the consent of Wellington Mines Co. directors.

WENDENDALE GOLD MINING CO.**ARIZONA**

Property near Wenden, Yuma Co., Ariz., in the Cunningham Pass district, is developed by a shaft, showing ore that gave returns to 13% copper and \$12 gold per ton, from a test smelter shipment. Shipping ore being mined by lessees in 1916.

WENTWORTH COPPER CO., LTD.**NOVA SCOTIA**

Idle. Address: Wentworth, Cumberland Co., N. S. Inc. 1907, to acquire lands, bought at foreclosure sale, of the Cumberland Copper Co. Company apparently holds property for speculation purposes as no work has been done since purchase.

WERINGER MINES CO.

CALIFORNIA

Officers: Jos. Weringer, pres. and mgr., Woody, Calif. F. J. Weringer, v.-p.; Erwin W. Owen, sec., Nat'l Bank Bldg., Bakersfield, Calif.; Otto Kamproth, treas. with E. H. Woody, Paul Fox and Amasa P. Peak, directors.

Inc. Dec. 17, 1914, in Calif. **Cap.**, \$500,000; \$1 par; 293,543 issued. Secretary is transfer agent. California Corporation Commission granted authority to sell 100,000 shares at 50c in 1915.

Property: the Greenback mines, 68 claims on R. R. land, with 2,200 acres mineral and water rights in sections 1, 2, 3, 10, T. 28 S., R. 29 E., situated 22 miles from R. R. at Oil Center. Mine said to show contact metamorphic deposit a mile long in granite and porphyry, running N. S. and S. W. and dipping 45° to 85°. **Orebody**, 100' wide, carries copper, molybdenite, wolframite, with manganese-iron ore. **Ore** said to average 5% copper, 4 oz. silver and \$1.50 in gold.

Development: aggregating 1,600' by 200 and 230' incline shafts, connected at 200' depth. Latest work on 140' level. **Ore reserves:** 10,000 tons claimed. 1,000 tons on dump valued at \$150,000.

Equipment: 20-h. p. gasoline hoist, 75-h. p. engine, compressor, etc.

Production: about 40 tons, yielding \$45,000. Company constructing a milling plant, expected to begin operations Sept., 1916. Property reported on by W. J. Adams, W. H. Storm, H. W. Turner, D. M. Folsom and other engineers.

WEST COAST MINES CO.

IDAHO

Directors: C. E. Stables, sec.-treas., Lansing, Mich.; Wm. L. Hoag, pres., Lansing, Mich.; H. C. Wyman.

Property: the Pearl mine near Boise, Idaho, showing a vein of gold-silver ore.

WEST COAST MINING & SMELTING CO.

MEXICO

Idle. Office: 30 Church St., New York. Mocerito, Sinaloa, Mex. Howard L. Haines, pres.; Chas. M. Hicks, sec. **Inc.** 1906, in Maine. **Cap.**, \$2,500,000; shares \$1 par; nonassessable; in \$500,000 of 7% cumulative preferred stock and \$2,000,000 of common stock.

Lands: 6 groups, 387 acres, 5 to 20 miles from Mocerito, and 12 to 40 miles from Carbó. Principal property is Los Tajos group, 357 acres, showing andesite, cut by narrow fissure veins of 4' average width that are said to carry chalcopryite ore. The River mine, has a 150' shaft, on a vein of 5 to 8' reported width, carrying ore said to average about 5% copper and \$3 per ton in gold and silver.

Equipment: a 70-h. p. steam plant, a small compressor and 6 drills. The 30-ton experimental concentrator has a Blake crusher, 2 rolls, 2 Bartlett tables and 3 screens. The smelter, at the mine, has a 50-ton water-jacket blast furnace.

WEST DOME CONSOLIDATED MINES

ONTARIO

Office: Traders Bank Bldg., Toronto. **Officers:** Sir Henry M. Pellatt, pres.; Hugh Blair, v.-p.; C. H. Manaton, sec.-treas., with J. A. Murry, A. M. Hay, and G. A. Stimson, directors.

Inc. 1915, in Ontario to take over property and assets of the West Dome Mines Co. **Cap.**, 3,000,000 shares; \$1 par; 2,000,000 shares offered in exchange for 3,000,000 shares in the old company, leaving 1,000,000 in the treasury to provide funds for development. Annual meeting in April. Listed on New York Curb and in Toronto.

Property: 167 acres, adjoining the big Dome on the west, in Tisdale township, Porcupine, Ont. **Development:** by shaft on a quartz vein 2½ to 3' in width at an incline of 70°. Two other veins are known, but no information is available. The incline shaft, 227' deep, on a good vein, will be sunk to the 300' level. Exploration to 600' or 700' by diamond drill has cut 4 veins, one at 700'. Property was idle 1912 to 1915 after fire destroyed plant and buildings with a loss of \$75,000. **Equipment:** includes a 6-drill compressor, 3 boilers and hoist.

It is reported July, 1916, that company is now working on a continuation of the big Dome orebody, and not on the old ankerite (spar) vein which yielded occasional rich specimens. Diamond drilling is said to have cut 10' of \$22 ore at 1,800' depth. The new shaft cut 10' of \$40 ore at 45', and drifting on the 100' and 200' levels has exposed the ore for 50'.

The Dome has a large probable tonnage and is expected to make a big mine.

WEST END CONSOLIDATED MINING CO.

NEVADA

Office: Syndicate Bldg., Oakland, Cal. Mine office: Tonopah, Nev. Officers: F. M. Smith, pres.; B. F. Edwards, v. p.; L. W. Bennett, sec.; preceding with R. L. Oliver, W. J. Douglas, C. P. Murdock, G. C. Ellis, directors; R. C. Bowen, asst. sec.; J. W. Chandler, gen. supt.; J. H. Blair, aud. and purch. agt.; J. A. Carpenter, mill supt.

Inc. 1906, in Ariz. Cap., 2,000,000 shares; \$5 par; nonassessable; outstanding 1,788,486. No bonded indebtedness. Listed on San Francisco Stock Exchange and New York Curb. Registrar & Transfer Co., New York, transfer agt. and registrar.

Total receipts for year ending Dec. 31, 1915, \$905,695; mine expense, \$575,081; net profits, \$303,396; dividends, \$178,849; surplus, \$232,905.

Dividends: in 1913, 5c; in 1914, 15c; in 1915, 10c. Total dividends to 1916, \$536,545.

Property: 10 patented and 4 unpatented claims, 184 acres in the Tonopah district. Also owns 732,065 shares of the Halifax-Tonopah Mining Co.; \$100,000 in Nevada Milling Co.; 350,000 shares of the Santa Rosa Mining Co., mine located in Invo Co., Cal., and a controlling interest in the Independent Lead-Silver Mining Co.

Whether there are two veins or one, the direction and angle of the dip, strike, etc., were the subject of litigation in the suits with the Jim Butler Company, in regard to apex rights of the West End MacNamara vein. This suit has been decided in the lower courts in favor of the West End, but is still pending in the higher courts. For geology of the district see Tonopah Bonanza.

In 1915 mill treated 56,976 tons ore, averaging 0.245 oz. gold, and 23.42 oz. silver, recovering 92.1% of the values. Concentration was abandoned in 1914, as marketing cost of concentrates overbalanced the extra recovery. The mill treated 156 tons, averaging 22.6 tons per stamp. Costs were as follows:

	Amount Used p. Ton		Cost p. Ton	
	1915	1914	1915	1914
Labor (av. of \$4.50 per shift), shift.....	0.156	0.161	\$0.704	\$0.724
Power, kw.-hour.....	36.0	35.0	0.526	0.506
Sodium cyanide, lbs.....	2.6	2.83	0.567	0.600
Cut sheet zinc, lbs.....	1.21	1.34	0.179	0.126
Lime, lbs.....	3.88	3.95	0.028	0.033
Lead acetate, lbs.....	0.66	0.43	0.051	0.037
Fuel-oil, gal.....	3.19	3.10	0.122	0.121
Water, gal.....	226.0	246.0	0.170	0.185
Pebbles, lbs.....	7.39	6.05	0.067	0.105
Tube-mill liners & supplies.....			0.042	0.050
Shoes & dies.....			0.030	0.026
Other supplies.....			0.235	0.255
Total direct milling costs.....			\$2.741	\$2.768
Indirect costs without depreciation.....			0.211	0.202

Total direct and indirect without depreciation.....\$2.952 \$2.970

A third of the ore treated was from the disputed Jim Butler territory but 39 tons a day custom ore, mainly sulphides were treated that averaged \$20.10 per ton.

Development: by 3 shafts, deepest 1,000' with underground workings

aggregating more than 8 miles. Ore reserves are not officially reported, but ore in sight is said to be sufficient for five years. Ore averages about \$14 a ton in gold and silver.

Equipment: includes hoists, buildings, compressors, etc., and the West End mill operated by the Nevada Milling Co., a subsidiary. The daily capacity of the mill was originally 100 tons, but has been increased to 225 tons. Total cost of plant is more than \$170,000.

Production: for 1915 was about 76,000 tons yielding a profit of slightly more than \$4 per ton. Total cost of mining, milling, etc., averaged about \$10 per ton. Monthly earnings during 1916 are understood to average above \$30,000 and production has been increased to take advantage of high silver prices.

The Santa Rosa property, near Bishop, Calif., was worked by lessees early in 1916, but a 4' vein of gold ore, averaging \$35 to \$75 per ton being discovered, the company will work the mine hereafter.

WEST END EXTENSION MINING CO.

NEVADA

Tonopah, Nev. **Officers:** (in 1912) Franz Sigel, pres.; Frank S. Harris, v.-p. with Daniel O. Hulse, M. T. Rowland and Jas. M. Satterfield, directors. Inc. in Del. **Cap.**, \$1,000,000; issued \$600,000; shares \$1 par. U. S. Corp. Co., New York, transfer agent and registrar. Listed on New York Curb as a prospect.

Property: 4 claims, the Bank group, 70 acres, at Tonopah; adjoins West End Cons. on the north and Tonopah 76 on the west.

WEST END MINING CO.

WISCONSIN

Inc. June, 1916, by D. F. Gardner, C. May, L. Hable, Chas. Roselip, Jr., and W. F. Weigle, to lease and operate a zinc mine near Platteville, Wis. **WEST GOLD ROAD MINING CO.**

ARIZONA

Office: Crocker Bldg., San Francisco, Calif. **Officers:** J. W. Wright, pres.; G. T. Campbell, v.-p.; G. Bradley, sec. Inc. in Calif. **Cap.**, 200,000 shares; \$5 par.

Property: 5 claims, 63 acres, near Oatman, said to contain the W. extension of the Gold Road mine. **Development:** consists of main shaft 455' deep, and several crosscuts and drifts. Stock unlisted.

WEST HILL MINING CO.

WASHINGTON

Address: D. M. Drumheller, mgr., Republic, Wash. **Officers:** J. W. Turner, pres., Spokane, Wash.; Thos. Neill, v.-p.; Ralston McCaig, sec.-treas., Spokane; Jerome Drumheller and C. M. Hansen, directors.

Property: the San Poil mine taken on a \$150,000 bond and lease from the receiver of the defunct San Poil Mng. & Milling Co., a well known gold producer, whose ores carry \$7 to \$15 per ton.

Development: by 400' shaft and extensive levels, said to block out 30,000 tons of ore above the 300' level.

There is a 75-ton cyanide mill on the ground, but ore will be shipped to the Trail, B. C., smelter under a new contract. Management plans extending 400' level to cut vein and sinking shaft to 800' in depth.

WEST HILL MINING CO.

WISCONSIN

W. Brown, supt., Platteville, Wis. **Cap.**, \$20,000. In last eight months of 1915, reported to have made 150% profit on capital stock.

Operates zinc lands in Platteville, Grant Co., extending its holdings by amalgamation with adjoining lands. An important shipper of zinc concentrates. Paid a 10% dividend in March and another in June, 1916.

WEST HUNTER MINING CO.

IDAHO

Cap., 1,500,000 shares; 10c par; 600,000 shares in treasury. **Property:** 1 patented, 8 unpatented claims about one-half mile from Mullan, in the Coeur d' Alene district. The claims show a large body of quartz sprinkled with galena, which has been exposed by surface workings. Reported, March, 1916, under option to the Stewart Mining Co.

WEST JORDAN SMELTER.

UTAH

Owned by U. S. Smelting Co., at West Jordan, Utah.

WEST MERCUR MINING CO.**UTAH**

C. A. Bennett mgr., Mercur, Utah. Company is operating a mine on the western dip of the Camp Floyd district, and running a 150-ton mill improved in 1916 and an Oliver filter wheel added.

WEST MEXICO MINES CO.**MEXICO**

Office: Wm. G. Krape Inv. Co., Gas & Electric Bldg., Denver, Colo. Mine office: San Antonio, Baja California. Officers W. G. Krape, pres.-mgr.; D. H. Lawrence, v. p.-supt.; Dr. H. C. Van Norman, sec.; T. Williams, treas.

Inc. Jan., 1912, in Arizona. Cap., \$3,000,000; shares, \$1 par; nonassessable; outstanding 1,985,000 shares. Annual meeting, 1st Wednesday in January.

Property: 3 claims, about 30 acres, in the San Antonio district, 38 miles S. of La Paz, Lower California, Mex. Veins are both fissure and contact, containing gold and silver. Pay ore occurs in shoots and streaks, the main orebody varying from 3' to 14' wide. Sulphides appear at 275' depth.

Development: by inclined shaft, greatest depth being 340' and extent of lateral workings 5,000'. Company claims to have 15,000 tons in reserve with a gross value of \$400,000. **Equipment:** includes a 3-stamp 10-ton concentrating mill.

Production: in January, 1916, is said to have covered expenses, concentrates being stored awaiting transportation. Total production said to be \$20,000 from 6 shipments of ore assaying \$192 to \$326 per ton.

In 1914 the Wm. G. Krape Inv. Co. was selling this stock at "12½c per share, fully paid and forever nonassessable" on the installment plan, a recommendation that is a warning to all but the most foolish.

WEST MINNESOTA MINING CO.**MICHIGAN**

Defunct. John Coughlin, receiver, 68 Devonshire St. Boston, Mass. Inc. about 1854 in Michigan. Cap., \$500,000; shares \$25 par. Was an old and long inactive company owning 550 acres lying mainly W. of the Ontonagon river. Property sold May, 1916, to F. W. Nichols of Houghton, presumably for T. W. Cole. Sale ordered because company's charter had expired.

WEST NINE MILE MINING CO.**IDAHO**

Chas. Heilbronner, pres.-gen. mgr., Wallace, Idaho. H. C. McAllister, treas. Olin & Co., fiscal agents.

Property: a group of claims west of the Success and Alameda mines on west fork of Nine Mile Creek.

Development: by 400' tunnel shows a vein said to carry occasional bunches of ore. It is announced that property will be equipped, a 200' shaft sunk and an additional 300' driven on tunnel, in 1916.

WEST SIDE GOLD & SILVER MINING CO.**OREGON**

R. Baird, sec. and mgr., Yam Hill. Officers: J. A. Simmons, pres.; G. W. Perkins, v. p.; R. Baird, sec.; W. G. Busbie, treas.; the foregoing. C. C. Laughton, N. N. Perkins, N. G. Gist, directors.

Inc. April, 1900, in Ore. Cap., 1,000,000 shares; 1c par; outstanding 814,307; nonassessable. Annual meeting, first Monday, January.

Property: 3 patented claims, about 57 acres, in Greenhorn, Baker and Grant counties, is under lease and bond to R. Baird, who, in 1915 mined about 550 tons in course of development. Values are gold, silver, copper, lead. A number of veins cutting through greenstone and schist run at right angles, the N.-S. veins dipping E., and E. W. veins south. Ores contain sulphides in quartz and dolomite; cinnabar is also reported. Pay ore occurs in shoots about 3' wide. Shipping ore is said to average about \$60 per ton and milling ore \$20.

Development: by several shallow shafts, comprises about 1,000' of workings, greatest depth being about 40'.

Equipment: includes a small steam pump. About \$10,000 spent in development during past two years. Developing in 1916.

WEST TOLEDO MINES CO.

Office: Kearns Bldg., Salt Lake City. **Mine office:** Alta, Utah. **Officers:** H. S. McCarty, pres.; H. S. Knight, v.-p.; J. A. Foley, sec.-treas.; preceding with E. B. Critchlow and W. Thornton, directors. D. J. Lemmon, mine supt.

Cap., 500,000 shares; 10¢ par; outstanding 340,000 shares. Listed on the Salt Lake Stock Exchange.

Property: 11 claims in the Little Cottonwood district, Salt Lake county. **Development:** chiefly by the Superior tunnel which is to be extended to cut several known mineralized veins. Grade of ore so far found is reported to be low. Actively developing in July, 1916, at three places to open the Cardiff west overthrust contact and to explore the Toledo fissure. Property is in a line with Cardiff and Hecla Extension in both of which the overthrust contact has proven ore-bearing.

WEST TONOPAH MINING CO.**NEVADA**

Address: J. G. Kirchen, mgr., Tonopah, Nev. Inactive since 1907, but mine now in process of development under new management, which has acquired 51% of the 1,000,000 shares of stock.

Property: 7 claims S. W. of Tonopah Extension. **Development:** by 850' shaft and crosscuts. It is proposed to extend the shaft to 1,200' and crosscut N. and S., in 1916.

WEST VIRGINIA-WYOMING COPPER MINING CO. WYOMING

Succeeded by Portland Consolidated Copper Co., which see.

WESTERN COPPER CO., LTD.**NEWFOUNDLAND**

Idle. Probably bankrupt. **Property:** the York Harbour mine, at York harbour, Birchy cove, Bay of Islands, N. F. Described Vol. X, Copper Handbook.

WESTERN DEVELOPMENT CO.**NEW YORK**

Bankrupt. Was the successor of Otto Heinze & Co., which firm became bankrupt in 1907.

WESTERN MINES CORPORATION**CALIFORNIA**

Office: 37 Wall St., New York. **Officers:** Major H. S. Howland, pres.; John Landers, v. p., San Francisco, Calif.; D. C. Demarest, v. p.; A. F. Hughes, chief engineer, with A. J. Harwood, directors. W. D. Wright, treas.; Jos. D. Fackenthal, sec.

Cap., \$2,000,000; shares \$5 par. **Bonds:** authorized, \$600,000, debentures 6%, convertible into stock on basis of \$200 in stock for every \$100 in bonds. Issued in denominations of \$100 and \$1,000, dated Aug. 1, 1916, due Aug. 1, 1926. Semi-annual interest, payable Feb. 1 and Aug. 1. Empire Trust Co., New York, trustee.

Property: the company was formed in 1916 to operate the Gwin mine on the Mother Lode, in Calaveras Co., Calif., 7 miles S. of Jackson, Amador Co., also the Sierra Mines, under option, 4½ miles from Downieville, Sierra county and the Inyo County mine. The Gwin mine, acquired in 1867 by Wm. N. Gwin, and said to have produced \$2,000,000 to the 1,500' level, has been idle since 1908.

Geology: the property is said to show the Gwin vein occurring in Mariposa slate. Vein strikes N. 12° W., dips 68° E. The ore shoots vary in width from a few inches to 20'. For geology see U. S. G. S. Folio 63.

Development: by shaft; main shaft sunk 2,400' vertical, cuts the vein at 1,200' level. A winze on the 2,400' level and 450' south of main shaft is 450' deep. **Ore reserves:** management claims 240,000 tons averaging \$4.25 gold per ton, between the 1,400' and 2,400' levels and 800,000 tons of milling ore above the 1,400' level; also that "it is an inexorable law applicable to Mother Lode mines that enrichment takes place with depth."

Equipment: includes two compressors, 118' steel head-frame, double drum hoist, three 80-h. p. boilers, two 10' Pelton wheels. Waste water

from hoist and mill is stored in 75,000-gal. tank, before passing to compressor plant on the river, giving a 400' head.

Mill: with 100 stamps, weight 950 lbs.; includes 2 Blake crushers and Frue vanners.

Sierra mines: 11 claims, 200 acres, with 2,150' of tunnel workings, claimed to have 216,000 tons ore in sight, assaying \$3 to \$8 per ton. Further development work planned.

Inyo County mine: 3 claims, 60 acres, is a prospect said to cover 4,500' of a quartz vein 100' in width. Development merely by a 200' tunnel. Further development planned for 1917.

Management estimates gross earnings of \$4 per ton, with net returns of \$280,000 per year and "when the Sierra mines have been equipped with a new plant, the earnings should be (\$894,000 gross, \$415,000 net) in excess of 20% on the capital stock." This estimate is regarded as much too optimistic.

WESTERN MINING CO.

COLORADO

Subsidiary of the American Smelters Securities Co. Is an important producer of zinc carbonate ores from Big Chief, Maid of Erin and other mines through the Wolfstone shaft, Carbonate Hill, Leadville, Lake Co.

Production: in 1915 was 500 tons daily. In January, 1916, shipments had been reduced to 6,000 tons monthly, owing to depletion of ore reserves, but reported July, unwatering shaft to 1,000' level to get into sulphide orebodies. This work will also drain the Greenback mine and open up rich ground, idle for some years past.

WESTERN MINING & DEVELOPMENT CO., BRITISH COLUMBIA

An organization of Fred J. Rowland's of Spokane, Wash. Inc. July, 1915, intended to take over the Yreka group, Quatsino Sound, Vancouver Is., B. C., but succumbed to infantile paralysis.

WESTERN MINING & MILLING CO.

UTAH

Is a subsidiary of the Great Divide Mines Co., which see. **Office:** J. H. Hurd, sec., 219 Douglas Ave., Salt Lake City. Controlled by John B. Taylor, 1154 Downington Ave., Salt Lake City, Utah. A. B. Hirth, pres.; E. D. Haskins, v.-p.; W. A. Cooke, treas.

Inc. 1897 and reorganized 1905 in Utah. **Cap.**, \$300,000; shares \$1 par; assessable, with 2 assessments levied; issued \$200,000. Is a close corporation; having only 9 shareholders.

Property: 20 claims, 19 patented, 215 acres, in the Pine Canyon section of the Bingham district, on the western slope of the Oquirrh mountains. The claims are developed by numerous tunnels, and show the same limestone beds, cut by mineralized fissures, which have made the bonanza orebodies of the Utah Cons. and other properties on the east side of the range.

WESTERN NEVADA COPPER CO.

NEVADA

Property formerly held by this company is now a part of the Nevada Douglas Copper Co.'s property. Fully described in Vol. X, Copper Handbook.

WESTERN PACIFIC COPPER CO.

UTAH

Office: care Wilson Bros., Brooks Arcade, Salt Lake City, Utah. **Mine office:** Callao Juab Co., Utah. E. J. Yard, pres.; Jackson H. McCrystal, v.-p. and gen. mgr.; Elroy M. Clark, sec.-treas.

Lands: 320 acres, adjoin the Western Utah Copper Co., in the Willow Springs division of Deep Creek district, Tooele county, just over the Juab county line. The mine has a shaft and 2 tunnels, 400' and 1,200' long, developing ore averaging about 13% copper, 23% lead and 22% iron, with small silver and gold values. In 1914 a rich strike was reported in a south drift run from the bottom of the 250' shaft. The vein is said to be 15' wide and a 100-ton sample ran 24.4% copper. Occasional small shipments of ore have been made. **Equipment:** includes a steam plant and air compressor.

WESTERN RESERVE MINING CO.**MONTANA**

Office: Youngstown, O. **Mine office:** Basin, Mont. **Officers:** F. S. Merwin, pres.; C. Livingston, v.-p.; H. F. Duesinc, sec.-treas.; the foregoing and C. J. Burns, J. E. Richardson, A. F. Schontz, E. C. Welch, J. W. Kuhns, directors. J. H. Hildebrand, supt.

Inc. in Ohio. Cap., \$100,000; shares \$1 par; nonassessable; no bonded indebtedness; annual meeting, February 1. **Transfer office:** Youngstown, O.

Property: about 100 acres, 5 claims, 1 patented, at Basin, Jefferson Co., being developed for gold, silver, lead and copper. The quartz veins in granite strike E. W. and dip N. Pay ore occurs in large and small bodies as shoots and streaks showing sulphides.

Development: by 2,700' tunnel, greatest depth being 660'. **Equipment:** includes a steam compressor. Future work for the year includes driving 100' tunnel and erection of concentration plant. Developing in 1916.

WESTERN SLOPE COPPER MG. & SM. CO.**COLORADO**

Office: % H. F. Regal, 319 S. Main St., Butler, Pa. **Mine office:** Grand Junction, Mesa Co., Colo. J. S. Shaw, pres. and gen. mgr.

Inc. July 25, 1900, in Colorado. Cap., \$750,000; shares \$1 par; non-assessable. **Bonds:** \$50,000 authorized, at 6%; \$27,000 issued.

Property: 13 claims, 8 patented, 130 acres, with about 100 acres timbered, in the Unawep district, 23 miles S. E. of Grand Junction and 12 miles from Whitewater, the nearest rail point on the Denver & Rio Grande railroad. Shows granite and diorite, cutting sandstone and limestone. The claims have 6 fissure veins, 2 of them under development showing paystreaks 8" to 4' thick of bornite and chalcocopyrite ore, with malachite ore near the surface. Shipments of 17 carloads made some years ago, gave returns of 11 to 18% copper, 2 to 10 oz. silver and \$1 to \$5 gold per ton. **Development:** by 6 shafts, deepest 250', with 3 tunnels, longest 310', the mine having 1,686' of workings.

Equipment: includes a 50-h. p. steam plant, with a 40-h. p. hoist good for 1,000' depth, and 4 mine buildings. There is an old 50-ton matting furnace at the mine. The management plans reorganization and refinancing of company in 1916. Property considered promising.

WESTERN TUNGSTEN MINES CO.**COLORADO**

Albert Heyn and Frederick Davy, mgrs., Nederland, Colo. Has a lease on the Bonanza No. 1 mine on Wolf Tongue ground and on the Alaska lode.

WESTERN UNION MINING CO.**IDAHO**

Wallace, Idaho. **Officers:** D. H. Anderson, pres.; B. L. Collins, sec.; L. L. Woodford, treas.; D. H. Anderson, R. F. Collins, J. E. Burbank, G. W. Allen, W. Holm, W. Bjorklund, E. Hagnan, directors. E. Roberts, supt.

Inc. Jan., 1916, in Idaho. Cap., 2,000,000 shares; 10c par; 1,500,000 shares issued in exchange for stock in Aurora-Sampson and H. E. M. companies; 500,000 shares in treasury for future development.

Property: 30 claims of the Aurora-Sampson and H. E. M. companies near Wallace, in the Coeur d'Alene district. Owns the H. E. M. 100-ton concentrating mill at Wallace, which has a flotation unit using Naval Stores oils.

Development: aggregating 8,500' includes the H. E. M. lower tunnel, which at 2,300' and at a vertical depth of 1,000' encountered a large orebody in Aurora-Sampson ground. Drifts on the vein extend 800'. Values are lead and silver. The H. E. M. mine has 8,000' of underground workings. Management proposes active mining work and ore extraction.

WESTERN UTAH COPPER CO.**UTAH**

Office: 1020 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Irapah, Tooele Co., Utah. **Officers:** W. S. McCornick, pres.; Capt. Duncan Mac-

Vichie, v. p.-gen. mgr.; Herman H. Green, sec.-treas., with Henry Hornblower, John W. Weeks, Jas. J. Phelan and J. A. Coram, directors.

Inc. 1906 in Wyoming. Cap., \$2,500,000; shares \$5 par; non-assessable. **Debentures:** \$100,000 authorized Aug., 1911.

Property: the Gold Hill mine, 51 claims, 364 acres, patented, and a 340-acre ranch on Gold Hill, in the Clifton section of the Deep Creek district, some distance from Wendover, the nearest rail point, on the Western Pacific. The claims show a prominent iron gossan, with copper and lead streaks, with a 3' paystreak assaying up to 20% copper, 6 to 22 oz. silver, and \$11 to \$14 gold per ton. Development is said to show an orebody 60' wide and 600' long on the 150' level, that will average 5% copper. The mine is reported to have 100,000 tons of ore blocked out.

Development: includes a 600' shaft and a long tunnel, with upwards of 1 mile of workings, the tunnel showing a vein of about 20' width, of which a 5' footwall paystreak carries silver-lead sulphides, balance of vein being mainly iron oxide. Property considered promising.

The stockholders at a meeting July 14, 1916, voted to dispose of 50,000 shares treasury stock to provide funds to build a railroad from Wendover to the mine.

WESTERN ZINC CO.

UTAH

Has lease and is operating the Lakeview Mng. Co. (which see) property on Promontory Point, Utah.

WESTERN ZINC OXIDE CO.

COLORADO

Address: A. Hoffman, pres., Leadville, Colo. Formed in 1915 to take over and operate the plant of the Western Zinc Mining & Reduction Co., west of Leadville.

Employs the Wetherill process of producing zinc oxide by volatilization and collecting fume in flues. Capacity, 50 tons daily, to be increased, and roasting furnace added to handle sulphide ores as well as carbonates hitherto treated. Plant operated continuously during 1915.

WETTERHORN LAND CO.

MICHIGAN

Idle. W. H. Garlick, 990 W. Kensington road, Los Angeles, Cal., agent. **Lands:** 760 acres, in Secs. 21 and 22, T. 51 N., R. 42 W., Ontonagon county, shows 14 copper-bearing beds of 4 to 9' average widths, the most important being an 8' bed of cupriferous sandstone, carrying native copper and silver, said to have given assays of 2.6 to 6% copper and 1 to 6 oz. silver per ton. An amygdaloid opened by 84' shaft shows a small amount of copper.

WETTLAUFRER-LORRAIN SILVER MINES, LTD.

ONTARIO

Office: 61 Broadway, N. Y. **Mine office:** South Lorrain. **Officers:** H. Lockhart, Jr., pres.; D. M. Steindler, v. p.; E. H. Westlake, sec.-treas.; the foregoing and T. L. Herrmann, J. H. Susmann, W. J. Magavern, W. H. Clipsham, J. L. Mitchell, directors. R. Livermore, mgr.

Inc. Nov., 1908, in Ontario. Cap., \$1,500,000; \$1 par; non-assessable; outstanding, 1,416,590 shares. Annual meeting, fourth Monday in January. Bankers' Trust Co., New York, Trust & Guarantee Co., Ltd., Toronto, transfer offices. Security Transfer & Registrar Co., New York, registrar. Listed on New York curb.

Operations ceased in 1913, owing to exhaustion of ore, and efforts to find other bodies in the property are practically abandoned. Treasury contains about \$150,000 which will be used for prospecting and purchase of other property. Examination of other properties planned for 1916-17.

WHALE MINE

NEVADA

Goodsprings, Nev. **Officers:** T. A. Varden, mgr.; J. M. Hays, sec.; R. M. Salisbury, C. W. Whitley, L. Greene, trustees.

Property: the Whale mine, 6 unpatented claims, 120 acres, 8 miles W. of

Goodsprings, Clark county. The mine has deposits of zinc ore which occur in limestone and dip 45°, the pay ore being found in shoots 2' to 5' wide. Mine is worked by a 600' tunnel. Greatest depth of workings, 300'. The mine is still in development stage.

Equipment: includes 10" x 10" compressor. Shipment of carbonate ore in 1915 averaged 38% zinc.

WHEALKATE MINING CO.

MICHIGAN

Reginald C. Pryor, sec., Houghton, Mich. Nathan F. Leopold, pres.; R. R. Goodell, v. p.; Albert F. Leopold, treas. **Inc.** Nov., 1902, in Michigan. **Cap.**, \$50,000; shares \$25 par. **Property:** 240 acres, including the old Whealkate mine, on which a little misdirected work was done many years ago. Though primarily a land and town-site company, the company owns mineral lands in Sec. 17, which carry the southern extension of the Isle Royale and other cupriferous beds of the Keweenaw series. Did some diamond drilling, 1907; idle since.

WHIRLWIND CONSOLIDATED MINING CO.

UTAH

Office: 400 W. 7th S. St., Salt Lake City, Utah. **Officers:** Chas. Tyng, pres.-mgr.; Frank K. Nelson, sec.

Inc. April 24, 1916, in Utah. **Cap.**, \$250,000; shares 25c par; 300,000 shares in treasury. Listed on Salt Lake Exchange. Cash on hand, \$6,250.

Property: 7 claims, unpatented, 110 acres, in the American Fork mining district, 20 miles from a railroad, said to show silver-lead ore. **Development:** a 500' tunnel driven by former management, which is to be driven 2,500' more, to cut the Pacific fissure, 1916. A new tunnel started June, 1916, is expected to cut a vein 700' from portal. Installation of machinery and power is planned for 1916-17. Stock offered by W. H. Childs & Co. for 7c a share in May, 1916.

WHITCOMB MINING & MILLING CO.

ARIZONA

Office: 154 W. Randolph St., Chicago, Ill. **Mine office:** Tucson, Ariz. **Officers:** W. Sanson, pres.; J. C. Freeman, v. p.; T. A. Snow, treas.; A. McCallum, sec.; H. Whitcomb, gen. mgr.

Inc. March, 1914, in Ariz. **Cap.**, \$100,000; recently increased to \$200,000; shares \$1 par; non-assessable; all issued. No bonded indebtedness.

Property: 3 unpatented claims in the Pima district, 20 miles from Tucson. The increase of capitalization was for the purpose of acquiring 6 additional claims known as the Prosperity group. **Development:** by inclined shaft about 500' deep and stopes on 3 levels. Ore is a silver-lead-bearing quartz of milling grade. **Equipment:** includes a concentrating mill, shut down in 1915 for lack of water, but again operated in 1916. Company claims \$500,000 worth of ore developed on the two properties.

WHITE CAPS MINING CO.

NEVADA

Tonopah, Nev. **Officers:** A. G. Raycroft, pres.; C. F. Wittenberg, v. p., with H. R. Cooke and C. J. Blumenthal, directors. P. S. Booth, sec.-treas.

Inc. June 7, 1915, in Nevada. **Cap.**, \$200,000; issued \$132,110; shares 10c par. U. S. Corporation Co., New York, transfer office and registrar. Listed on New York Curb, in San Francisco and on the Nevada Exchanges.

Balance sheet of April 30, 1916, shows **assets:** property and equipment, \$248,069; cash, \$10,336; accounts receivable, \$5,712. **Liabilities** show surplus April 30, 1916, end of fiscal year, \$118,659; current liabilities, \$13,549.

Property: 2 claims, near Manhattan, Nye Co., Nev., said to show a vein of gold ore in limestone. **Development:** by a 310' vertical shaft with levels at 210' and 310'. Also an old 225' incline shaft. Two ore shoots opened in Aug., 1916, are reported to show 10' of \$40 ore, and 3' of \$124 ore, respectively. Ore below 210' level is said to carry primary sulphides. It "has hitherto presented many metallurgical difficulties, due to the presence

of antimony and arsenic. These difficulties have been satisfactorily solved, and a process worked out which will effect a good extraction at a low cost." No figures concerning such costs are given. Work in 1916 has been largely on the 310' level, searching for the downward extension of orebodies opened on levels above. **Equipment:** includes a 10-stamp mill and 75-ton cyanide plant; plans adding a roasting plant.

Production: is said to total 19,900 tons oxidized ore, average value \$19 per ton, all from above the 210' level.

WHITE CHIEF COPPER CO.

MONTANA

Mine near Jefferson Island, Mont. Lewis Schmuck, Mrs. Helen Schmuck and Ben W. Wilson, incorporators. Organized Sept., 1913. **Cap.**, \$1,000,000; shares \$1 par. **Lands:** 7 claims, in the Whitehall district, developed by a 600' upper and 100' lower tunnel showing copper-silver-lead-gold ore. A drift at depth of 82' disclosed a 5' vein, assaying 13% lead and \$14 gold. Development has been hampered by lack of working capital.

WHITE GULCH MINING CO.

CALIFORNIA

Office: 263 Twelfth St., Oakland. C. C. Powning, supt., Bagby, Calif. **Property:** the Virginia Quartz mine, 8 miles from Bagby, Mariposa Co. The vein varies from a seam to many feet in width with serpentine footwall and diabase hanging-wall. **Development:** 650' shaft, with 4 levels, 250' drifts, 350' raises and 250' winzes. **Equipment:** includes a Fairbanks-Morse hoist and 35-h. p. motor; 50-h. p. Ingersoll-Rand compressor; 3 miles of power line; track, cars, pipe, buildings, etc. Also a ten-stamp mill with crusher and amalgamating plates and 50 h. p. gas engine. Company started operations in 1912, employing 15 men; no recent information.

WHITE KNOB COPPER & DEVELOPMENT CO., LTD.

Address: Mark M. Salomon, treas., 43 Cedar St., New York. Mining property was the White Knob mine, at Mackay, Custer Co., Idaho, now owned by the **Empire Copper Co.** For further details of this company and its predecessors, see Vols. IX and X, Copper Handbook.

Cap., \$6,000,000; \$4,000,000 common and \$2,000,000 7% cumulative preferred stock. Company is a holding company controlling through ownership of \$1,200,000 of the capital stock, the **Argonaut Consolidated Mining Co.**, a dividend payer, at Jackson, Calif., which see. **Dividends:** were resumed in 1914, with payments of 25c per share on preferred stock, Nov., 1914; 10c in Feb. and May, 1915, and 10c Feb., 1916.

WHITE OAKS MINES CONSOLIDATED, INC.

NEW MEXICO

Office: Room 45, 45 Broadway, and 500 Fifth Ave., New York. **Mine office:** White Oaks, N. Mex. Richard Wightman, pres. **Inc.** in New York. **Cap.**, 200,000 shares; \$5 par. Traded in on New York curb. U. S. Corporation Co., 36 Nassau St., New York, registrar and transfer agent.

Property: about 300 acres in the White Oaks district, Lincoln Co., including the Old Abe mine, the North and South Homestake and the Welen claims, worked in the past for gold; also coal lands. Company claims in its literature to have produced 10 tons tungsten ore and concentrates per month since July 1, 1915.

Equipment: includes electric hoists, 2 stamp mills, and concentrating plant equipped with 5 Joplin hand jigs and one Richards jig.

In May, 1916, the stock sold up to \$16 per share; in June, the price broke from \$11 to \$5. Reported July, 1916, that "internal dissension arose in the White Oaks Co.'s management, and rather elaborate plans for reopening the mines have apparently been abandoned."

WHITE PINE COPPER CO.

MICHIGAN

(Subsidiary of Calumet & Hecla Mng. Co.)

Office: 12 Ashburton Place, Boston, Mass. **Mine address:** Ontonagon,

Ontonagon Co., Mich. **Officers:** R. L. Agassiz, pres.; G. G. Endicott, sec.-treas.; H. L. Bennett, asst. sec.-treas.; Jas. McNaughton, v. p.-gen. mgr., preceding with D. S. Dean, Benj. Joy, F. L. Higginson, J. M. Longyear and E. V. R. Thayer, directors. Thos. H. Wilcox, supt.

Inc. 1909. Cap., \$5,000,000; shares \$25 par; in 150,000 common shares and 50,000 5% cumulative preferred shares; issued 85,320 common and 34,759 preferred. Is controlled by the Calumet & Hecla Mng. Co., through ownership of 34,259 shares of preferred stock and 42,602 shares of common stock.

Annual report for 1915 gives balance of quick assets, \$139,786, compared with balance of liabilities Dec. 31, 1914, of \$134,559. Mine expenses were \$705,473 and receipts \$979,818; \$518,318 from ore sales and \$461,500 from sale of 18,460 shares preferred stock at par (\$25).

Property: the White Pine mine and surrounding lands, formerly owned by the Keweenaw Association and others. The White Pine mine, 80 acres, is in Sec. 5, T. 50 N., R. 42 W., 3 miles E. of the Nonesuch mine at the extreme south end of the Keweenaw mineral belt. The other property was paid for by stock. A 9 mile railroad line connecting the property with the Chicago, Milwaukee & St. Paul R. R., was completed in Dec., 1915.

Geology: property as a whole shows eruptive rocks with interbedded sandstone and conglomerates of the Secondary Keweenaw series. It also holds what F. E. Wright called epidote veins which are epidotal melaphyr crossing the face of the cliffs parallel to the sandstones, but showing evidence of faulting and crushing. There is also a second set of minor, nearly vertical epidote veins which, unlike the first, are barren of copper. The sandstone beneath the melaphyr is a fine-grained, dark red, almost quartzitic rock that is jointed and has numerous calcite veins and occasional threads of malachite which extend down a few feet from the contact. The rock is, however, usually concealed by talus from the cliffs. Native copper also occurs in a very fine-grained sandstone-conglomerate, which is said to run from 5 to 10%. The dip of the bedded formation is towards the S. E., varying from 8 to 35°. The so-called Nonesuch formation consists of 2 parallel beds of sandstone running from 4 to 8' in thickness and separated by a 5' bed of slate. The entire copper-bearing ground has a width of about 40'. The beds carry considerable finely disseminated native copper which is as a rule very flaky. This formation is badly faulted and in the mine is reported to have been thrown so that the payable lode abutted directly against the unpayable one. Besides the 2 veins described, there is a third which lies about 45' back in the footwall.

Development: includes 4 shafts; No. 2 temporary shaft was 183' deep and had 3,926' of openings, Jan. 1, 1916. It connects with the old White Pine shaft. The main working shaft (called No. 3), located between the two temporary shafts (Nos. 1 & 2), is an incline 1,090' deep, with 5,336' of underground workings, Jan. 1, 1916. It is equipped with 5-ton skips.

The No. 4, an inclined shaft west of No. 1 shaft, is sunk in the hanging at a considerable distance above the lode. On Jan. 1, 1916, it was 977' deep and had 10,275' of underground workings. It is also equipped with 5-ton skips. New workings totaled 8,605' in 1915; 4,721' in 1914, and 2,909' in 1913. The rock is soft and can be mined and crushed cheaply. The property has been extensively diamond-drilled, more than 110 holes having been made since work was begun in 1907.

Equipment: includes a power plant and compressor at the mine. A 750-k. w. electric turbine on Iron River, 1½ miles from the mine and mill, supplies water for the mill.

In 1915 a 1,000-ton mill was completed and put in operation. Instead of the steam stamps common in the Lake Superior copper country, it is

equipped with gyratory crushers, rolls and Hardinge mills. Concentration is effected on Wilfley tables and the tailing saved, as future regrinding and leaching will undoubtedly be used in reclaiming the copper content. The mill is near the working shafts and connects with them by means of trestles over which rock is transferred from the shaft rockhouses to the crushing plant at the mill. An extraction of but 67% is being made at present, the copper lost in the tailing consisting partly of sulphides, but mostly of fine flaky particles of native copper.

Production: last 8 months of 1915:

	Tons R'k Treated	Lbs. Cu. p. T.	Mine Cost p. T.	Lbs. Cu. Prod.	Cost per Lb.	Rec'd per Lb.
1916 (6 mos.)	.....	.....	.....	3,446,425	.....	.....
1915	.....114,039	24.76	\$2.182	2,824,145	16.64c	18.353c

Mine costs include mining, transportation, stamping and taxes per ton of rock treated.

Property is decidedly promising and a long life assured by discovery in diamond drill work of high-grade rock at 2,100' depth.

WHITE PINE EXTENSION COPPER CO.

MICHIGAN

Offices: 15 William St., New York, and Pinex, Ontonagon Co., Mich.
Officers: J. R. Stanton, pres.; Angus Smith, v. p.; preceding with R. D. Jones, Jas. S. Dunstan, Henry Ledyard, directors. Geo. W. Drucker, sec.; Theodore Dengler, mgr.; Wm. H. Bolly, supt. Edw. Roscollia, mine capt.

Inc. June, 1915, in Mich. **Cap.**, \$3,750,000; shares \$25 par; assessable; in treasury, 65,000 shares.

Property: 1,400 acres mineral land in the White Pine district, Ontonagon Co., 5 miles west of the White Pine property of the C. & H. Mng. Co. The company owns the leases and exclusive mining rights for 50 years, paying a sliding scale royalty. These leases were purchased from S. L. Smith of Detroit, and associates, who received 60,000 shares of stock in payment for their lands and the development work done prior to June 1, 1915.

The property is similar to that of the White Pine Copper Co. in that it shows sandstone and soft shales and slates. Considerable copper glance was found during diamond drill exploration work, the copper in the core of one hole showing glance only, no native copper being present.

Development: little underground work has been done, but a thorough diamond drill development is nearing completion. It consists of one line of holes, spaced 1,000' apart, which cut the copper-bearing beds about 400' below the surface and on their dip; a second line of holes similarly spaced, cut the beds about 600' in depth; the third line of holes, also 1,000' apart, cut the beds at a depth of 1,100'. The second line was located half way between the holes of the first; the third line holes were put down 250' from those of the second line. When the drilling is completed there will be a line of holes along the strike at intervals of 250', 250' and 500', repeating the sequence. Drilling completed in 1916, has disclosed very uniform values for a distance of 4,000' along the strike of the formation and at an average depth of 300'. The first of the five shafts planned was started in April at the eastern end of the property. It will be vertical and have 3 compartments.

Concentration will undoubtedly be by means of the flotation system, experimental work showing possibilities of an 80% extraction. A temporary mill will be built in 1916 and the property should enter the producing class some time during the year.

Outlook for the property is especially good and the management capable.

WHITE STAR MINING CO.

UTAH

Idle. Office: 408 South State St., Salt Lake City, Utah. **Mine office:** Eureka, Juab Co., Utah. Richard B. Shepard, pres. and gen. mgr.; P. A.

Sörenson, v. p.; Emma C. Shepard, sec.; Bernard Rich, treas., and Harry Rich, directors.

Inc. 1898, in Utah. **Cap.**, \$30,000; shares 10 cts. par; assessable; with several assessments levied. **Property:** 4 claims, patented, 80 acres, 3 miles from Eureka, the nearest rail point. The mine has a 100' shaft and 100' tunnel.

WHITEHALL MINING, MILLING & DEV. CO. MONTANA

Whitehall, Mont. **Officers:** T. T. Gates, pres.; N. D. Root, v. p.; C. W. Hatch, sec.; with Edw. Ryan, Jesse Johnson, L. B. Knight, R. Edwards, J. M. Borden and Jas. Ryan, directors.

Inc. June, 1914, at Whitehall, Mont. **Cap.**, \$500,000; shares \$1 par; 200,000 shares in treasury; 250,000 shares were given for the mining property.

Property: 5 claims, about 3 miles N. E. of Whitehall, Jefferson Co., is reported to have an orebody 36' wide from which shipments have averaged \$16 per ton.

WHITLATCH MINE MONTANA

Owned by C. W. Young, Chicago, Ill. Worked since 1912 under lease by Sherman Bros. (H. C., A. R. & Wm.), of Helena, Mont. The mine, 3½ miles south of Helena, Mont., located in 1864 and operated intermittently to date, has been a good and profitable gold producer. The mine carries silicious gold ore, containing small silver values and is developed by a 500' shaft; recent work is mostly between the 400' and 500' levels. **Equipment:** includes tramway, compressor, pump and hoist. Only 5 stamps of the 20-stamp mill and cyanide plant are at work in 1916, handling both Whitlatch and custom ores.

WICKES-CORBIN COPPER MINING CO. MONTANA

Office: Union Bank Bldg., Helena. **Officers:** S. A. Balliet, pres.; A. Major, v. p.; L. C. Henry, sec.-treas.; foregoing with N. Salvail and T. A. Grimes, directors.

Inc. July 9, 1907, in Mont. **Cap.**, 5,000,000 shares; 10c par; non-assessable; outstanding, 3,633,711. Annual meeting, June 3.

Property: 7 unpatented claims, 110 acres, 20 miles S. of Helena, and a half mile S. of Wickes, Mont. The claims show N.-S. fissure veins cutting granite, aplite, andesite and dacite. The ores carry gold, silver, copper and zinc values. **Development:** by Bunkerhill tunnel, 1,030' long and Tulare tunnel, 700'. Total workings, about 2,000', greatest depth, 350'. Developing, in 1916, and ore being mined by lessees.

WIG MOUNTAIN MINING & MILLING CO. UTAH

Officers: George A. Storrs, pres., American Forks, Utah. George A. Brown, v. p.; J. W. Storrs, sec.-treas., John Curzon and Jos. Thurgood, directors. **Inc.** May, 1916. **Cap.**, \$1,000,000; shares 1c par.

Property: the Jumbo group, 7 claims, on Wig mountain. Is a prospect which is to be developed, 1916-17.

WILBERT MINING CO., LTD. IDAHO

Office: 222 Kearns Bldg., Salt Lake City, Utah. **Officers:** A. S. Ross, pres.; H. S. Knight, v. p. and mgr.; C. Wamock, sec.-treas.

Inc. in Utah, 1907. **Cap.**, \$1,000,000; shares \$1 par; assessable; all issued. Annual meeting, May. Stock transferred at company's office. Listed on Salt Lake Stock Exchange.

Dividends: \$10,000, Nov. 15, 1915; \$10,000, Feb. 15, 1916; \$10,000, May 15, 1916.

Receipts for year ending May 1, 1916, were \$251,940 and disbursements, \$209,472, leaving \$42,468 cash in bank. Received from ore sales, \$223,382.

Property: 16 patented claims, in the Dome mining district, 40 miles from Arco, Fremont Co. The claims carry a fissure vein in Cambrian quartzite

that contains lead and silver ore, mostly of concentrating grade. The top of the vein has been folded into a nearly horizontal bed, worked by quarrying. The main ore-shoot has been followed to a depth of 600', and is stoped out from No. 5 level to the surface, May 1, 1916.

Equipment: includes a 100-ton concentration mill. In the annual statement value of the mill is placed at \$65,000, and that of the mine plant, \$50,000.

Production: for year ending May 1, 1916, was 15,204 tons crude ore, said to assay 25% lead and 3.86 oz. silver, which yielded by sorting and concentration, 5,787 tons, assaying 52% lead and 8 oz. silver. Costs were \$3.56 per ton. Shipments average 300 tons monthly.

WILLARD MINES CO.

NEVADA

Lovelock, Nev. **Officers:** F. H. Bird, pres.; J. T. Goodwin, v. p.; R. Nenzel, sec.; V. A. Twigg, treas., with L. A. Friedman, D. C. Wheeler, directors. H. H. Hunter, mgr. and supt.

Inc. in Nev. Cap., \$1,000,000; shares \$1 par; non-assessable; outstanding, 662,000. No bonded indebtedness. Annual meeting, third Wednesday in January.

Gross earnings for 1915, \$1,466, from the sale of ore from development work only. Shipments averaged \$54 per ton in gold and silver.

Property: 3 unpatented claims, 8 miles E. of Lovelock, Humboldt Co., Nev., which show a vein carrying pay ore in shoots. **Development:** by several shafts, deepest 50', and a 70' tunnel. Active development planned in 1916.

WILLIAMS LUMAN MINING CO.

WYOMING

Address: care W. J. Thom, cashier First Nat'l Bank., Buffalo, Wyo. **Mine office:** Depass, Fremont Co., Wyo. L. R. Vanhouten, pres.

Inc. May 2, 1908, in Wyoming. Cap., \$2,500,000; shares \$1 par; issued 2,385,000 shares.

Property: 9 claims, patented, 130 acres, 16 miles from a railway, in the Copper Mountain district, shows 8 fissure veins in granite, diorite and altered schists. The main vein, a zone 50 to 60' wide, traceable 3,400', in much altered, crushed and fissured diorite, has a 2' paystreak carrying free gold, copper ore, and native copper in thin sheets and nuggets, ore minerals being cuprite, melaconite, malachite and chalcocite. Ore is reported to assay 10% copper, 5 to 10 oz. silver and \$2 to \$8 gold per ton.

Development: by an 820' shaft, showing sulphides on the 800' level, with 2,000' of workings. There also are tunnels of 513' and 300'.

Equipment: includes an 80-h. p. gasoline plant, with a 15-h. p. hoist and a 2-drill compressor. Electric current is taken, over a 16-mile transmission line, from the Asmus Boysen dam. The company is operated as a close corporation, money for development having been furnished by about 10 shareholders only. Idle since 1912, for lack of funds. Property favorably regarded, but needs railroad transportation.

WILLIE ROSE CO.

ARIZONA

W. B. Wright, mgr. **Property:** the Willie Rose mine, near Triangle Springs, 13 miles S. of San Simon, Ariz., operated under 10-year lease from 1914. Developed by 124' shaft said to be bottomed in a 12' vein carrying slightly argentiferous chalcocite, of about 2% copper tenor. Ore occurs in lime-porphry contact, veins running E.-W., showing copper glance at slight depth. Was developing with a small force at last reports. Has made several shipments of \$12 per ton ore to the El Paso smelter. **Equipment:** includes hoist, oil engine, compressor and air-drills.

WILLOW CREEK MINES CO.

ALASKA

Address: Doherty & Thompson, Knik, Alaska. Company leases and

operates the Gold Bullion mine, one of the largest gold producers of the Willow Creek district. Five stamps were to be added to mill in August, 1916.

WILLOW CREEK MINING CO.**MONTANA**

Address: P. H. McDermott, chief owner, Helena, Mont. Owns the Mountain Meadow group, 4 miles from Pony, Madison Co., Mont., on Willow Creek. Mine shows a 12' fissure vein in granite carrying free gold with pyrite and chalcopyrite, both with gold values, in quartz gangue. Has a small mill. Regarded as promising.

WILLOW VALLEY MINING CO.**CALIFORNIA**

Office: 443 Holbrook Bldg., San Francisco. **Mine office:** Nevada City, Calif. **Officers:** M. Dozier, pres.; J. L. M. Shetterley, v. p.; C. E. Reith, sec-treas.; A. W. Hoge, C. F. Kinsey, R. W. Bender, directors. A. W. Hoge, supt.

Inc. May 18, 1915, in Calif. **Cap.,** \$1,000,000; shares \$1 par. Annual meeting in May.

Property: 9 claims, 4 patented, 125 acres, in Nevada City district, Nevada Co., has several veins, containing gold and silver ore, which occur in granodiorite and slate and dip from 20° to 70°. Developed by shaft and tunnel to depth of 800'. **Equipment:** includes electric power, compressor, pump, tramway, stamp-mill, etc. Developing only at present.

WILMOT MINING CO.**MICHIGAN**

Office: 990 W. Kensington Rd., Los Angeles, Cal. Mine near Ontonagon, Mich. W. H. Garlick, pres.; W. B. Goucher, sec. **Inc.** in Michigan. **Cap.,** \$500,000; shares \$25 par. Paid dividends of \$17,000, from sale of timber lands, with mineral rights reserved, and has received \$1,500 from assessments. Owns mineral rights to 3,520 acres in Ontonagon county. No mining done.

WILSHIRE BISHOP CREEK CO.**CALIFORNIA**

Bishop, Kern Co., Calif. Operates a mine owned by Rocky Point Cons. Mines Co., which see. Has 50-ton mill to be increased to 100 tons per day. Property reported on by E. W. Walter, Oct., 1915.

WILSON CONSOLIDATED MINING CO.**UTAH**

Offices: 208 Brooks Arcade Bldg., Salt Lake City, Utah, and Wendover, Tooele Co., Utah. Clyde H. Wilson, pres.; Frank L. Wilson, sec-treas.

Property: located in the Clifton district, Deep Creek Mts., Tooele Co., 45 miles from Wendover, was the only mine in the U. S. which shipped bismuth ore in 1914. Reported to have shipped one 25-ton lot of bismuth ore carrying gold and silver, and assaying 8% bismuth. Ore was hand jigged to bring shipment up to 20%.

WILSON MINES CO.**MISSOURI**

Webb City, Mo. **Cap.,** \$10,000. **Dividends:** 10% in April, 1916, 5% May 1. Stock held mainly in Milwaukee, Wis.

Operates, under lease, 150 acres of land of the Boston Duenweg Mining Co., Webb City, Jasper county. In 1915, developed extensive orebodies by drilling, operated 2 shafts and produced the bulk of the output of Boston-Duenweg holdings. Has invested \$30,000 in plant, capacity 500 tons daily.

WILSON MINING & SMELTING CO.**MONTANA**

Address: William Burke, pres.-mgr., Saltsee, Mont. A Burke, v. p.; A. W. Dougherty, sec. and treas.; M. Hays and G. Early, directors.

Developing 2 groups of claims on Silver and Big Thunder Creeks, about 2 miles from Saltsee, Missoula Co.; 6 claims on a lead-silver vein form one group, 8 claims showing a shoot of copper, the other group. Work in 1916 comprises a drift from Silver Creek on the copper vein. Commercial lead ore is reported in an upper tunnel.

WINGFIELD MINING CO.**MISSOURI**

Webb City, Mo. Inc. in Missouri. **Cap.**, \$32,000; investment, \$48,222. Operates, under lease, 50 acres sheet-ground lands of Scott, Bowman & Ware, working through 3 shafts. Capacity, 1,000 tons daily. Mill equipment includes Webb City crusher and 4 tables.

WINNEMUCCA MOUNTAIN MINING CO.**NEVADA**

Winnemucca, Nev. **Officers:** Victor C. Alderson, pres.-gen. mgr.; W. G. Adamson, sec.-treas.; John R. Turner, supt.; Roscoe F. Allen, asst.

Cap., \$2,000,000; shares \$1 par; outstanding \$1,200,000; non-assessable; no bonded indebtedness.

Property: 25 claims, 2 patented, 7 miles from Winnemucca, Humboldt Co., including 9 claims owned by the Winnemucca and Bonanza companies now merged with the present organization. The claims show a N. E.-S. W. fissure vein, traceable through the property for 3,000'. This vein cuts shale intruded by dikes of diorite and andesite. The orebody varies from 3' to 30' in width, and ore carries gold and small silver values. 3,000 tons of ore on the dump is said to average \$15.

Development: by 5,000' of tunnel work. The working tunnel, 425' long, enters a fault zone at a point 29' below an ore-shoot 175' long and 30' wide. The work defines 15,000 tons of indicated ore said to average \$15 per ton. **Equipment:** includes electric hoist, compressor and a 50-ton cyanide mill. Property is a prospect.

WINNIE-LAWSON ZINC CO.**MISSOURI**

Highly advertised in the Joplin papers January, 1916, as an "investment offering of great significance and importance." The company claims to have under lease, 270 acres of land in the "most promising portions of the southwest lead and zinc district," and that it has let a contract for a 400-ton mill. Edward Lawson is the promotor. No reports of big undertakings on the part of this company have come from outside sources.

WINONA COPPER CO.**MICHIGAN**

Office: 705. Sears Bldg., Boston, Mass. **Operating office:** Houghton, Mich. **Mine office:** Winona, Houghton Co., Mich. **Officers:** Chas. J. Paine, Jr., pres.; Geo. P. Gardner, v. p., with W. A. Paine, Walter Hunnewell, Jas. H. Seager and W. Cameron Forbes, directors. W. E. Coe, sec.-treas.; Rex R. Seeber, supt.

Inc. 1898, in Michigan. **Cap.**, \$2,500,000; shares \$25 par; increased 1911 to \$5,000,000; issued 166,667 shares, fully paid. Last assessment of \$1 was paid July 2, 1914. The Company 1911 acquired the property of the King Philip Copper Co., issuing 166,667 shares of Winona stock therefor. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, last Tuesday in March. Company ended 1915 with surplus assets of \$223,324.

Property, 2,608 acres, with timber rights to 1,768 acres additional, lying 3 to 5 miles S. of the mine.

Geology: the main tract carries the outcrop of the Winona amygdaloidal bed for about 2 miles. The mine was discovered 1864, by a line of old Indian pits along the outcrop, and a single shallow shaft was sunk, but owing to entire lack of transportation facilities little was accomplished. The property was leased in 1880 and worked for mass copper, but did not pay and was closed, until the present company began work April, 1898, when the old shaft was cut down, retimbered and deepened, and 3 new shafts sunk. The Winona bed is an amygdaloid of 12' minimum, 20' average and 46' maximum width, striking N. 59° E., and having an average dip of about 70°. The Winona amygdaloid greatly resembles both the Baltic bed and the Knowlton bed of the Evergreen belt, carrying considerable epidote, calcite

and quartz, with a limited amount of both mass and barrel copper, though the bulk of the metal occurs in stamp rock. Diamond-drill borings have located several other cupriferous beds on the Winona tract, all lean where cut. The mine is on a spur of the Copper Range railway.

The older workings show mineral of the lighter grades, with somewhat heavier copper at depth.

Development: No. 1, the discovery shaft, has 3 compartments, is 400' deep, with 4 levels opened, which show a little heavy copper and some stamp rock in the northern drifts, but is of little promise and has been idle since 1901.

No. 2 shaft is 1,000' deep, with 9 levels opened, showing good copper at depth of about 200', but with poor ground below, and has been idle since early 1906.

Old No. 3 shaft, 750' deep, has been idle for years.

New No. 3 shaft, 1,650' S. W. of No. 2, is bottomed at the 13th level. The 3d to 10th levels, inclusive, have been extended to No. 4 shaft at depth of 1,272' showing alternations of good and poor ground. The openings, as a whole, show rock carrying 12 to 15 lbs. fine copper per ton, allowing for judicious stoping and reasonable selection of ground broken. Underground work in 1915 consisted of stoping and cutting out, and 113' of drifting on the 6th level of No. 4 shaft.

Equipment at No. 3 shaft includes a steel shaft rock house, equipped with two 18"x24" crushers, pneumatic steel gates, and pneumatic trolley cranes.

No. 4 shaft, about 1,700' S. W. of No. 3 is down to the 15th level. The shaft is sunk in the footwall and was opened by sinking and raising simultaneously. Underground work has been confined to stoping for the past year. Connection is had with the King Philip workings on the 5th, 7th, 8th, 9th, 10th and 12th levels.

No. 4 shaft is equipped with a modern steel shaft rock house, having a cylindrical main bin of about 40' diam., built of heavy steel plate and a 24x36" Portage Lake-Farrell crusher.

The hoist at No. 4 shaft, about 1,700' from the central plant, and good for 1,500' depth, operates two 3-ton skips, working in counterbalance, at a speed of 1,200' per minute.

King Philip No. 1 shaft, about 1,400' S. of Winona No. 4 shaft, is 14x25' in size, sunk about 85' in the footwall, at an angle of 70°, and is temporarily bottomed at the 14th level. The lode shows a width of 20 to 25', and carries considerable epidote.

King Philip No. 2 shaft is 2,780' S. of No. 1, on the southern side of Sleeping river, and 3,400' from the southern boundary of the tract. This shaft, temporarily idle, also sunk in the footwall, is 1,108' deep, with cross-cuts on the 6th, 8th and 10th levels, to the Winona bed, which gives a fair showing, about the same as in No. 1, with which it has underground connection on the 8th level.

King Philip No. 1 has a shaft house completed in May, 1916, which allows a 35% increase in output. No. 2 shaft has an isolated steam hoisting plant.

The power plant equipment at No. 3 shaft includes an Allis-Chalmers 250-kw. 3-phase 60-cycle 2,300-volt cross-compound a. c. generator. The equipment at No. 4 shaft includes a motor-generator set which has a 450-h. p. 3-phase 60-cycle 2,080 volt variable speed induction motor, at 600 r. p. m., connected on either side by flexible couplings, to two 20-ton fly-wheels, 10' in diam. The motor-generator set has 2 bearings of 11x33", and 2 bearings of 9x27" with oil pumped through them at the rate of 16 gals. per minute.

automatically filtered and water-cooled, insuring perfect lubrication. A 150-kw. motor-generator operating the electric locomotives, transforms a 2,200-volt alternating current into a 500-volt direct current. There is a 25-drill Nordberg air compressor in the central power house, and steam is provided by three 270-h. p. water-tube boilers, operated at 175 lbs. initial steam pressure.

The King Philip boiler house has a battery of two 300-h. p. Parker tubular boilers. The 34x40' power house has a 50-drill Nordberg 3-stage air compressor.

Mine buildings include a carpenter shop, machine shop, smithy, warehouse, office building, 2 boarding houses and about 150 dwellings for employees. There also is a sawmill, with wing for boilers, and a wing containing a shingle mill, the plant having a daily capacity of 20,000' of sawed lumber.

The mill: built at a cost of about \$300,000, is located near No. 4 shaft, thus saving about 13 cts. per ton in transportation charges. The mill secures its water from the Sleeping river, across which a dam has been built, with a storage capacity of 150,000,000 gals. Careful hydrographic surveys for 3 years show that the watershed tributary to this river yields about 3,000,000 gals. per day, which is enough for the mill. The item of 13 cts. per ton transportation charges saved by the new mill may seem small, at first sight, but it actually means about 1 ct. per lb. on the cost of finished copper, and may mean the difference between success or failure, so closely are costs and income adjusted in a low-grade Lake Superior copper mine. The custom for many years past has been to put Lake Superior mills some miles away from the mines, on large bodies of water, but in the case of the Winona, the management has had to consider costs rather than the easier solution of its milling problem.

Rock, brought to the mill by electric locomotives, is crushed in 2 Allis-Chalmers stamps, 1 a simple head having a 24" cylinder, and 1 a steeple-compound head with 16" and 32" cylinders. Equipment includes 6 Hardinge conical tube-mills, 60 Wilfley tables and 12 settling tanks. Under the wash floor there are 6 large settling tanks for the wash water, which is reused after clarification. Tailings are carried by belt-conveyor for a distance of 321' from the mill, and delivered at a height of 123' above the ground, forming a great hill of waste at hand for retreatment at some future time. Slimes are delivered by a 1,200' steel launder to a ravine beyond the sand discharge. Company employs about 300 men.

Production: 1902, 101,188 lbs. copper; 1903, 1,036,944 lbs.; 1904, 646,024 lbs.; 1905, no production; 1906, 278,182 lbs.; 1907, 1,285,863 lbs.; 1908, 1909 and 1910, no production.

Recent production:

	Tons R'k. Stmpd.	Mineral Lbs.	Lbs. Copper		Ref. Copper Produced Lbs.
			per Ton Rock	Rec. per Ton R'k	
1915	102,594	3,032,045	29.55	16.79(a)	1,722,638
1914	123,339	2,239,170	18.15	10.96	1,352,085
1913	120,806	2,467,460	20.42	11.99	1,448,737
1912	181,148	3,586,520	19.79	12,738	2,307,237
1911	97,445	2,533,870	26.00	13.091	1,275,675

(a) Higher recovery due to closer selection of rock stamped. Copper was sold at 17.4 cts. per lb. in 1915.

In Aug., 1914, the mine was shut down on account of the low price of copper. In Oct. work was started by lessees, the rock being shipped to the Centennial-Allouez mill, until Jan. 1, 1915, and after this date to the Tri-

mountain mill, and continued until the Spring of 1915. In June, the company started work, sending the mine output to its own mill.

The Winona has made various separate campaigns of production; on several occasions the percentage of copper extracted ran down to unpayable figures, returns averaging 18.95 lbs. fine copper per ton of rock stamped in 1904, 14.34 lbs. in 1906, and 12.59 lbs. in 1907. The average yield in 1914 was only 10.96 lbs. fine copper per ton of rock stamped.

Winona's rock averages 20 lbs. of copper per ton, but the copper is light and flaky and the mill has never been able to make adequate recovery. A great deal of experimental work has been done in an attempt to solve the problem. The method finally determined upon, and being tried out at present, is the Slater ferric-chloride process. Results indicate that when it is made continuous instead of treating the ore in batches it will be the solution to the problem.

Development: underground is much better to the S. of the property than in the original workings to the N., and the mine has been extensively opened, with a large tonnage of rock available for stoping. Notwithstanding the unsatisfactory results secured thus far, the Winona is considered to have very fair chances of making a successful low-grade mine, with profits depending upon copper selling at 15 cts. or over. The management is efficient and resourceful.

WINONA GOLD-COPPER MINING & MILLING CO. WYOMING

Office: 111 Market Ave., S., Canton, Ohio. **Mine office:** Painter, Big Horn Co., Wyo. **Officers:** L. Cavnah, pres. and gen. mgr.; Geo. House, v. p.; Dr. J. H. East, 2nd v. p.; Wm. H. McAloney, sec.-treas., at last accounts. **Inc.** 1903, in Wyoming. **Cap.**, \$5,000,000; shares \$1 par; fully paid. Management was changed and company practically reorganized Dec. 12, 1905.

Property: 25 claims, unpatented, 440 acres, in the Sunlight basin, on Silver creek, in Bear Tooth and Sulphur mountains, in the N. W. corner of Big Horn county, about 12 miles E. of the Yellowstone National Park. Claims show granite, porphyry and andesitic breccia, carrying 6 fissure veins with shoots of low-grade copper ore. The ores carry chalcopyrite and chalcocite and are reported to average 7 to 8% copper with about \$3 gold per ton. The principal veins in andesite are known as the Bluff, Malachite and Greenhorn. The Bluff vein is said to be 25' wide with a 12' paystreak of copper ore. The Malachite vein, 10 to 25' wide, has a paystreak of high-grade copper ore, 1½' wide at surface, increasing to 5' at depth.

Development: by 2 tunnels, the lower or main working tunnel, 804' long. Total workings, 1,032'. **Equipment:** includes steam and electric power plant and 10 buildings.

WISCONSIN MINING CO.

IDAHO

Kellogg, Shoshone Co., Idaho. **Officers:** Louis Bolduc, pres.-treas.; P. Mason, v. p.; J. S. Ross, sec. **Directors:** Louis Bolduc, P. Mason, J. Bolduc, F. Jones and J. W. Thompson.

Inc. 1912. **Cap.**, \$1,500,000; shares \$1 par. Company is practically the successor of the Gold Leaf Consolidated Mines and the Coeur d'Alene Consolidated Mining Co., the shares of the old companies being made transferable share for share in the new company, upon payment of back assessments.

Property: 4 claims, unpatented, 2½ miles east of Kellogg, has 800' of tunnels and crosscuts and one 90' vertical shaft, developing a vein of 5 to 6' width, carrying copper ore and a little lead. **Equipment:** includes a 2-drill compressor, run by water power from Moon creek, and a hoist. Development work only was done in 1915.

WISCONSIN MONTANA MINING CO.**MONTANA**

Office: Downing, Wis. **Mine office:** Superior, Missoula Co., Mont.
Officers: A. O. Nichols, pres.-gen. mgr.; D. McDonald, v. p.; C. C. Coolidge, sec.; Dr. P. A. Beebe, treas. and R. A. Cleveland, directors.

Inc. Jan. 29, 1906, in Wisconsin. Cap., \$50,000; shares 5 cts. par.
 Annual meeting 1st Tuesday in February.

Property: 16 claims, 320 acres and a 5-acre mill site in T. 15 N., R. 25 W., 1 mile from the Missoula river and about 10 miles east of Superior. Claims show fissure veins cutting through limestone, slate and quartz; one reported as 70' wide, with a 7' paystreak carrying azurite and chalcopyrite ore giving assays of 2 to 3% copper, with gold-silver-lead values.

Development: by tunnels of 40', 400' and 710' length, with about 100' of other laterals. Idle.

WISCONSIN ZINC CO.**WISCONSIN**

A subsidiary of the American Zinc, Lead & Smelting Co., which see.
Address: H. C. George, gen. mgr., Galena, Wis. Owns the East End, Winkskill, Champion, Longhorn, Thompson, Federal and Birkbeck mines, in the Benton, Wis., district. Also has roasting plants at Galena and New Diggings. The latter plant contains 7 Skinner hearth furnaces, 20' diam., preparing ore for magnetic separation of marcasite from zincblende. Crude ore averages 2.8% zinc.

WOLF MOUNTAIN COPPER CO.**UTAH**

S. A. Holmes, sec., P. O. Box, 315, Salt Lake City, Utah. Assessments May, 1914, 5 mills, March, 1915, 1½ mills.

WOLF TONGUE MINING & MILLING CO.**COLORADO**

Controlled by Firth Sterling Steel Co., Pittsburgh, Pa. **Address:** Nederland, Boulder Co., Colorado. Wm. Todd, supt.

Property: 593 acres, including the Cold Spring and other mines in the 75-acre Beaver group a mile south of Nederland, and the Clyde mine of the Ranch group, 3 miles NE.

The **Clyde** mine, the principal producer, has a vein 2'-6' wide with an 80° dip. **Development:** includes a 305' incline shaft, a 560' tunnel connecting with 230' level of shaft. Mine is reported to have produced more ore above 80' level than any other tungsten property known, but ore pinched out. A 2' vein of high grade was found, Feb., 1916, in winze below 230' level.

Ore: the principal ore mineral is ferberite, iron tungstate, occurring in veins in granite or pegmatite. Orebodies are commonly in the form of small lenses a few feet in length. On the 300' level, there is ore for 100'. The greater part of the mining is done by lessees who are paid for shaft sinking and ship their ore to the company's mill; the company receives as royalty 25% of the net proceeds, after deducting treatment charges.

The mill on South Boulder Creek at Nederland treats 15 to 20 tons of 3½ to 4% ore daily. It is described in detail by Leroy A. Palmer in Salt Lake Mng. Review, Feb. 15, 1914, p. 14. Recoveries in the district range from 65 to 85%.

Equipment: includes compressor and power plant. For full description of Colorado tungsten ores see Bull. 583 of U. S. Geol. Survey by Hess & Schaller, 1914.

The **Cold Spring** mine, leased 1916 to Geo. Retallack et al., has a vein showing 6' face of ore with 18" streak of ore containing 57% tungstic acid, in a shoot 150' long on the 350' level. **Production:** July, 1916, averaged 25 tons of rich ore daily.

WOLFSTONE EXTENSION MINING CO.**NEVADA**

Address: V. J. Bonaby, sec., 110 Sutter St., San Francisco, Calif. Cash on hand and received 1914, \$4,058; expenses for 1914, \$541; dividends paid

1914, \$2,820. Balance Jan. 1, 1915, \$695. Property in Manhattan district, Nye Co., Nev., is under lease.

WOLFTONE MINE**COLORADO**

Is working shaft of Western Mng. Co., Leadville, Colo., owned by A. S. & R. Co. Was being unwatered jointly with Empire Zinc Co., July, 1916.

WOLVERINE & ARIZONA MINING CO.**ARIZONA**

Office: Calumet, Mich. Marc Bailey, mine supt. Bisbee, Ariz. **Officers:** John Daniell, pres.; Paul P. Roehm, v. p.; Edw. Ulseth, 2nd v. p.; W. Frank James, treas.; Chas. Chynoweth, sec.; preceding with Benj. F. Chynoweth, W. H. Brophy, Fred C. Smith, W. H. Roberts, Jr., supt., directors.

Inc. 1905 in Arizona, as successor of Wolverine & Arizona Development Co. **Cap.**, \$3,000,000; shares \$15 par; issued 118,674 shares, par value \$1,457,340, subject to assessment and 21,792 shares, par value \$326,880, of full-paid stock. Levied 25-cent assessments March 19, 1906; Sept. 17, 1906; June 17, 1907; Nov. 18, 1907. Annual meeting, second Wednesday in November.

Receipts for fiscal year ending Sept. 30, 1915 totaled \$135,215, with total disbursements of \$60,552. Cash on hand \$155,974.

Dividends: 10 cts. per share, in Dec., 1914; 25 cts. per share, in Dec., 1915.

Property: 9 claims, 152 acres, known as the Cairo, Memphis, Kentucky, Georgia, Louisiana, Chicago, Warren, George and Broken Promise. The Georgia claim lies 600' from lands of the Calumet & Arizona, and is about 3,000' from the Irish Mag shaft of that company, and from the Spray and Holbrook shafts of the Copper Queen. The Uncle Sam and White Tail Deer claims of the Copper Queen are adjacent to the Wolverine & Arizona.

Development: claims lie along the high limestone ridge W. of Bisbee, extending westward to the open valley and the first development was begun on the farthestmost side of the group. The Broken Promise shaft, 700' deep, with 3 compartments, cut mineralized limestone showing considerable iron but no ore in commercial quantity. A drift on the 500' level, running 850' toward the Pittsburg & Duluth group (Cal. & Ariz.) cut leached ore and ledge matter, carrying traces of copper. Drifts running in other directions showed leached ore, but not in encouraging quantities, and work in this area was suspended, 1909.

Exploratory work on the western claims proving disappointing, the easternmost claims were prospected in 1906 by diamond drill and a hole 410' deep passed into 50' of 4 to 10% oxidized copper ore near the Shattuck mine. This orebody being inaccessible from the Broken Promise shaft, the use of the Higgins tunnel was acquired and the ore opened up from the Bisbee side of the mountain. The tunnel was extended 310' to the Wolverine boundary and then southerly to intersect the orebody on the Wolverine ground. Orebody proved to be a replacement deposit of rich oxidized ore, lying within the limits of the Warren claim, about 2,700' from the tunnel portal. After working out the oxidized ore down to the Shattuck boundary, exploration upward was begun and a fine body of sulphide ore was developed in the footwall limestone above the oxidized zone.

The mine has been a small but steady shipper of high-grade ore to the Douglas smelter, this ore paying all working expenses and building up a small surplus. It formerly averaged about 10% copper, but the sulphide ore is of lower grade. The mine has about 3,000' of workings and its orebodies connect downward with great stopes in the Shattuck mine, the deposit being the top of one of the pre-shoots of that property. The mine

is connected underground with the Uncle Sam mine of the Copper Queen Co. as well as with the workings of the Shattuck mine.

Equipment: includes a 250-h. p. steam plant, 2 single-drum hoists and a 6-drill air compressor, all at the Broken Promise shaft and all unused for several years.

Production: 2,524 tons, netting \$37,962 in 1910; 984 tons, netting \$11,873 in 1911; 762 tons netting \$12,861 in 1912. The output for fiscal year ending Sept. 30, 1915, yielded \$130,370 or \$17.13 per ton. The property is excellently handled.

WOLVERINE COPPER CO.

NEVADA

Address: E. S. Deardorf, mgr., Winnemucca, Nev. **Property:** 15 claims, 300 acres in Harmony or Sonoma Mts., 5 miles S. E. of Winnemucca, shows 5 veins, carrying copper ore with silver and gold values.

Development: merely a 65' shaft showing gold ore in the bottom. Work on a new shaft is reported to have begun, June, 1916. **Equipment:** includes gasoline hoist.

WOLVERINE COPPER MINING CO.

MICHIGAN

Office: 15 William St., New York. **Mine office:** Kearsarge, Houghton Co., Mich. **Officers:** John R. Stanton, pres.; Geo. W. Drucker, sec.; preceding with Jas. S. Dunstan and Samuel L. Smith, directors. Theo. Dengler, supt.; F. W. Hartmann, asst. supt.; Chas. L. Noetzel, clerk; David L. Vivian, mill supt.; Arthur Williams, mine capt.; A. Floetter, engr.; A. B. Holtenhoff, master mechanic.

Inc. 1890 in Michigan. **Cap.,** \$1,500,000; shares \$25 par. The company owns \$80,000 stock in the Michigan Smelting Co. Old Colony Trust Co. Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Monday in August.

Financial statement for fiscal year ending June 30:

	Receipts	Tot. Exp.	Profit	Div.	Tot. Sur.
1916	\$1,369,286	\$634,068	\$735,218	\$660,000	\$862,529
1915	929,193	610,991	318,201	360,000	787,311
1914	484,061	402,936	81,075	.....	829,109
1913	1,326,501	724,987	601,514	600,000	748,034
1912	1,327,030	713,840	613,180	540,000	746,520

Dividends: the first dividend was paid Oct. 1, 1898 and 33 dividend disbursements, to 1916, aggregated \$8,400,000.

Property: 320 acres, 280 acres freehold, and 40 acres mineral rights, carries 3,100' of the strike of the Kearsarge amygdaloidal bed, on which the mine is opened. Neighboring properties are the North Kearsarge on the N., Mayflower on the E., Mayflower and South Kearsarge on the S., and Centennial on the W.

The Kearsarge bed averages about 16' in width on the Wolverine property, and this mine was for many years the richest amygdaloidal mine in the Lake Superior district, second in richness only to the Calumet & Hecla among all Lake Superior copper mines. All shafts are sunk at an angle of 41°, and skip tracks have been given crossties, in place of longitudinal stringers, following the plan introduced in the Calumet & Hecla, which permits the use of a cheaper grade of timber and allows quicker repairs. All levels, except some of the very upper ones, are opened at 100' intervals. Owing to the uniformity of the cupriferous bed, all levels from the 1st to the 23d, inclusive, are opened through the entire property, connecting all 4 shafts to the bottoms of Nos. 1 and 2 and connecting Nos. 3 and 4 only below the 17th level. With production at the rate of 6,500,000 lbs. fine copper yearly, the life of the mine is estimated at about 12 years. The new lease on life is due to the reworking of the footwall rock of supposedly

worked out stopes, throughout the mine. The total width of the lode is 15' to 20'; in the original work only 12' was mined, so there remains 3' to 5' of rock which contains about 18 lbs. copper per ton.

Development: several parallel lodes have been prospected, an exploratory crosscut being driven for 2,000' across the formation on the 14th level, reaching the Kearsarge conglomerate on the W., where it was barren. Another exploratory crosscut, 1,600' long, driven E. on the 28th level, intersects the Old Colony lode 1,489' E. of the Kearsarge amygdaloid and cuts other cupriferous beds. A little drifting on the Old Colony lode failed to disclose payable ground. The West lode lying 80' W. of the Kearsarge has been opened by several levels, with some payable ore on the 13th and 14th.

The Wolverine lands also carry the Osceola amygdaloid, but it proved non-commercial in a 631' shaft with drifts on 5 levels.

No. 1 shaft near the Kearsarge line, was abandoned years ago. No. 2 shaft, next S., is bottomed at 1,700' and is used for handling men and supplies.

No. 3 shaft sunk in the footwall, is bottomed at the 39th level, total depth 4,005'. Sinking was stopped at the 39th level as the hoist had reached the limit of its rope capacity. It is proposed to open and mine the remaining 100' below the 39th level by means of a winze 600' S. of the shaft. This inclined winze will eventually attain a depth of 700' in order to reach the boundary of the property. It will take 5 years to reach this point and 15 years to exhaust the ground.

Shafts Nos. 3 and 4 are connected by drifts down to and including the 33rd level. No. 4 shaft sunk 45' in the foot, to guard against drawing, has reached the 38th level, total depth 4,007' and can be sunk to the 42nd level before reaching the Centennial boundary.

Equipment: at No. 3 shaft duplicates that of the Mohawk mines. That at No. 4 includes a 14"x60" Nordberg duplex-cylinder hoist with double conical drum having a maximum diam. of 18', capable of raising 4-ton skips from 1 mile depth, with a 1¼" steel cable. There are 20-drill and 22-drill compressors, and 3 Stirling water-tube boilers, with American automatic stokers and a Green fuel economizer.

Mine has Knowles electric pumps, 3 at No. 2 shaft, and one at shafts Nos. 3 and 4, three pumps having an average lift of more than 1,000' each.

The principal mine buildings are at No. 4 shaft, but there is a model changing house at No. 3 shaft. A telephone system connects underground pump stations and all buildings. The company maintains a 6-ward hospital and staff, and owns a large number of substantial dwellings, the location being exceptionally prosperous in appearance.

Rock is transported between the mine and mill by the Mohawk & Traverse Bay railroad, with a down-grade haul of 13 miles.

Mill is near the mouth of Tobacco river, on Traverse bay, Lake Superior, and adjoins the Mohawk mill, both being served by a single pump and managed by a joint superintendent. The mill has 2 Nordberg heads and uses Wilfley tables. Mineral from the heads and wash is sluiced to the basement through iron pipes, going to the works of the Michigan Smelting Co. at Houghton. A Jackson tailings plant provides for settling out the water and stacking the tailings 800' from the mill by belt conveyor.

The boiler house houses a battery of 200-h. p. Stirling water-tube boilers, equipped with American automatic stokers.

The pump house, owned jointly by the Wolverine and Mohawk, has a 20,000,000-gal. Snow horizontal triple-expansion pump, with 18", 33" and 54" steam cylinders and 22" water plungers, with 36" stroke, besides an auxiliary

8,000,000-gal. Nordberg triple expansion water-end pump, with 3 plungers. The pump house is located on the river, near its mouth, the intake being protected by timber cribs running 300' into the lake to prevent clogging from floating bark and anchor ice.

Average number of men employed at mine and mill is 370.

Recent Production: (fiscal year ending June 30).

	Tons R'k		Tons R'k		Lbs. Cu.		Mineral	Ref. Cu.		Cost per Lb. (b)
	Hoisted	Cost p. Ton	Stamp'd	Cost p. Ton	p. Ton	Lbs.		Lbs.	per Lb. (a)	
1916	301,898	\$1.31	388,898	\$1.89	17.07	9,127,790	6,541,402	8.43	c	
1915	403,219	1.28	397,014	1.80	18.23	9,734,850	7,250,896	8.43		
1914	188,147 (a)	1.85	182,127	1.92	18.86	4,006,015	3,435,459	11.72		
1913	408,514	1.53	388,502	1.62	21.49	10,782,405	8,350,312	8.965		
1912	414,544	1.53	401,908	1.58	23.45	12,164,790	9,408,990	7.586		
1911	400,296	1.59	388,476	1.64	24.75	12,227,500	9,617,168	7.542		
1910	405,790	1.55	390,837	1.61	24.96	12,359,000	9,757,101	7.413		

(a) Mine was closed from July, 1913, to April, 1914, on account of the Western Federation of Miners strike. (b) Cost per pound includes construction.

Production and yield of refined copper per ton of rock for the first 7 months of 1916:

	Output, lbs.	Lbs. p. T. rock
January	460,967	16.52
February	516,607	18.07
March	577,684	18.00
April	588,032	17.91
May	495,437	15.82
June	493,378	15.74
July	545,156	18.62

With a 12-year life, as estimated by the directors, and an annual yield of 6,500,000 lbs. of copper figured at a total of 78,000,000 lbs., the profit with 15c copper and 9.4c cost would be 4,368,000, equivalent to \$72 per share, or \$6 per year.

Company's surplus June 30, 1916, was \$862,529, equivalent to \$14.36 a share.

WOLVERINE MINING & DEVELOPMENT CO. BRITISH COL.

Succeeds Kootenay Dev. Co. Ainsworth, B. C. Jere Madden, pres., Rapid River, Mich. J. Cleveland Haas, managing director, and J. F. Carey of Spokane, Wash., director.

Property: the Nicollet group of 14 claims on Kootenay lake, north of Ainsworth and adjoining the Highland and Florence mines (Florence Mng. Co.). Veins in metamorphic rocks are said to carry rich silver-lead ores. A new tunnel will be driven in 1916-17.

WONDERFUL MINING CO., LTD.

IDAHO

Office: Otterson Blk., Wallace, Idaho. Mine near Mullan, Shoshone Co. Idaho. A. H. Featherstone, sec.-treas. Stock is assessable; 9 assessments called to end of 1915, last one of 1 mill levied July 18, 1916, payable Aug. 30.

Lands: 4 claims, patented, lying next W. of the Bullion mine, on the eastern slope of Stevens peak, have a 1,200' crosscut tunnel developing a vein said to give a fair showing of galena and copper ore.

WOODBURY COPPER CO.

ARIZONA

H. G. Murphy, Phoenix, Ariz., agt. Reported in July, 1916, that H. Cavanaugh and associates of Seattle, Wash., had purchased the property for \$200,000 and that work would be begun on the claims in August.

WOODLAWN COPPER MINING CO.

UTAH

Office: 305 Atlas Blk., Salt Lake City, Utah. Mine near Brighton, Salt Lake Co., Utah. **Officers:** H. W. Lawrence, pres.; A. C. Ellis, Jr., v. p.; George N. Lawrence, sec.-treas. Inc. 1899, in Utah. **Cap.,** \$70,000; shares 10 cts par, assessable.

Lands: 7 claims, patented in the Big Cottonwood district, 18 miles from a railroad, having 3 tunnels of 360', 980' and 100', with about 3,500' of workings, showing lead, zinc, silver and copper ore, whose value is mainly in lead.

Development: work was resumed in 1915, after an idleness of several years, the main tunnel being driven 500' further. Estimated in May, 1916, to have 2 carloads of shipping grade zinc ore in the stockpile.

WORLD'S FAIR MINE.

ARIZONA
Patagonia, Santa Cruz Co., Ariz. **Property:** 13 claims, near Harshaw, S. of Patagonia, in the eastern end of the Salero mountains, has a 600' main shaft, with about 2 miles of workings, developing an 8' orebody, carrying silver-lead ore.

The mine has been a shipper, since about 1893, of high-grade silver ore, and is popularly reputed to have produced about \$500,000 worth of ore. Property was under option to a syndicate of stockholders in the Commonwealth M. & M. Co., but option was relinquished, April, 1915.

WYANDOT COPPER CO.

MICHIGAN
Office: 68 Devonshire St., Boston, Mass. **Operating office:** Houghton, Mich. **Mine office:** Winona, Houghton Co., Mich. **Directors:** Ashley Watson, pres.; Jos. Dorr, v. p.; Chas. E. Adams, sec.-treas. and Frank L. Van Orden, mgr. Louis La Rochelle, mg. capt.

Inc. Feb. 3, 1899, in Michigan. **Cap.,** \$2,500,000; shares \$25 par; paid in \$11. Has levied assessments of \$500,000 since organization. Shares are listed on the Boston Stock Exchange. State Street Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Annual meeting, second Monday in May.

Company ended fiscal year March 31, 1916, with cash assets of \$23,733; due from unpaid assessments, \$80,819.

Property: 1,065 acres, adjoins the Winona, in Secs. 16, 20 and 21, T. 52 N., R. 36 W. Exploratory work, begun Feb., 1899, was done in search of the Winona bed; later to locate the southern extension of the Baltic amygdaloid, after which attention was turned again to the Winona bed, and latterly to development of an amygdaloidal bed, the No. 8 lode, lying about 2,300' E. of the Winona lode. The average strike of the Keweenawan formation on this land is N. 53° E., with an average dip of 65°, and the Wyandot lands carry the strike of the Keweenawan bedded series for about 1½ miles.

Development: by several shafts. No. 1, 1,000' deep, located in the S. E. ¼ of Sec. 21, T. 52 N., R. 36 W., is sunk in the footwall of the Winona bed.

No. 11 exploratory shaft is sunk 710' on a stratum paralleling the Winona bed, at a distance of 1,200'. This bed looked good when first opened, and diamond-drill cores were rich, but the bed proved poor under development. A crosscut driven S. E. from the bottom of No. 11 shaft for 2,640', intersects 13 distinct amygdaloidal beds, Nos. 3 and 8 showing copper. Drifting done on No. 3 bed disclosed considerable mass and barrel copper, but No. 8 is the more promising.

Miscellaneous work of the past includes a 102' vertical shaft, sunk on a lean amygdaloidal bed known as the Misery river bed, in Sec. 16, T. 52 N., R. 36 W., but nothing of value was developed. Some years ago a vertical shaft was sunk on lands held under option, near the W. quarter post of Sec. 28, T. 52 N., R. 36 W., to depth of 250', and crosscuts driven both E. and W. with about one-half mile of workings. This work crossed the horizon of the Baltic bed, but what was deemed the Baltic amygdaloid was found highly altered, and worthless, as was the whole country in the neighborhood.

Extensive diamond drilling has been done on the property and a core, taken 1904, from the horizon of the Lake bed, showed a little copper, but

was not considered important at that time. The ground has been carefully prospected again by diamond drill, in Secs. 16 and 21. Holes Nos. 21 and 22 showed beds offering encouragement, and some trenching was done on 1 bed, 48' wide, carrying a little copper from foot to hanging. Another trench, 1,500' N. E. disclosed the bed under only 16' of overburden, and a shaft known as the Sec. 16 shaft, was sunk to a depth of 65'. A crosscut at this depth shows the bed to be 38' wide, carrying finely-disseminated copper for about 10', with small masses along the footwall.

Recent activity has been centered in development work in the No. 8 lode, 1,100' S. E. of the No. 11 shaft. This lode is opened by the long crosscut on the 700' level, and below this depth by a 115' winze, with about 800' of drifts on the 815' level, 400' of drifts on the 900' level and drifts have been started on the 1,000' level, the bottom of the winze. The showing on these levels has been varied and sufficient work has not been done to fully demonstrate the value of the lode.

Equipment: includes a steam plant with Lidgerwood hoist, good for 1,000' and compressors of 12 drills aggregate capacity.

Work at present is confined to drift-stopping, preparatory to regular stoping, both N. and S. of the winze on the 800' level. Gratifying results have been obtained and if present developments are indicative of the general mineralization of the lode, the future of the property looks good. About 25 men are employed.

The Wyandot company has worked faithfully and with skill for more than a decade to make a profitable mine, and though not yet successful, has not exhausted the possibilities of its holdings.

WYOMING COPPER & GOLD MINING CO.

WYOMING

Office: Alma, Kan. No representative at former mine office, Encampment, Carbon Co., Wyo. C. B. Henderson, pres.; Al Rohr, v. p.; J. R. Henderson, sec.-treas. **Inc.** Sept. 3, 1903, in Arizona. **Cap.**, \$1,500,000; shares \$1 par; nonassessable.

Property: 9 claims, known as the Metal Chief and Jessie group, in Hog Park, in the upper Platte district, 12 miles from a railway. Claims show granite and gneiss, cut by 2 fissure veins with S.-E. strike, reported by management to average 28 to 35' in width, and to carry copper oxide and carbonate ores, with average assay of 3 to 15% copper, a little silver and \$1.63 to \$3.29 gold per ton. The Metal Chief vein has a 105' shaft and the vein is reported to widen at depth. The Jessie vein has a 175' shaft showing ore of 5 to 10% copper tenor with small gold and silver values.

Equipment: includes a small steam plant with a hoist and 3 buildings. Development has been slow for some years past, as the officers have furnished most of the funds, but a little work has been done annually.

WYOMING COPPER MINING CO.

WYOMING

Office: 303 Detroit Free Press Bldg., Detroit, Mich. **Mine office:** South Pass City, Fremont Co., Wyo. **Officers:** Charles K. Skinner, pres.; C. F. Remington, treas.; Jas. MacFarlane, v. p. and supt.; C. A. Spalding, sec.; preceding with Chas. E. Murphy and Chas. D. Ridgway, directors.

Inc. 1905, in Wyoming. **Cap.**, \$2,000,000; shares \$1 par; nonassessable; issued \$1,375,000. Annual meeting, last Saturday in July.

Property: 12 quartz claims, 240 acres, and a 30-acre placer claim, in the South Pass district of the Wind River mountains, is reported to show a contact zone, between granite and metamorphic rock, proven for one-half mile length by prospect pits. **Development:** includes a 500' incline shaft, and several hundred feet of crosscutting. The vein is reported by the former management to show sulphide ore at depth of 72', ore giving assays of 2 to

6% copper, with an average of 1 to 2 oz., and maximum of 20 oz. silver, and \$3 to \$4 gold per ton.

Equipment includes an 80-h. p. boiler and a 40-h. p. Fairbanks-Morse hoist, with several buildings.

YAEGER CANYON COPPER CO.

ARIZONA

Dead. Described Vol. XI, Copper Handbook. Formerly at Jerome, Ariz.

YAK MINING, MILLING & TUNNEL CO.

COLORADO

Office: Marbridge Bldg., W. 34th St., New York. Mine office: Leadville, Colo. Officers: Myron T. Herrick, pres.; Harry C. James, v. p.; Walter W. Davis, v. p. and genl. mgr., Leadville and New York; J. C. Mitchell, sec-treas., Denver Natl. Bank, Denver. Hugh C. Watson, supt.

Cap., \$1,000,000; shares \$1 par; all outstanding and assessable.

Comparative General Balance Sheet:

	Assets:				Liabilities:	
	Tunnel & Prop.	Equip.	Other Current	Total	Capital Stock	Undiv. Profits
1915	\$ 977,543	\$66,386	\$724,383	\$1,768,312	\$1,000,000	\$768,312
1914(a)...	1,087,013	81,139	181,678	1,626,401	1,000,000	530,070
1913	1,000,611	85,582	93,889	1,439,787	1,000,000	410,765

(a) Last issued.

Comparative Income Account:

	Mng. Co. Acct.	Total Net	Div.
1915	\$268,264	\$398,242	\$160,000
1914	217,949	306,545(a)	110,000
1913	154,928	210,985	80,000
1912	69,247	120,216	80,000

(a) Except certain charges in profit and loss account.

Dividends: quarterly, commenced March 31, 1904, have been continuous. Total \$1,877,685 to July 1, 1916, including a stock dividend of 12½% declared Oct. 31, 1904. Present rate 3%.

Property: owns 249 acres and controls an additional area of 1,817 acres at Leadville. Also holds agreements covering several hundred additional acres, under which agreements company has the right to drive the Yak tunnel into such ground at its option.

The Yak Tunnel is a 4-mile transportation and drainage tunnel which drains an important part of the Leadville camp, including the White Cap and Cord properties on Iron Hill. The portal of the tunnel is in California Gulch, about 1 mile from Leadville; the breast, Jan., 1916, was in the Vega group, 1,200' from surface. The ores developed by the tunnel are chiefly complex sulphides containing gold, silver, lead and zinc. For geology of the Leadville District see U. S. G. S. Bull. 320, by S. F. Emmons and J. D. Irving.

Company employs 140 men; has electric power and haulage.

The company is one of the largest in the district, is in experienced hands and is well managed.

YALE DEVELOPMENT & CONSTRUCTION CO.

BRITISH COLUMBIA

Has 25-year lease on property of Olalla Copper Mines & Smelting Co., which see.

YAMPA SMELTING CO.

UTAH

Dead. Smelter equipment sold in 1914. Fully described Vol. XI, Copper Handbook.

YANKEE BOY MINING CO.**IDAHO**

Scott Anderson, pres.-mgr., Wallace, Idaho. Property leased, in part, to Big Creek Leasing Co., which see. The Yankee Boy mine is in the Big Creek section, near Kellogg, Shoshone Co., Idaho.

Development: includes an 1,800' tunnel and a 500' raise. A 4' vein cut in 1916 is said to average 200 oz. silver per ton with copper-lead values. Samples said to have assayed 123 oz. silver; 8.4% lead; 14% iron; 0.8% copper. **Equipment:** includes gasoline engine, compressor, etc.

Production: in 1913 was 271 tons with gross value of \$35,461 and 381 tons in 1914 returning \$38,646. Net profit for 1914 was \$4,557.

YANKEE CONSOLIDATED MINING CO.**UTAH**

Office: 308 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab Co. **Officers:** A. W. Vosburg, pres.; G. L. Bemis, v. p.; A. E. Canfield, sec.-gen. mgr. Lew Merriman, supt.

Inc. July 8, 1898, in Utah. **Cap.**, \$1,000,000, increased in 1908 from \$500,000; shares \$1 par; assessable all issued; listed in Salt Lake City. Has paid dividends of \$192,500; last dividend paid in Feb., 1913, 1c per share.

Property: 134 acres on Godiva Hill, Tintic district, includes the Yankee, Mountainview and Lakeview mines, lying between the Beck Tunnel and Uncle Sam Consolidated on the south and May Day on the north. **Ore:** silver-lead-zinc with some gold. Country rock is limestone and porphyry. For geology of Tintic District see U. S. G. S. Folio No. 65.

Development: by tunnels and shafts, deepest 1,700'. Late development is along a strong fissure vein thought to be the May Day and showing high-grade silver ore. A drift is also being run on a quartz ledge from the bottom of a 100' winze. Lessees are working part of the property.

Company has not replied to requests for information.

YAQUI CANYON COPPER CO.**MEXICO**

Idle. **Former offices:** 408 Gumbel Bldg., Kansas City, Mo., and Suaqui de Batuc, Ures, Sonora, Mex. **Officers:** at last accounts, A. J. Davies, pres.; S. M. Major, v. p.; W. T. Kerr, sec.; Frank B. Foster, treas. **Inc.** in Ariz. **Cap.**, \$2,000,000; shares \$1 par.

Property: 60 pertenencias, 148 acres, known as the Todos Santos and Great Republic mines, and a 50-acre smelter site, has contact deposits between limestone and porphyry, two under development, of 10' estimated average width, carry copper and lead ores, former said to assay 7% copper and 50 oz. silver, and latter 15% lead and 30 oz. silver, with a trace of gold. The principal property is an antigua. **Development:** by 4 tunnels and 7 or 8 shafts.

Equipment: includes a steam plant, air compressor and a small smelter, with a 10-ton reverberatory furnace. Presumably idle as the region in which the mine is located is notoriously unsafe since the Mexican revolution began.

YAQUI COPPER CO.**MEXICO**

Office: 1 Madison Ave., New York. **Mine office:** Suaqui de Batuc, Ures, Sonora, Mex. **Officers:** Wm. Sauntry, pres.; Dr. A. E. Magoris, v. p.; Hon. Geo. E. Green, sec.-treas., at last accounts. **Inc.**, 1902, in West Virginia. **Cap.**, \$5,000,000; shares \$1 par.

Property: originally claimed to be 6,032 acres of mineral territory, and 119,284 acres of timber and grazing lands, also water rights to 25 miles of the Yaqui river, the mining lands being in the vicinity of Suaqui de Batuc Campo Santo Nino, in the Sierra Madre, 120 miles from Hermosillo. Property is claimed to show antigua workings, iron ore and indications of coal. In June, 1906, the Montana de Cobre Co. was said to have acquired 1,000 pertenencias formerly held by the Yaqui Copper Co.

Development: begun, 1901, is by 2 shafts and 8 tunnels, and so far as can

be learned the mine has shown practically no ore. Improvements include an engine and boiler house, office building and store.

The company was promoted with \$10,000 offices, magnificently furnished, in which visitors were royally entertained and given handsome ore samples. Company's literature was untruthful, its representations gross exaggerations, and its property practically valueless. It caused as much misery and harm as any mining fraud ever perpetrated. See Vol. VIII of Copper Handbook for full description.

YAQUI MINING CO., S. A.

MEXICO

Fundicion, Sonora, Mex. Geo. M. Ryall, pres., care Jonathan Club, Los Angeles, Calif. Inc. in Mexico. Owned by Mexican Exploration & Mining Co., controlled by Pacific Smelting & Mining Co. Property is described under latter title.

YAQUI SMELTING & REFINING CO., S. A.

MEXICO

San Antonio de la Huerta, Ures, Sonora, Mex. Is the Mexican operating company of the Sonora Mining & Development Co., and described under latter title. Fully described Vol. VIII of the Copper Handbook.

YAVAPAI CONS. GOLD-SILVER-COPPER CO.

ARIZONA

Office: Prescott, Ariz. Mine office: Crown King, Yavapai Co., Ariz. Hon. Frank M. Murphy, pres.

Lands: 48 claims, partly patented, including the Old Reliable mine, 3 miles from Crown King; the Wild Flower group, in Pine Grove district; the Tiger group, in the Bradshaw mountains, and the Crowned King mine, in the Bradshaw mountains. The last named group, 18 claims, bought from B. A. Turner, receiver of the old corporation, for \$75,000, half in cash and half in shares, has been a considerable producer, mainly of gold.

Development: by several thousand feet of old workings on a contact vein, between porphyry and syenite, carrying slightly auriferous and highly argentiferous copper ores, opened by a 170' shaft. **Equipment:** includes steam power, compressor, 10-stamp mill and 100-ton concentrator. About 20,000 tons of old tailings were sold in 1915 and are being treated in a flotation plant. Mine is idle.

YAVAPAI METALS MINING & REDUCTION CO.

ARIZONA

Dead. Property: now owned by A. W. Bichols of Humboldt, Ariz., consisted of 14 claims, 266 acres, unpatented, in the Agua Fria district, about 7 miles N. E. of Humboldt. See Vol. XI, Copper Handbook.

YELLOW ASTOR MINING & MILLING CO.

CALIFORNIA

Office: Coulter Bldg., Los Angeles. Mine office: Randsburg, Calif. **Officers:** A. Ancker, pres.; E. D. Mooers, v. p.; W. J. Cotton, 2nd v. p. and mgr.; R. L. Burcham, sec.; the foregoing and E. L. Kenney, R. A. Dalluca, C. G. A. M. de Pauw, directors. C. H. Fry, supt.; A. Little, mill supt.

Inc. Nov. 16, 1907, in Nev. **Cap.**, 100,000 shares; \$10 par; all issued. R. L. Burcham, Los Angeles, transfer agt. Annual meeting, May 16. Is a close corporation.

Dividends: declared third Wednesday and paid the 10th of following month. Total dividends paid to June 1, 1915, \$1,163,789.

Assets: Dec. 31, 1915; property account, \$1,115,143; securities owned, \$30,000; other investments, \$680,485; inventories, \$6,772; accounts receivable, \$17,000; cash, \$38,287, total, \$1,887,687. **Liabilities:** capital stock, \$1,000,000. Gross earnings, \$473,277, working expenses, \$395,477, net earnings, \$77,800; other income, \$10,000, total net income, \$87,800. Deductions, \$58,194. Surplus for year ending Dec. 31, 1915, \$29,606.

Property: 40 patented claims, over 600 acres at Randsburg, Rand district, Kern county. Vein occurs in granite, porphyry and schist. Main orebody averages 30' to 40' wide with schist hanging-wall. Ore is low-

grade, free milling gold. Reserves assay \$3 per ton and mill extraction is 98%. Smaller veins are said to contain rich ore.

Development: includes main shaft, 750' deep, 12 miles of tunnels, 15 miles of stopes, raises and winzes and several opencuts. Most of the work is by the glory-hole method on a large scale, electric power being used for lighting and haulage. **Ore reserves:** are said to be about 5,000,000 tons. Mining and milling costs total \$1.55 per ton.

Mill: equipment includes 100 stamps, amalgamating plates and cyanide department, all driven by electric power from the lines of the Sierra Power Co. Mill operates in 3 shifts and reduces about 500 tons daily, tailings being stacked.

YELLOW BIRD GOLD MINING CO.

COLORADO

Address: J. J. Yeckel, pres. and gen. mgr., Cripple Creek, Colo. **Cap.** 1,500,000 shares; 10c par; non-assessable. A new company promoted to revive and develop a group of claims, about 40 acres, on Gold Hill, Cripple Creek, Teller Co., Colo., including the Yellow Bird, Red Bird, Cottontail, Volcano, Mound Rock and Red Jacket. These properties have been inactive for years except for a little work by lessees. Initial offer of stock was made at 2½c a share.

YELLOW BOY MINE

MONTANA

See Helena Mining Bureau, Inc.

YELLOW JACKET G. & S. MNG. CO.

NEVADA

Property sold to and company merged with Jacket Crown Point Belcher Mines Co., March 10, 1915, for 360,000 common and 12,000 preferred shares of the new corporation.

YELLOW PINE MINING CO.

NEVADA

Offices: 431 Security Bldg., Los Angeles, Calif. and Goodsprings, Nev. **Officers:** J. F. Kent, pres.; R. B. Chapman, v. p.; F. A. Hale, Jr., sec. and mgr.; G. W. Kent, treas.; with S. E. Yount, directors. J. C. Kemple, mine supt.

Inc. 1905, in Nev. **Cap.**, \$1,000,000; shares \$1 par; non-assessable; all issued. No bonded indebtedness. Stock transferred and registered at company's Los Angeles office. Annual meeting, third Wednesday in January. Listed on Los Angeles Stock Exchange.

Gross earnings, year ending January, 1916, \$853,200; receipts from sale of ore, \$852,652; operating expenses, \$153,589; cash, \$162,188; dividends paid, \$450,000. Total dividends, \$893,008.

Property: 13 patented claims, about 240 acres at Goodsprings, Yellow Pine district, Clark county. Ore occurs as carbonate and oxide in limestone and averages 30% zinc, 14% lead and 12 oz. silver. The main deposit dips about 30° and strikes N-S.

Development: by an inclined shaft, 900' deep, greatest depth of workings being 950' and linear extent 20,000'. Ore is mined by square set stoping.

Equipment: includes 40-h. p. electric hoist, compressor, 12 miles of 36" gauge railway, buildings, etc.

Mill: the 100-ton mill is, strictly speaking, a separator rather than a concentrator. The ore is a high-grade lead-zinc material, and in the treatment at this plant no rejection is made, all products of the mill being shipped.

The ore consists principally of lead carbonate and zinc carbonate and silicate. Sulphides are almost entirely absent as evidenced by the fact that the smelter returns on the lead concentrates show only 2 or 3% sulphur.

From the mill bin the ore is fed to a short conveyor, on which the larger pieces of waste are sorted out. This conveyor dumps over a 1" grizzly and the oversize goes to an 8" by 16" roll-jaw crusher. Grizzly and

rock breaker both discharge to a chain elevator, which dumps to the fine-ore bin.

The fine ore is delivered to a set of 16" by 36" Cornish rolls set to $\frac{1}{4}$ ". These discharge to a wet elevator, which raises the ore to the top of the mill, where it passes successively over $\frac{1}{4}$ " and $\frac{1}{8}$ " Impact screens. The screen oversize is treated on two 2-compartment Harz jigs, which make lead concentrates from the bed and hutch of the first compartment and middlings through the second compartment and over the tailboard. The middlings from the coarse jig are returned to the first set of rolls and those from the finer jig to a second set, both of which discharge to the elevator and to the impact screens.

The undersize of the second screen goes to a 5-compartment Richard's classifier, which makes 6 products, each of which goes to an Overstrom table. The tables make only 2 products, lead and zinc concentrates. The lead goes to tubs and the zinc, with all slime to settling bins beneath the table floor. The lead is shoveled to small cars, the zinc is drawn off through gates and the slime overflows to ponds from which it is shipped when a sufficient amount accumulates.

Under this system an extended run of 16,136.3 tons of crude ore assaying 10.2% lead, 31.8% zinc and 5.4 oz. silver produced 1521.085 tons of lead concentrate averaging 53.2% lead, 13.75% zinc and 28.1 oz. silver; 11,260.65 tons of zinc concentrate assaying 33.2% zinc, 4.4% lead and 2.5 oz. silver, and 2173.0 tons of slime averaging 7.3% lead, 35.1% zinc and 4 oz. silver; 833.4 tons of waste was removed by sorting. During 1915 milling cost was \$1.53 per ton.

Production: for 1915, 1521 tons lead concentrates, averaging 53.2% lead and 28.1 oz. silver per ton; 13,914 tons zinc concentrates with 35% zinc; crude zinc ore, 2,267 tons. Total output to date about 80,000 tons. Indicated earnings per share, 1915, about 60c.

Among improvements planned for 1916, is an increase of hoisting capacity.

YELLOW TIGER MINING CO.

NEVADA

Office: 107 Boston Bldg., Denver, Colo. Mine office: Goldfield, Nev. H. A. Riedel, pres.; F. W. Holmes, supt. Cap., \$4,500,000; shares \$1 par; 500,000 shares in treasury.

Stock is listed on San Francisco and Salt Lake City exchanges and is traded on the New York Curb.

Property: 35 acres, next S. of the Goldfield Consolidated and E. of the Columbia Mountain fault, shows a vein of 18" to 2' width worked to a depth of 750' by shaft with several hundred feet of openings. Ores are said to carry from 6 to 9% copper, and gross values reported as from \$25 to \$32 per ton, are apparently mainly in this metal. About \$120,000 has been spent in development work. In 1915 obtained control of the Red Lion group of claims, adjoining on the south, supposed to contain the continuation of veins found on Yellow Tiger company's land.

Only development work was done in 1914 and 1915, mainly on the 600' and 700' levels. In April, 1916, property closed down and plans are reported under way for refinancing, preparatory to developing both Red Lion and Yellow Tiger claims.

YERINGTON BULLION MINING CO.

NEVADA

Ludwig, Nevada Co., Nev. Officers: A. J. Schmidt, pres.; J. A. Knox, sec.-gen. mgr.; J. M. Moyle, treas.; with J. A. Sisk, E. W. Brush, F. S. Stanley and Henry Hertz, directors. W. F. Pfeleger, supt.

Inc. May 31, 1909, in Nev. Cap., \$2,500,000; shares \$1 par; 1,000,000 shares preferred stock, fully paid and non-assessable; 300,000 shares issued;

1,500,000 shares common or promotion stock; assessable, 1,275,759 shares issued.

Property: 56 mining locations, 1,120 acres, 2 miles N. of the Nevada Douglas property in Yerington district. Developed by 400' main working shaft and 2 tunnels 300' long, E. and W. of the shaft on the 300' level, showing a deposit of sulphide ore with gold and copper values. **Equipment:** includes a smelter, 2 hoists, compressor and tools.

Company is apparently without funds and its literature is of a suspicious character.

YERINGTON CONSOLIDATED COPPER CO. NEVADA

Office: 509 McCornick Bldg., Salt Lake City, Utah. **Mine office:** Mason, Lyon Co., Nev. Frank J. Hagenbarth, pres.; J. H. Mays, v. p.; M. B. Johnson, sec.; John Dern, treas.

Inc. Feb. 11, 1907, in Utah. **Cap.**, \$5,000,000; shares \$5 par; nonassessable; issued, 725,000 shares. **Debentures**, \$100,000 at 6%, authorized. Annual meeting second Monday in July.

Lands: 14 claims, patented, in 2 groups, known, as the Copper King and Copper Deposit, the former, lying between the Bluestone and Mason Valley mines, developed by a 70' shaft and 2 tunnels of 500' and 600', showing carbonate ores.

YERINGTON MALACHITE COPPER CO. NEVADA

Office: 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Yerington, Lyon Co., Nev. **Officers:** Grant Snyder, pres. and gen. mgr.; H. J. Mayer, v. p.; Gideon Snyder, sec.-treas.; with S. M. Levy and W. T. Snyder, directors.

Inc. Oct., 1906. **Cap.**, \$5,000,000; shares \$5 par; assessable; issued, 666,333 shares.

Property: 11 claims, patented, adjoining the Mason Valley mine, show 3 mineralized zones of 20 to 150' width, proven on surface for a distance of 2,000'. Orebodies are fissure veins in limestone, carrying oxidized ores to a depth of about 100' below which ore minerals are mainly chalcopyrite, associated with epidote and garnet.

Development: by numerous short tunnels and pits, a 600' tunnel, and a 140' three-compartment shaft, with about 2,000' of workings connecting on the vein with the Mason Valley workings. Ores as mined average about 6% copper. Management estimated 1914, 100,000 tons of 2% ore available for treatment, when leaching plant is installed.

Equipment: includes a 125-h. p. General Electric motor, steam hoist good for 600' depth. Rand Imperial compressor, and Hendrie & Bolthoff hoist. Electric power is taken from the Truckee River Power Co. There are several mine buildings.

Production was begun May, 1912, and company shipped ore, returning 174,407 lbs. copper to the Mason Valley smelter, in 1913. No later output reported.

YERINGTON MINES & EXPLORATION CO. NEVADA

Yerington, Lyon Co., Nev. **Officers:** C. S. Durand, pres.; B. F. Kurz, v. p.; V. B. Durand, sec.; Geo. F. Willis, treas., with W. S. Weaver and Wm. Cramer, directors.

Inc. Feb. 27, 1909, in Nevada. **Cap.**, \$1,000,000; shares \$1 par; nonassessable; issued \$735,000. Annual meeting, first Monday in March.

Property: 24 claims, unpatented, including the Effie May group of 2 gold claims, the Copper Flat group of 10 copper claims, and the Mohawk group of 12 gold-copper claims, latter being the principal property, located 1 mile N. W. of Yerington.

The Mohawk group is developed by a 125' incline and several shallow

shafts of 20' to 80' depth, sunk in the copper-bearing formation. Three cars of ore shipped in 1914 from the 125' inclined shaft contained 0.5 oz. gold and 1.75% copper per ton. A 15-h. p. gasoline hoist has recently been added and development work is now in progress.

The **Copper Flat** group, 1 mile E. of Yerington, is developed by about 20 pits and shallow shafts, deepest 60', showing malachite and cuprite of about 6% copper tenor.

The **Effie May** group is a gold prospect developed by a 135' shaft, with about 2,000 tons of ore blocked out. Property is on the Nevada Copper Belt railway.

YERINGTON MOUNTAIN COPPER CO.

NEVADA

Office: Tonopah, Nev. **Mine office:** Schurz, Mineral Co., Nev. **Officers:** F. K. Pittman, pres.; E. M. Kirchen, v. p.; P. S. Booth, sec.-treas.; J. G. Kirchen, gen. mgr., with H. O. Jones, W. A. Krasselt and H. J. Toner, directors. E. J. Haug, supt.

Inc. 1912 in Nevada. **Cap.**, \$3,000,000; shares \$1 par; non-assessable; issued, \$1,500,000. First National Bank of Tonopah, Nev., registrar and transfer agent. Listed on New York Curb. Balance sheet, Feb. 1916, shows assets, \$1,979,359; cash in banks, \$45,046; liabilities, \$1,741,203; surplus \$283,202.

Property: 33 claims, 680 acres, in the Mountain View district, 9 miles N. W. of Schurz and about 12 miles E. of Yerington, shows 2 fissure veins, in grano-diorite, that run N. 40° E., and dip 65°. Ore minerals are mainly chalcocite, with chalcopyrite, chrysocolla, malachite, cuprite and occasional native copper.

In July, 1916, company purchased the Adelaide mine, near Golconda, Humboldt Co., Nev., from the Glasgow & Western Dev. Co.

Development: by a vertical 540' main shaft, and 3 tunnels of 650', 750' and 950', with about 6,000' of openings. A crosscut below the Levine tunnel is developing a good body of ore. The Azurite tunnel was 1,000' long, June, 1916; it is being driven from the other side of the mountain to cut ore exposed in the Levine tunnel and at 400' greater depth. Tunnel discloses ore in bunches and streaks. The Beach tunnel yields a good grade of shipping ore of about 5.5% copper.

Equipment: includes a 25-h. p. gasoline hoist, 10x12" compressor and 11 buildings. Employs 20 men.

YORK HARBOUR MINE.

NEWFOUNDLAND

Idle. Former address: York Harbour, Birchy Cove, Bay of Islands, N. F. The mine, 4,000' from the bay, at elevation of 1,000', carries cupriferous pyrite. The ore is compact and close-grained with 2% to 4.5% copper and 38 to 41% sulphur, the sulphur being valuable for the manufacture of acid.

Development: by 360' main shaft sunk at an angle of 72° to the S. E., practically the same as the dip of the ore lenses. Levels are opened at 60' intervals, with drifts driven S. W., along the strike of the orebodies.

Equipment: included a 250-h. p. steam plant, with a 50-h. p. Flory hoist and an 8-drill Norwalk high-altitude air compressor. Company supposedly bankrupt and property has been closed down for years.

YOSEMITE MINES CO.

UTAH

Controlled by Bingham Mines Co.

Office: 60 Congress St., Boston, Mass. **Operating office:** 404 Dooly Bldg., Salt Lake City, Utah. **Mine address:** Bingham Canyon, Salt Lake Co., Utah. **Jas. P. Graves**, pres.; **Sydney S. Millett**, sec.-treas.; **Imer Pett**, gen. mgr. **Inc.** Aug, 1909, in Maine. **Cap.**, \$1,000,000; shares \$1 par.

Property: 12 claims, patented, including the Yosemite and Cluster

groups and the Mississippi claim, said to have produced \$1,000,000 gross. The lands lie N. and W. of the Dalton & Lark group of the Bingham Mines Co., and carry approximately 2,400' of the strike of the Lark and Lead mine veins.

Development: by the Yosemite shaft connecting with the Mascotte tunnel on the 2,220' level and the 1,650' Paradox tunnel. Ores carry silver-lead, but copper ore, associated with pyrite, is found on the 800' level. **Equipment:** includes a power plant and air compressor.

YOUNG MINES CO., LTD.

ARIZONA

Phoenix, Ariz. **Officers:** G. U. Young, pres. and gen. mgr.; S. H. Stewart, sec.; E. M. Young, treas.; A. S. Lewis, supt.

Inc. 1910, in Ariz. Cap., 75,000 shares; \$10 par; non-assessable; outstanding 12,000. Annual meeting in June.

Property: 12 claims, about 220 acres, 20 miles E. of Mesa, Mariposa Co., contains a large, disseminated low-grade orebody, said to carry sufficient free-milling gold for mining on a large scale by steam shovel or caving. Low-grade dump is said to average \$4.20 per ton.

Development: includes 3 shafts, 150', 320' and 445' deep and about 3,000' of laterals. **Equipment:** includes 3 steam hoists, 3 pumps, small compressor, a 20-stamp 60-ton mill, buildings, etc.

Y. P. MINING CO.

ARIZONA

Address: N. H. Getchell, mgr., Prescott, Ariz. Operates the Cash property, 14 miles S. of Prescott in the Senator district, Yavapai Co.

Dividends paid are said to amount to \$15,000.

Development: has continued for 3 years and is now at 750'. The 60-ton mill and concentrating plant has 5 Wilfley tables and a Monell slimer and is reported as producing \$8,000 gold bullion per month.

YUBA LEASING & DEVELOPMENT CO.

NEVADA

B. L. Smith, mgr., Pioche, Nev. H. L. Parker, supt. Operates under lease a group of mines at Pioche, Lincoln Co., developed by 1,200' shaft and equipped with a gasoline hoist and air compressors. A 100-ton cyanide and concentrating mill erected in 1915 was destroyed by fire in January, 1916.

YUCCA-ARIZONA COPPER CO.

ARIZONA

Address: 516 Merritt Bldg., Los Angeles, Cal. **Mine:** 20 miles from Yucca, on the A., T. & S. Fe R. R., in Mohave Co., Ariz. **Officers:** S. J. Haynes, pres.; C. H. Post, v. p.; H. Leon Haynes, sec.; preceding with W. S. Bullis and W. H. Dann, directors. J. E. White, supt.

Inc. Jan. 20, 1911, in Arizona. **Cap.,** \$2,000,000; shares \$1 par; 525,000 issued. Annual meeting, third Monday in January.

Property: 15 claims, 12 owned, 3 bonded, 320 acres, with 2 mill sites and 2 water rights. Lands show granite and porphyry with 6 veins, the main ledge averaging 3' thick and proven for 3,000' along the outcrop. Ore carries chalcopyrite and copper glance and is reported to average 11.85% copper.

Development: includes 700' shaft, with crosscut showing 4' of ore. **Equipment:** includes small gasoline hoist, electric power and mill.

Company expects to change organization and capitalization in 1916 to comply with requirements of the Corporation Commission, and list stock, pending which the property will remain idle.

YUCCA TUNGSTEN CO.

ARIZONA

Yucca, Mohave Co., Ariz. **Property:** 20 claims, 25 miles N. of Edmaier Mining Co., (tungsten mine) in Cedar Valley district, Mohave Co., shows a 5' vein of ore carrying 5% tungstic acid and 1% to 3% copper.

Development: comprises a 250' shaft and 300' of drift tunnels, 200' apart vertically. Company operates a 25-ton mill.

YUKON COPPER CO., LTD.**Y. T., CANADA**

Address: White Horse, Y. T. Dr. Alfred Thompson, pres.; W. D. Greenough, v. p., White Horse, Y. T.; Jas. Smiley, sec.-treas., Ottawa, Can. Inc. November, 1915, in Canada. **Cap.** \$200,000; shares \$100 par, all issued. Company took over holdings of the Atlas Mining Co.

Property: 10 claims, 720 acres, in the valley of Porter creek, 4 to 7 miles west of White Horse, include the Pueblo group of 420 acres, and the Carlisle group of 300 acres.

The Pueblo concession, located 1899, was sold to the White Horse Copper Co. That company immediately bonded it to the British American Corp'n, who relinquished bond in 1901 and property reverted to locator, H. E. Porter. In 1906, the Yukon Pueblo Mines Co. of Spokane, bought the concession, transferring it in 1911 to the Atlas Mining Co., controlled by Greenough Bros. of Spokane.

Geology: The Pueblo orebody is an irregular shaped mass 400' long and 200' wide, running N. W.-S. E. and raking north. It is enclosed in crystalline limestone, near a granite contact, and apparently the limestone replaced by the orebody was cut by granite dikes, traces of which remain. There also is a porphyry dike of 3 to 4' width, crossing the orebody, decomposed and showing copper stains. Ore is essentially cupriferosus hematite, varying in texture from compact to coarse, with some alteration, and with irregular silicification. The copper sulphides in the hematite have been largely altered into carbonates, oxides and silicates, only a little chalcopyrite having been found to depth of 100'. Principal ore mineral is malachite, disseminated in hematite, with considerable chrysocolla, and some cuprite occurring in veinlets and small masses. Ore ranges from 1 to 10% in copper, and 700 tons of roughly sorted ore sent to the Crofton smelter, carried 5% copper, 1.25 to 2 oz. silver and some gold per ton.

Development: by a 400' shaft. Work in 1914 consisted of 28 prospect diamond drill-holes, totaling 3,796' and prospecting deposit for 250' further in depth. Employs 100 men.

The Carlisle mine, 2 miles from the Pueblo, has a vein 15' wide, with a high-grade paystreak up to 4' in width of bornite and chalcopyrite. Developed by shafts of 50' and 137'.

Equipment: includes steam power, a 10-drill air compressor and necessary mine buildings. Mine has a spur line to the White Pass & Yukon railway, built 1910.

Production: 1914, shipped to the Tacoma smelter, was 250 tons of ore per day from the Pueblo mine. Property considered promising.

YUKON GOLD CO.**ALASKA AND CALIFORNIA**

Office: 120 Broadway, New York. Controlled by the Yukon Alaska Trust, inc. 1916 to take over the residuary assets of the dissolved Guggenheim Exploration Co.

Officers: Wm. Loeb, Jr., pres.; Daniel Guggenheim, v. p.; C. K. Lipman, sec.; Leopold Fredrick, treas.; O. B. Perry, cons. engr. and gen. mgr.; above with M. Guggenheim, S. R. Guggenheim, Isaac Guggenheim, F. R. Foraker, E. L. Newhouse, directors. J. K. MacGowan, purch. agt.

Inc. Feb. 28, 1907, in Me. **Cap.**, \$25,000,000 reduced Jan., 1915, to \$17,500,000; shares \$5 par; all issued; \$14,213,125 stock owned by the Yukon Alaska Trust. Guaranty Trust Co., New York, registrar; D. A. Crockett, 120 Broadway, New York, transfer agent. Listed on New York and Boston Curb. Annual meeting 2nd Monday in January, at Augusta, Me.

Dividends: 8% (40c per share) quarterly from Sept., 1909, to Dec., 1911; 6% (30c per share) annually from April, 1912, to date; last payment, June, 1916.

Comparative General Balance Sheet:

Assets:						
	Property & Invest's	Equip.	Def'd Charges	Bullion & Cash	Other Current	Total
1915	\$11,569,474	\$7,039,902	\$548,532	\$469,729	\$1,357,015	\$20,984,652
1914	11,524,181	7,036,424	600,066	195,283	1,509,654	20,865,608
Liabilities:						
	Capital Stock	Guggenheim Expl.	Current	Deprec.	Surplus	Total
1915 ..	\$17,500,000	\$1,500,000	\$158,078	\$1,223,740	\$602,834	\$20,984,652
1914 ...	17,500,000	1,675,000	134,729	987,995	567,884	20,865,608

Comparative Income Account:

	Total Income	Royalties Paid	Amort- ization	Int. Ch's, Exp's., etc	Total Deduct's	Surplus
1915	\$2,121,031	\$542,241	\$248,037	\$245,803	\$1,036,081	\$1,084,950
1914	2,213,126	489,169	534,073	61,577	1,084,819	1,128,307

Property: includes 650 claims in the Klondike district, Alaska, extensive holdings in the Yukon territory, 24 claims on Flat Creek, Iditarod district, Alaska, 130 acres in the Yuba basin, including the Sunset and Gilt Edge claims on the Yuba river, Calif., and 160 acres on Butte Creek, near Chico, Calif. Company operated 3 dredges in California, 7 in the Yukon and 1 at Iditarod, Alaska, during 1915.

Operating Results, 1915:

	Cu. yds.	Gold recovered
Alaska (Iditarod)	926,956	\$845,998
California	3,818,126	437,852
Yukon (dredges at Dawson)	5,041,075	2,456,597
Yukon (hydraulicking at Dawson)	3,031,647	412,535
Total	12,817,804	\$4,152,982

Recovery and Cost, 1915:

	Gold saved per yd.	Cost per yd.
Dredging in Alaska	91.30c	38.70c
Dredging in Yukon	48.73	26.46
Dredging in California	11.46	4.51
Hydraulicking	13.60	7.00

YUKON MINES CO.

COLORADO

Office: J. B. Conger, pres., Century Bldg., Denver. **Mine office:** Parlin, Colo. Inc. in Colo. Cap., \$200,000; shares \$1 par; non-assessable; outstanding, May, 1915, 100,000 shares.

Property: the Alaska and Yukon mines, patented, Cochetopa district, Saguache Co. The ore in the Alaska shaft contains mainly zinc-blende; that in the Yukon vein, gold, silver and copper. **Development:** by 2 shafts, the Alaska shaft being 165' deep. **Equipment:** includes a compressor, and 100-h. p. boiler. Small shipments of copper ore were made in 1914. Lessees on the Alaska shaft have shipped zinc ore.

Property is a prospect undergoing development.

YUMA MINE (Molybdenum)

ARIZONA

Property: 14 miles W. of Tucson, is controlled by Col. Epes Randolph, Tucson, Ariz., and associates. Reported, May, 1916, to be shipping to Tucson ore containing chiefly molybdenum, with about \$3 gold per ton. About \$100,000 is reported to have been spent in equipment and preliminary work. Employs 100 men.

ZAMBONA DEVELOPMENT CO.**MEXICO**

Idle. **Mine office:** Minas Nuevas, Alamos, Sonora, Mex. **Officers:** R. R. Coleman, pres. and treas.; Wm. S. Cranz, v. p.; C. W. Hayes, sec., at last accounts. Is supposed to be owned by Pacific Smelting Co.

Property: includes the Zambona, Purisima and San Antonio mines, said to have produced about \$7,000,000 worth of ore, in the past, carrying native silver, argentite and chalcocite, with values largely in silver. Developed to depth of 730', and by a long crosscut tunnel. There remain about 200,000 tons of low-grade disseminated ore on the dumps, available for milling and cyaniding.

Equipment: includes a steam and electric plant, a 30-stamp mill having 4 Huntington mills and 3 tube mills, and a 100-ton cyanide plant. Idle and company probably dead.

ZINC CONCENTRATING CO.

Officers: L. N. Godfrey, pres., 60 Congress St., Boston, Mass.; Augustus T. Clark, treas.; with D. L. Goff, Jas. B. Etherington, M. B. Ryan, Oscar Hoppe, Herbert H. Brooks, directors.

Cap., \$3,000,000; shares \$10 par; full-paid and non-assessable; all issued. Stock traded in on New York Curb.

Company owns all the patents and rights of the Campbell System of Magnetic Separation and the Dings' Magnetic Separators. The Campbell process has been successfully used at two plants, one at Linden, Wisc., operated by the Linden Zinc Co. and one at Cuba, Wisc., under lease to the Wisconsin Zinc Co. Company claims a regular zinc recovery of 95% and a total ore recovery, zinc, sulphur, iron, of from 85-90%.

The Linden Zinc Co., is reported paying \$9,000 annual royalty for one unit.

ZUMA MINING & MILLING CO.**UTAH**

Eureka, Juab Co., Utah. **Officers:** P. J. Fennell, pres.; Mrs. Mary E. Drescoll, sec.; W. F. Shriver, treas.

Inc. 1907, in Utah. **Cap., \$500,000;** shares 50c par.; 700,000 shares outstanding. Stock listed on Salt Lake Exchange.

Property: 6 claims, 4 patented, in the East Tintic district, near the Crown Point and Iron King mines, said to carry gold-silver-lead zinc ore. Development is by a 270' shaft, 1,000' of tunnels and winze. The shaft is to be sunk to 500', in 1916. **Equipment:** including hoist, engine and compressor, claimed to have cost \$24,000.

CHAPTER V

THE METAL MINING INDUSTRY

The remarkable prosperity of the metal mining industry for 1915 and 1916 is a direct result of the great European war. When this war began in 1914, the sudden lack of demand and cessation of exports of the metals, coupled with slack if not stagnant business conditions in the U. S., led to lowered prices, and a painfully depressed state of the entire industry, but in 1915-16 the truly remarkable demand for copper, zinc and mercury and tungsten, with runaway prices, quickly led to the reopening of many properties long idle and the crowding of output from producing mines.

The following table, showing production for the years 1913-1915, does not disclose this activity, since in the figures for the calendar year the small output for the first half year, combined with the great output of the second half, makes the total nearly normal. The total from July to July would be quite different. The table is from the Engineering & Mining Journal.

PRODUCTION OF METALS IN THE UNITED STATES

Metal	Unit	1913	1914	1915
Aluminum.....	Pounds	49,601,500	(h)45,000,000	(h)80,000,000
Copper (a).....	Pounds	1,225,735,834	1,158,581,876	1,424,640,565
Ferromanganese.....	Long tons	229,834	185,118	232,210
Gold (b).....	Dollars	88,884,400	94,531,800	98,891,100
Iron.....	Long tons	30,736,477	23,147,226	29,738,981
Lead (c).....	Short tons	433,476	538,735	565,356
Nickel (e).....	Pounds	47,124,330	30,067,064	38,966,138
Quicksilver.....	Flasks	(h)20,000	16,300	(f)20,681
Silver (b).....	Troy ounces	66,801,500	72,455,100	67,485,600
Zinc (d).....	Short tons	358,282	362,361	492,495

(a) Production from ore originating in the United States. (b) The statistics for 1913 and 1914 are the final and those for 1915 are the preliminary statistics reported jointly by the directors of the Mint and the U. S. Geological Survey. (c) Production of refined lead from ore and scrap originating in the United States; antimonial lead is included. (d) Total production of smelters, except those treating dross and junk exclusively; includes spelter derived from imported ore. (e) Imports: for 1915, first 9 months only. This nickel is refined in the United States for the production of metal, oxide and salts. (f) As reported by U. S. Geological Survey. (g) As reported by the Metallgesellschaft, Frankfurt am Main. (h) Estimated.

The most important individual producer is the American Smelting & Refining Co., often called the Smelter Trust. This company handles most of the custom ore sold in this country and Mexico, and also has many mines of its own. The metals recovered by its smelters in 1915 were sold for \$232,281,182.

In 1915 this single company received nearly \$55,000,000 for gold produced from the ores handled, equal to more than half the United States production; its smelter extracted over \$38,000,000 of silver from the ores treated, including some from Mexico and Canada.

The copper ore put through its smelters realized \$92,356,662, or over 35% of the country's total production for the year. The lead production, equivalent to over one-half the value of the entire United States production, was sold for over \$27,000,000. These figures explain why the company is so often called the Smelter Trust.

METAL PRICES

The price per unit of metal production (gold excepted, which is fixed by law at \$20.67+ per fine ounce) is based upon averages of daily market prices current at New York for silver, copper and lead, and at St. Louis for metallic zinc or spelter. The prices used by the U. S. Geological Survey for calculation of values for the years 1850-1915, inclusive, are as follows:

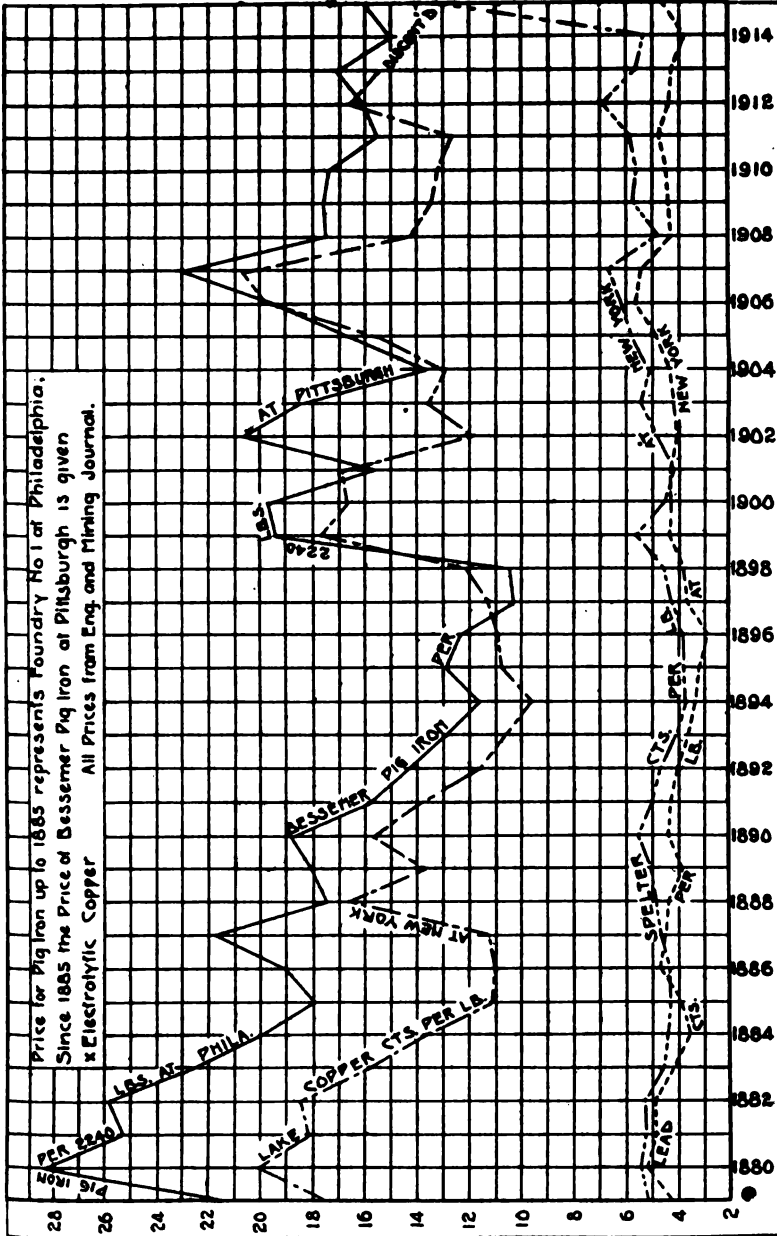
PRICES OF SILVER, COPPER, LEAD, AND ZINC.

Year	Silver Fine oz.	Copper Pound	Lead Pound	Zinc Pound	Year	Silver Fine oz.	Copper Pound	Lead Pound	Zinc Pound
1850	.....\$1.32	\$0.22	\$0.05	.....	1883	.....\$1.11	\$0.165	\$0.043	\$0.045
1851	.....1.34	.166	.06	.....	1884	.....1.11	.13	.037	.044
1852	.....1.33	.22	.05	.....	1885	.....1.07	.108	.039	.043
1853	.....1.35	.22	.06	0.055	1886	......99	.111	.046	.044
1854	.....1.35	.22	.06	.....	1887	......98	.138	.045	.046
1855	.....1.34	.27	.07	.....	1888	......94	.165	.044	.049
1856	.....1.34	.27	.066	.....	1889	......94	.135	.039	.05
1857	.....1.35	.25	.06	.....	1890	.....1.05	.156	.045	.055
1858	.....1.34	.23	.06	.....	1891	......99	.128	.043	.05
1859	.....1.36	.22	.055	.....	1892	......87	.116	.04	.049
1860	.....1.35	.23	.056	.....	1893	......78	.108	.037	.04
1861	.....1.33	.22	.05	.....	1894	......63	.095	.033	.035
1862	.....1.35	.22	.06	.....	1895	......65	.107	.032	.036
1863	.....1.345	.34	.06	.....	1896	......68	.108	.03	.039
1864	.....1.345	.47	.07	.139	1897	......60	.12	.036	.041
1865	.....1.337	.3925	.066	.....	1898	......59	.124	.038	.046
1866	.....1.339	.3425	.07	.....	1899	......60	.171	.045	.058
1867	.....1.33	.2537	.065	.....	1900	......62	.166	.044	.044
1868	.....1.326	.23	.065	.....	1901	......60	.167	.043	.041
1869	.....1.325	.2425	.06	.....	1902	......55	.122	.041	.048
1870	.....1.323	.2118	.06	.....	1903	......54	.137	.042	.054
1871	.....1.325	.2412	.06	.....	1904	......58	.128	.043	.051
1872	.....1.322	.3556	.064	.....	1905	......61	.156	.047	.059
1873	.....1.297	.2800	.06	.....	1906	......68	.193	.057	.061
1874	.....1.278	.2200	.06	.....	1907	......66	.20	.053	.059
1875	.....1.24	.227	.058	.07	1908	......53	.132	.042	.047
1876	.....1.16	.21	.061	.072	1909	......52	.13	.043	.054
1877	.....1.20	.19	.055	.06	1910	......54	.127	.044	.054
1878	.....1.15	.166	.036	.049	1911	......53	.125	.045	.057
1879	.....1.12	.186	.041	.052	1912	......615	.165	.045	.069
1880	.....1.15	.214	.05	.055	1913	......604	.155	.044	.056
1881	.....1.13	.182	.048	.052	1914	......553	.133	.039	.051
1882	.....1.14	.191	.049	.053	1915	......507	.175	.047	.124

These prices do not accord with the yearly averages reported by the American Metal Exchange, the differences being possibly those between an arithmetical and a geometrical average.

The 25 years (1889-1913) geometric averages for the three metals are as follows: Silver, 66 cts. per oz.; copper, 14 cts. per lb.; zinc, 5.3 cts. per lb.

In the following pages, the essential facts concerning the price, production, consumption, exports and imports of each metal are given in tables.



COURSE OF METAL PRICES SINCE 1879—ANNUAL AVERAGES

Price for Pig Iron up to 1885 represents Foundry No. 1 at Philadelphia.
 Since 1885 the Price of Bessemer Pig Iron at Pittsburgh is given
 x Electrolytic Copper
 All Prices from Eng. and Mining Journal.

ALUMINUM

Aluminum Production and Prices of the United States, in Pounds

Year	Production (lb.)	Price (per lb.)
1883	83	7,150,000
1884	150	7,300,000
1885	283	7,500,000
1886	8,000	8,600,000
1887	18,000	11,347,000
1888	19,000	14,910,000
1889	47,468	17,211,000
1890	61,281	11,152,000
1891	150,000	13,210,000
1892	259,885	14,734,000
1893	333,629	14,125,000
1894	550,000	16,607,000
1895	920,000	17,379,000
1896	1,300,000	19,129,000
1897	4,000,000	9,806,000
1898	5,200,000	
1899	6,500,000	
1900	7,150,000	
Total		556,672,779

a Consumption. b American Metal Market figures. In July, 1916, virgin ingots, 98% 99% pure, sold at 61 to 62 cents per pound, remelted at 58 cents, and alloy at 47-49 cents.

EXPORTS OF ALUMINUM OF UNITED STATES PRODUCTION

Year	Value (\$)	Year	Value (\$)
1908	330,092	1912	1,347,621
1909	567,375	1913	968,094
1910	949,215	1914	1,546,510
1911	1,158,608	1915	3,682,117

WORLD'S PRODUCTION OF ALUMINUM.

In metric tons of 2,204.6 lbs.

Year	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
United States and Canada	3,400	3,900	4,500	6,000	8,000	6,000	13,200	16,100	18,000	19,500	22,500
Germany, Austria, Switzerland	2,500	3,000	3,000	3,500	4,000	4,000	5,000	8,000	8,000	12,000	12,000
France	1,600	1,700	3,000	4,000	6,000	6,000	6,000	9,500	10,000	13,000	16,000
England	700	700	1,000	1,000	1,300	2,000	2,800	5,000	5,000	7,500	7,500
Italy						600	800	800	800	800	800
Norway							600	900	900	1,500	1,500
Total	3,200	9,300	11,500	14,500	19,300	18,000	31,200	43,800	45,000	62,600	65,200
Price in cents per pound							22.18	22.97	20.34	22.52	23.63

From American Metal Market.

Figures for 1914 and 1915 not published. Price for 1914, in U. S. was 18.595 and for 1915, 34.13 cts. per pound.

ALUMINUM PRODUCER

Aluminum Co. of America.....U. S. and Canada

ANTIMONY

ANTIMONY PRODUCTION OF THE UNITED STATES, IN SHORT TONS,

(U. S. G. S.)

Year	Contained in anti-montal lead of domestic origin.		Antimony produced from domestic ore.		Recovered from average old alloys, scrap, dross, etc.		Average price per pound.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
1903	2,558	\$445,092	570	\$109,341			
1904	2,571	448,598	486	61,926			
1905	2,747	538,354	493	117,433			
1906	1,362	544,890	b404	58,149			20.00
1907	1,561	508,886	b351	77,300			6.30
1908	2,246	359,360	(c)	(c)			8.00
1909	1,617	252,252	(c)	(c)	1,556	\$242,736	7.80
1910	1,598	263,481			e2,779	457,979	8.24
1911	1,543	264,780			e2,369	406,520	8.58
1912	1,224	209,059			e2,506	428,025	8.54
1913	2,204	375,562			e2,705	460,932	8.52
1914	2,530	d529,740			e2,645	d555,450	10.50

(a) Estimated from the average content of the ore. (b) Figured as 60% of domestic ores only. (c) None produced from domestic ore. Figures not col-

lected for foreign ores. (d) Includes actual marketed value of a few tons of antimony made as a by-product in the electrolytic refining of copper.

Figures by Geological Survey. In 1910 a total of 9 tons, in 1911 a total of 10 tons, in 1912 a total of 13 tons, in 1913, 45 tons; in 1914, 1 ton, was recovered as antimony, the remainder as alloy.

ANTIMONY IMPORTS OF THE UNITED STATES, IN POUNDS

Year	Metal		Crude and ore		Oxide and salts		Total value
	Quantity	Value	Quantity	Value	Quantity	Value	
1904	4,288,045	\$248,726	2,488,518	\$50,414	981,026	\$70,868	\$869,808
1905	4,941,247	431,228	1,970,788	53,028	1,010,228	80,130	564,384
1906	10,305,734	1,391,289	1,972,658	125,841	784,070	99,251	1,816,279
1907	9,600,901	1,407,861	2,771,387	180,903	682,192	98,088	1,886,802
1908	8,089,915	771,206	3,287,218	108,930	623,125	65,898	944,034
1909	9,557,956	620,117	3,453,542	94,240	955,890	60,958	774,710
1910	7,985,945	492,870	1,346,962	47,185	326,138	14,201	553,066
1911	8,486,137	470,552	1,841,467	60,459	1,003,647	54,426	585,437
1912	13,936,873	808,473	1,562,066	51,444	1,759,908	81,077	940,994
1913	12,479,727	798,581	4,021,486	187,780	1,968,476	117,169	1,053,536
1914	13,110,426	736,420	2,606,349	75,345	2,744,406	315,001	1,126,760
1915*	13,859,564						

* For first 10 months (American Metal Market figures).

ANTIMONY PRICES, IN CENTS PER POUND

	1913			1914			1915	
	Cook-son's	U. S.	Ordinaries	Cook-son's	U. S.	Ordinaries	Cook-son's	Ordinaries
January	9.94	9.53	8.97	7.388	7.110	6.125	17.90	15.85
February	9.47	9.09	8.25	7.250	7.057	6.100	21.25	18.21
March	9.28	8.85	8.18	7.315	7.073	6.053	26.73	22.13
April	9.13	8.50	7.98	7.363	7.048	6.006	31.88	24.88
May	8.88	8.37	7.79	7.865	7.020	5.845	42.70	35.30
June	8.79	8.27	7.64	7.250	7.000	5.825	47.50	37.69
July	8.54	8.08	7.55	7.210	6.940	5.638	50.44	38.18
August	8.38	7.91	7.39	17.250	15.800	13.800	48.00	38.00
September	8.37	7.93	7.37	11.830	.....	9.940	44.58	28.63
October	7.60	7.27	6.49	14.680	.....	12.060	45.50	31.43
November	7.62	7.30	6.45	17.750	.....	14.450	47.25	38.88
December	7.50	7.25	6.13	16.130	.....	13.810	55.00	39.23
Year	8.73	8.22	7.52	10.732	.....	8.763	40.06	30.28

Figures from Eng. & Min. Jour., Jan. 8, 1916.

WORLD'S PRODUCTION OF ANTIMONY IN 1911 AND 1912. TONS OF 2,000 POUNDS

	1911 Quantity	1912 Quantity
Algeria (ore)		
Argentina	34	5,139
Australia		Not stated
New South Wales (ore and metal)	186	71
Queensland (metal)	11	
Victoria (ore)	1,250	2,722
Austria (ore)	298	4,983
Bolivia (ore)	344	100
Canada: Nova Scotia (ore)	192	
China, exports:		
Metal	7,702	14,914
Ore	7,509	2,263
France (ore)	32,267	12,147
Hungary:		
"Crude" and metal	983	947
Ore	88	72
Italy (ore)	2,691	2,070
Japan:		
Crude	1	14
Refined	106	69

Mexico :		
Ore	133	17
Metal	4,554	3,849
Portugal (ore)		110
Servia (ore)	186	327
Spain (ore)	110	551

Production in 1913 was approximately 22,000 tons (long tons) of regulus, crude and refined, made up as follows: China, 12,820 tons; France, 6,000; Mexico, 2,315, and Hungary, 860 tons.

The antimony deposits of the U. S. may be classed as those containing antimony only, and those whose antimonial content is a valuable by-product. Though many deposits of stibnite are known, they cannot be worked with normal prices, because in ordinary years the Chinese and Japanese smelters can supply it cheaper than we can produce it, and because the market is limited and easily glutted, resulting in still lower prices. The domestic production has therefore come almost entirely from the electrolytic refining of antimonial lead and copper metal.

The entire world's consumption up to 1914 was less than $\frac{1}{8}$ that of tin or 3% of that of zinc or copper. Antimonial ores to be valuable must be free from arsenic, zinc and lead.

The average price for the 30 years preceding 1914 is 7.5 cts. per pound.

The Market for Antimony. The principal uses of antimony, the demand for which continues to increase, are in making anti-friction bearing metals, white metals for the foundation of silver-plated ware, and other plated ware, such as clock-cases, table-ware, coffin trimmings and toys. In 1915-16 a great demand was created by the use of antimony in making shrapnel bullets.

The following persons are buyers of antimony ores:

Atkins, Kroll & Co., San Francisco, Cal.; Elsasser Merchants Finance Co., 625 Security Bldg., Los Angeles, Cal.; Frazer & Co., 50 Church St., New York City; C. W. Hill Chemical Co., 320 S. San Pedro St., Los Angeles, Cal.; Edw. Hill's Son & Co., Inc., 65 Wall St., New York City; Hoyt Metal Co., St. Louis, Mo.; M. D. Mackay, 130 Pearl St., New York City; Magnolia Metal Co., 113-15 Bank St., New York City; Pennsylvania Smelting Co., Pittsburgh, Pa.; Philipp Brothers, 42 Broadway, New York City; Herbert Solinger, Beer-Sondheimer Co., Newhouse Bldg., Salt Lake City, Utah; C. Solomon, Jr. (Chapman Smelting Co.), 409 Battery St., San Francisco, Cal.; David Taylor, Consolidated Ores Co., Boston Bldg., Salt Lake City, Utah; Wm. Wraith, mgr., International Smelting Co., Salt Lake City, Utah.

In 1915 antimony mines in all parts of the U. S. were reopened, notably those of Pine Creek, in the Coeur d'Alene, and several small furnaces built, due to the increased price of the metal. The largest production was made from deposits near Wild Rose Spring, on the northwest slope of Telescope Peak, in the Panamint Range, Death Valley, Calif. Alaska furnished 800 tons of stibnite ore from the Fairbanks district and from Seward Peninsula. Reported that shippers received from \$1.25 to \$1.75 per unit of stibnite.

Crude antimony is largely used in the making of fireworks, safety-matches, vulcanizing rubber, etc. Oxide of antimony is used for the manufacture of paints, enamels in glass and crystals, and the preparation of antimony salts. Antimony metal is used for hard lead, type-metal, anti-friction compounds and other alloys. It is sold as "starred" metal, and the market not only demands a product assaying 99%, but also that each slab should have the fern-like crystallized surface known as the "star," although this does not indicate that it is chemically pure.

ANTIMONY MINES

Antimony Corp.....Mexico	Idaho Antimony Mining Co....Idaho
Antimony Silver Mining Co...Idaho	Merchants Finance Co. (Western Metals Co.).....Calif.
Benton Mining Co.....Idaho	Pomana Antimony Mine.....Nevada
Coeur D'Alene Antimony Co...Idaho	Stanley Mining Co., (no recent production).....Idaho
Coniagas Mines, Ltd.....Ontario	Star Antimony Co.....Idaho
Coniagas Reduction Co., Ltd..Ontario	Wah-Chang Mining & Smelting Co...China
Homelode Mining & Development Co.....So. Dakota	
Howell Mining Co.....Utah	

ARSENIC

U. S. PRODUCTION OF WHITE ARSENIC, As₂O₃, IN SHORT TONS

Year	Quantity	Value	Year	Quantity	Value
1901.....	300	\$ 18,000	1908.....		
1902.....	1,353	81,180	1909.....	1,214	\$ 52,946
1903.....	611	36,691	1910.....	1,497	52,305
1904.....	36	2,185	1911.....	3,132	73,408
1905.....	754	35,210	1912.....		190,757
1906.....	737	63,460	1913.....	2,513	159,236
1907.....	1,751	163,000	1914.....	4,670	313,147

PRICES AND IMPORTS OF ARSENIC COMPOUNDS 1904-1914

Fiscal year :	Quantity, short tons	Value	Price per pound, cents	Paris green and London purple	
				Quantity, pounds	Value
1904.....	3,400	\$243,380	3.58	28,498	\$ 985
1905.....	3,838	256,540	8.34	44,931	1,118
1906.....	3,987	350,045	4.39	311,298	21,347
1907.....	5,164	574,998	5.52	133,422	21,919
1908.....	4,964	430,400	4.34	195,000	30,764
1909.....	4,036	803,728	3.76	183,765	20,370
1910.....	5,139	314,306	3.06	181,363	14,643
1911.....	4,096	247,323	3.01	126,191	4,972
1912.....	6,156	428,741	3.48	162,272	6,950
1913.....	4,701	410,446	4.37	99,692	4,431
1914.....	3,628	273,713	3.77	15,476	2,235

WORLD'S PRODUCTION OF ARSENIC, BY COUNTRIES, IN SHORT TONS

	1911		1912	
	Quantity	Value	Quantity	Value
Great Britain :				
Arsenopyrite.....			1,310	\$ 6,276
Arsenic.....			2,401	70,124
Canada*.....	2,097	\$ 76,237	2,045	89,262
China :				
Exports.....	246		186	
Orpiment—exports.....	366	23,138	377	21,635
France (arsenopyrite).....				
Germany (arsenic ore).....	5,356	105,084	24,389	656,775
Japan (metal).....	7	384		
Mexico.....	2,000		2,000	
Portugal.....	987	38,356	1,047	45,416
Spain (arsenopyrite).....	1,164	34,931		
United States.....	3,132	73,408	3,142	190,757

* Production in Canada for 1913 was 1,692 tons valued at \$101,463 and for 1914, 1,737 tons.

The occurrence of arsenic in metal-bearing ores is so common as to be practically universal. This is shown at the smelters treating lead, copper and zinc ores, which send out over 20,000 tons of arsenious trioxide a year into the atmosphere in the form of smelter smoke or fume. A small amount is saved at the Anaconda, Mont., smelter, and at the Ontario smelters treat-

ing Cobalt ores, and also in Mexico by the Mapimi smelter of the American Metal Co.

With such an enormous wastage, it is foolish to attempt to work arsenical ores for the arsenic alone. The chief use of the metal is in glass-making and for insecticides in agriculture; the glass industry uses about half of the amount produced in this country.

ARSENIC MINES

American Smelting & Refining Co.	Metals Chemical Co.....Ontario
Canadian Smelting & Refining Co....	Nipissing Mining Co., Ltd....Ontario
Deloro Mining & Reduction Co..Ont.	Puget Sound Reduction Co....Wash.

BISMUTH

Occurrence. Bismuth ores are comparatively rare, though the metal occurs in many of the lead ores of the Rocky Mountain regions. The U. S. production comes entirely from electrolytic lead refineries at Grasselli, Ind., Omaha, Neb., and a few other plants. The Wilson Cons. Mining Co. produced oxidized bismuth ore in the Clifton district, Tooele Co., Utah, in 1914. The world's supply comes mainly from Bolivian mines owned by Aramayo Francke & Co., at Chorolque and Tasna. This firm produced 511 tons crude metal in the year ending May 31, 1915, compared with 437 tons the previous year.

Occasionally lots of gold-silver or lead ore containing from 10 to 20% bismuth have been marketed in the west, but buyers gave nothing for the bismuth contained.

Prices. The price for bismuth in the U. S., ordinarily about 65 cents a pound, was \$2.75 per lb. at the beginning of 1915; toward the end of the year it sold to \$4 per lb.

The price and market for bismuth ores are both artificial, being fixed by a combination of English and German firms, who absolutely control the market and shut out competition by most drastic and inquisitorial methods. Were American production constant, our producers could secure the American market. The Anaconda smelter dust carries over 1% bismuth, equal to a daily production of 1,580 lbs., and this plant will probably be a producer in 1916.

Uses. Metallic bismuth is employed in making low-fusing alloys or cliché metals which are used in automatic fire sprinklers, fuses for electric wiring, and solders. Some of the salts have a smooth, unctuous feel, and are used in face and toilet powders and in medicinal preparations. It is also employed to a small extent in making optical glasses.

U. S. IMPORTS OF METALLIC BISMUTH IN POUNDS

Year	Quantity	Value	Year	Quantity	Value
1904.....	185,905	\$839,058	1910.....	198,174	\$332,668
1905.....	148,589	318,007	1911.....	172,003	311,771
1906.....	254,783	318,452	1912.....	182,840	316,440
1907.....	259,881	325,015	1913.....	117,747	213,257
1908.....	164,798	257,397	1914.....	90,505	165,208
1909.....	183,413	286,516			

BISMUTH MINES

American Sm. & Ref. Co.
U. S. Metals & Refining Co.....N. J.

Wilson Cons. Mining Co.....Utah

CADMIUM

The world's supply of cadmium comes from the zinc smelters of Upper Silesia, Germany, with small amounts from U. S. zinc furnaces.

CADMIUM PRODUCED IN GERMANY (U. S. G. S.)

Year	Quantity Pounds	Value	Average Price per pound	Year	Quantity Pounds	Value	Average Price per pound
1882	7,702			1898	32,954	\$29,668.70	\$0.90
1883	5,333			1899	21,698	15,544.28	.72
1884	6,118			1900	29,835	19,524.81	.65
1885	7,222			1901	28,977	19,754.71	.68
1886	10,944	\$8,710.56	\$0.80	1902	27,843	15,132.00	.54
1887	16,140	11,542.29	.72	1903	36,519	19,242.06	.53
1888	10,578	5,439.49	.51	1904	55,655	32,882.32	.59
1889	11,327	4,621.71	.41	1905	54,163	35,240.18	.65
1890	9,167	3,477.18	.38	1906	47,868	36,088.89	.76
1891	6,281	2,423.32	.39	1907	72,639	60,757.85	.84
1892	7,055	2,718.20	.38	1908	72,741	48,590.21	.67
1893	11,651	5,198.87	.45	1909	81,982	46,777.16	.57
1894	15,095	8,393.31	.56	1910	90,516	39,309.51	.43
1895	15,095	9,052.04	.60	1911	93,861	53,372.45	.57
1896	23,514	19,453.64	.83	1912	94,262	63,507.26	.67
1897	34,231	42,037.23	1.23	Average 1898-1912			.65

U. S. CADMIUM IMPORTS IN POUNDS

Year	Quantity	Value	Year	Quantity	Value
1903	8,679	\$ 4,585	1909	8,862	\$4,559
1904	7,655	4,524	1910	4,060	2,295
1905	8,133	5,298	1911	5,367	3,370
1906	13,808	10,522	1912	5,250	3,764
1907	1,953	1,633	1913	1,656	1,232
1908	3,567	2,390	1914	441	368

CADMIUM PRODUCER

American Sm. & Ref. Co.

CHROMIUM

The chromium produced in the U. S. all comes from chromite or chrome ore.

U. S. CHROMITE PRODUCTION * (Long Tons)

Year	Quantity	Value	Price per ton	Year	Quantity	Value	Price per ton
1880	2,238	\$27,808	\$12.15	1898			
1881	2,000	30,000	15.00	1899			
1882	2,500	50,000	20.00	1900	140	\$ 1,400	\$10.00
1883	3,000	60,000	20.00	1901	368	5,790	15.73
1884	2,000	35,000	17.50	1902	315	4,567	14.50
1885	2,700	40,000	14.81	1903	150	2,250	15.00
1886	2,000	30,000	15.00	1904	123	1,845	15.00
1887	3,000	40,000	13.33	1905	22	375	17.05
1888	1,500	20,000	13.33	1906	107	1,600	16.82
1889	2,000	30,000	15.00	1907	290	5,840	19.45
1890	3,599	53,985	15.00	1908	359	7,230	20.14
1891	1,372	20,580	15.00	1909	598	8,300	13.88
1892	1,500	25,000	16.67	1910	205	2,729	13.31
1893	1,450	21,750	15.00	1911	120	1,629	13.58
1894	3,680	53,251	14.46	1912	201	2,753	13.70
1895	1,740	18,795	9.65	1913	255	2,854	11.19
1896	786	6,667	8.48	1914	591	8,715	14.75
1897				1915	3,281	36,744	11.20

* U. S. Geol. Survey.

Chromic iron ore is sold on the basis of 50% chromic oxide, bringing \$12 to \$30 per ton in New York. Production is almost entirely from California, largely from near Copperopolis, with freight rates of \$11 per ton to the East. The output during the first six months of 1916 was more than three times the greatest annual yield of former years.

Occurrence. The chief producing areas are the belts of serpentine in the Sierra Nevada and Coast ranges. Shasta County is a great producer. Most of the orebodies are small and lenticular in shape, containing only from 1. to 200 tons ore. Quebec, Canada, is also a producer, 10,087 tons being imported from there into the U. S. in 1915. The market is irregular and subject to wide variations.

Use. Chromic iron ore is used in the manufacture of ferrochrome and steel for high-speed tools, armor plate and projectiles and in the manufacture of bichromates of soda and potash, chromic acid, chrome alum and chrome tannage.

WORLD'S PRODUCTION OF CHROMIC IRON ORE, IN LONG TONS. U. S. G. S.

Country—	1907	1908	1909	1910	1911	1912	1913
United States	290	859	598	205	120	201	253
Bosnia and Herzegovina.....	805	492	327	315	246	197	.....
Canada	6,425	6,451	2,205	297	140	.....	.....
Greece	11,545	4,281	9,448	9,311	4,542	6,209	.....
India	7,274	4,745	9,250	1,737	3,804	2,890	.....
Japan .....	.....	.....	.....	2,091	1,500	1,591	.....
New Caledonia	3,739	15,550	39,368	39,368	34,447	41,325	62,352
New South Wales	80	.....	.....	.....	.....	28	.....
Rhodesia.	8,017	11,927	22,875	39,237	46,753	61,840	62,365
Russia	25,940	10,777	21,857	14,157	.....	20,934	.....
Sweden .....	.....	.....	.....	81	.....	.....	.....
Turkey	21,111	28,394	11,364	.....	.....	145	.....

In 1915 imports from Quebec were 8,473 tons, out of a total production of 14,076 tons, valued at \$11.23 per ton. New Caledonia was the world's greatest producer, the output being 82,806 tons in 1914.

CHROME ORE AND CHROMIUM IMPORTED IN U. S.

Year.....	Potash salts		Chromic acid		Chrome ore		Value
	Pounds		Pounds	\$	Long tons		
1908.....	218,081	\$15,453	3,805	\$ 708	27,376	\$345,960	\$362,121
1909.....	537,017	28,837	7,559	1,412	39,624	460,768	491,007
1910.....	406,790	19,569	9,850	1,685	33,579	415,768	436,972
1911.....	22,408	2,159	6,789	1,349	37,540	407,958	411,466
1912.....	32,913	3,085	8,728	1,376	53,929	499,818	504,279
1913.....	18,629	1,819	5,562	1,100	65,180	622,821	625,740
1914.....	31,838	2,375	9,164	1,597	80,736	695,845	699,617
1915.....	82,942	2,902	8,571	755	*76,455	780,061	783,718

* From New Caledonia and Quebec.

COBALT

COBALT ORE, OXIDE, AND ZAFFER IMPORTED INTO THE U. S., IN POUNDS

Year	Quantity	Value	Year	Quantity	Value
1906.....	41,084	\$83,167	1911.....	802,454	\$ 69,151
1907.....	48,013	74,849	1912.....	791,242	83,080
1908.....	219,098	17,677	1913.....	209,396	95,785
1909.....	12,182	11,096	1914.....	334,556	274,538
1910.....	14,935	6,352			

No record is kept of the imports of metallic cobalt. The price of the metal seems to have varied little during the last three years, ranging from \$1.50 to \$2 a pound. In Sept., 1915, the Engineering and Mining Journal quoted \$2.00 per lb. 97% cobalt metal.

No cobalt was produced from domestic ores in 1913 and 1914. The cobalt used in making high-priced steels and stellite is generally reduced from the imported oxide. (Stellite is an alloy, 75% cobalt and 25% chromium, said to be especially valuable for making high-speed steels and non-tarnishable cutlery). Experimental work in 1916 has shown that cobalt may be substituted for nickel in plating. Canadian production, mainly from Cobalt, Ont., is as follows:

	Metallic Cobalt	Cobalt Oxide	Total metal
1914.....	242,572 lbs.	899,027 lbs.	871,801 lbs.
1915.....	211,610 lbs.	879,219 lbs.	477,063 lbs.

From Preliminary Report, Mineral Resources of Canada, 1915.

COBALT MINES

Beaver Mt. Mining Co. (Idle).....	Alaska	Independence Mining Co. (Small quantities).....	Wyoming
Canadian Smelting & Refining Co.....	Ontario	Metals Chemical Co.....	Ontario
Cobalt Comet Mines Co., Ltd.....	Ontario	Mine La Motte Co.....	Missouri
Conlagas Mines Ltd.....	Ontario	Nipissing Mining Co., Ltd.....	Ontario
Conlagas Reduction Co., Ltd.....	Ontario	Peterson Lake Silver Cobalt Mining Co., Ltd.....	Ontario
Deloro Mining & Reduction Co.....	Ontario	Pittsburgh & Lorrain Syndicate.....	Ontario

GOLD

Gold production of the United States in ounces.

Year	Quantity	Value	Year	Quantity	Value
1880.....	1,741,500	\$36,000,000	1898.....	3,118,398	\$64,463,000
1881.....	1,678,612	34,700,000	1899.....	3,437,210	71,053,400
1882.....	1,572,187	32,500,000	1900.....	3,829,987	79,171,000
1883.....	1,451,250	30,000,000	1901.....	3,805,500	78,666,700
1884.....	1,489,950	30,800,000	1902.....	3,870,000	80,000,000
1885.....	1,538,373	31,801,000	1903.....	3,560,000	73,591,700
1886.....	1,686,788	34,869,000	1904.....	3,892,480	80,464,700
1887.....	1,603,049	33,136,000	1905.....	4,265,742	88,180,700
1888.....	1,604,478	33,167,500	1906.....	4,565,333	94,373,800
1889.....	1,594,775	32,967,000	1907.....	4,374,827	90,435,700
1890.....	1,588,877	32,845,000	1908.....	4,574,340	94,560,000
1891.....	1,604,840	33,175,000	1909.....	4,821,701	99,673,400
1892.....	1,597,098	33,015,000	1910.....	4,657,018	96,269,100
1893.....	1,739,323	35,955,000	1911.....	4,687,053	96,890,000
1894.....	1,910,813	39,500,000	1912.....	4,520,717	93,451,500
1895.....	2,254,760	46,610,000	1913.....	4,299,783	88,884,400
1896.....	2,568,132	53,088,000	1914.....	4,572,976	94,531,800
1897.....	2,774,935	57,363,000	1915.....	4,887,604	101,035,700

Total... 107,740,319 2,227,188,100

GOLD PRODUCTION OF THE UNITED STATES, IN OUNCES, 1914 AND 1915

	1915		1914	
	\$	5,100	\$	12,800
Alabama		247	495	12,800
Alaska	808,846	16,710,000	800,471	16,547,200
Arizona	220,392	4,555,900	221,020	4,568,900
California	1,090,731	22,547,400	1,028,061	21,251,900
Colorado	1,089,928	22,530,800	962,779	19,902,400
Georgia	1,684	34,800	813	16,800
Idaho	56,628	1,170,600	57,431	1,187,200
Maryland			10	200
Montana	240,825	4,978,300	200,446	4,143,600
Nevada	574,874	11,883,700	558,064	11,536,200
New Mexico	70,632	1,460,100	58,974	1,219,100
North Carolina	8,258	170,700	6,303	130,300
Oregon	90,321	1,867,100	76,887	1,589,400
Philippine Islands	63,898	1,320,900	53,179	1,099,300
Porto Rico	34	700	135	2,800
South Carolina	174	3,600	155	3,200
South Dakota	358,145	7,403,500	354,732	7,334,000
Tennessee	329	6,800	309	6,400
Texas	87	1,800	426	8,800
Utah	180,045	3,907,900	163,362	3,377,000
Virginia	24	500	15	300
Washington	22,330	461,600	28,435	587,800
Wyoming	672	13,900	324	6,700
Total	4,887,604	\$101,085,700	4,572,976	\$94,531,800

WORLD'S PRODUCTION OF GOLD (U. S. G. S.)

1860	\$134,083,000	1875	\$ 97,500,000	1890	\$118,848,700	1905	\$380,288,700
1861	122,989,000	1876	109,700,000	1891	130,350,000	1906	402,508,000
1862	122,989,000	1877	113,947,200	1892	146,651,500	1907	412,968,600
1863	122,989,000	1878	118,092,800	1893	167,494,800	1908	442,478,900
1864	122,989,000	1879	108,778,800	1894	187,176,600	1909	454,059,100
1865	122,989,000	1880	106,436,800	1895	192,768,600	1910	458,339,100
1866	129,614,000	1881	108,028,100	1896	202,251,600	1911	461,989,700
1867	129,614,000	1882	101,996,800	1897	236,083,700	1912	464,186,100
1868	129,614,000	1883	95,392,000	1898	266,879,700	1913	454,942,211
1869	129,614,000	1884	101,729,600	1899	308,724,100	1914	453,000,000
1870	129,614,000	1885	108,438,600	1900	254,576,800		
1871	115,577,000	1886	108,189,900	1901	260,592,900		
1872	115,577,000	1887	105,774,900	1902	297,737,800		
1873	96,200,000	1888	110,196,900	1903	327,702,700		
1874	90,750,000	1889	123,489,200	1904	347,877,200		
							Tot. \$11,257,320,811

WORLD'S PRODUCTION OF GOLD, BY COUNTRIES

Country	1909	1910	1911	1912	1913	1914
North America:						
United States	\$99,673,400	\$96,269,100	\$96,890,000	\$93,451,500	\$88,884,400	\$94,531,800
Canada	8,822,200	10,205,800	9,782,100	12,648,800	16,216,181	15,925,044
Mexico	28,842,900	24,910,600	24,880,100	24,500,000	18,250,000	18,000,000
Cuba			20,000		24,900	
Africa	170,988,600	175,189,900	191,538,400	211,860,600	208,875,000	201,000,000
Australasia	71,007,900	65,470,600	60,184,200	54,509,400	53,038,090	49,388,180
Europe:						
Russia and Finland	32,381,300	35,579,600	32,151,600	22,199,000	24,578,575	26,750,000
Austria-Hungary	1,942,000	2,172,600	2,185,100	2,048,200	2,180,414	1,500,000
Germany	69,200	62,900	78,100	78,100	60,000	
Norway		1,400				
Sweden	10,100	2,000	2,000	20,300	38,630	
Italy	24,200	29,600	44,800	11,000	30,572	
Spain and Portugal	2,900	2,800	2,400	2,800	2,500	
Turkey	500	500	500	500	500	
France	1,400,800	1,707,100	1,812,100	1,812,100	1,946,600	1,000,000
Great Britain	21,500	39,600	39,600	27,800	17,860	
Servia	150,800		251,100	251,100	250,000	100,000
South America:						
Argentina	189,900	173,100	289,000	107,300	100,000	
Bolivia and Chile	492,400	468,600	362,500	175,000	800,000	500,000
Colombia	3,179,900	3,370,000	3,187,800	2,971,700	8,000,000	3,000,000
Ecuador	274,400	249,200	276,800	406,500	289,122	
Brazil	2,252,900	1,954,700	3,834,500	3,870,900	8,009,786	3,000,000
Venezuela	280,800	340,500	364,800	622,500	444,800	

WORLD'S PRODUCTION OF GOLD, BY COUNTRIES.

Guiana—						
British	1,192,700	1,192,700	892,000	879,800	1,858,368	1,250,000
Dutch	621,000	792,600	523,400	407,300	470,433	500,000
French	2,143,800	2,229,100	2,229,100	3,050,800	3,050,600	3,000,000
Peru	514,500	465,900	492,800	492,200	492,200	500,000
Uruguay	91,600	91,600	70,600	111,000	111,000	.....
Central America	2,680,100	4,657,400	3,860,400	3,080,400	3,000,000	3,500,000
Asia:						
Japan	3,616,900	3,908,600	4,118,600	4,467,000	4,470,723	4,476,500
China	9,852,100	8,658,100	3,314,600	3,668,900	3,658,900	3,800,000
Indo-China	65,900	55,000	74,700	74,700	70,000	.....
Chosen (Korea).....	1,998,600	4,399,100	2,889,400	2,852,600	3,281,333	3,750,000
Siam	327,600	56,500	56,500	56,500	56,500	.....
India, British.....	10,858,600	10,718,400	11,054,100	11,055,700	11,152,463	11,388,876
East Indies, British	1,486,900	1,446,800	1,389,400	1,352,000	1,352,000	.....
East Indies, Dutch.	2,146,460	3,387,100	3,387,100	3,387,100	3,387,100	4,750,000
Total	454,089,100	455,239,100	461,939,700	466,136,100	454,942,211	458,000,000

Figures from U. S. Geological Survey report, 1914.

DERIVATION OF GOLD PRODUCTION OF THE UNITED STATES

Production by:	Percentage of total output—		
	1912	1913	1914
Placers.....	24.8	24.9	25.3
Gold and silver mills:			
By amalgamation	22.3	21.5	20.9
By cyanidation	30.9	31.2	31.4
By chlorination .....	.4	.3	.2
Total milling	53.6	53.0	52.5
Smelting	21.6	22.1	22.2
Total	100.0	100.0	100.0

IRIDIUM—See Platinum.

IRIDOSMINE (osmiridium)—See Platinum.

LEAD STATISTICS

The lead production of the U. S. comes largely from three States, Missouri, Idaho and Utah, whose 1915 output was 195,634 tons, 160,680 tons, and 106,105 tons, respectively. Colorado produced only 32,352 tons.

The great bulk of Missouri's output comes from the south-eastern part of the State, where a half-dozen companies work on 3 to 4% disseminated ore. The characteristic of this district is that lead alone, without zinc, is produced. Idaho's production comes from the lead-silver-zinc ores of the Coeur d'Alene district, which in some years leads all others. Utah's production comes mainly from the silver-lead ores of Park City and Bingham and the mixed ores of the Tintic district.

Only 43,029 tons of lead from foreign ore mainly British Columbia and Mexico was refined in the United States last year, compared with 94,984 tons in 1911. The production of lead from domestic ores in 1915 reached the total of 537,012 tons, a healthy increase from 389,211 tons in 1910. Next to the United States, the important lead-producing countries of the world are Spain and Australia.

The vital figures of the industry are given in the following tables:

U. S. LEAD PRODUCTION (SHORT TONS), PRICE AND VALUE

Year.	Desilverized Lead.	Soft Lead.	Total Production.	From domestic ores and base bullion.	From foreign bullion.	From foreign New York.	Price at New York.	Value.
1720-1868		755,400	755,400	755,400			\$	79,829,200
1868		17,600	17,600	17,600			.065	2,275,000
1870		17,830	17,830	17,830			.063	2,246,580
1871	970	19,000	19,970	19,970			.061	2,436,340
1872	5,220	20,590	25,720	25,720			.063	3,240,720
1873	19,559	22,381	41,940	41,940			.063	5,284,440
1874	27,074	23,556	51,230	51,230			.060	6,147,600
1875	33,859	24,731	58,590	58,590			.059	6,913,620
1876	36,519	20,421	62,940	62,940			.061	7,678,680
1877	49,228	31,152	80,380	80,380			.055	8,841,800
1878	62,360	26,770	89,130	89,130			.036	6,417,360
1879	62,710	28,130	90,840	90,840			.041	7,448,880
1880	68,035	27,690	95,725	95,725			.050	9,572,500
1881	83,725	30,770	114,495	114,495			.046	10,991,520
1882	100,765	29,015	129,780	129,780			.049	12,718,440
1883	118,497	21,800	140,297	140,297			.043	12,065,542
1884	116,365	19,932	136,297	136,297			.037	10,085,078
1885	104,217	21,975	126,192	126,192			.040	10,095,860
1886	111,389	20,800	132,189	127,189	5,000		.046	12,161,388
1887	131,482	25,148	156,630	141,630	15,000		.045	14,096,700
1888	146,925	20,090	176,015	147,379	28,636		.044	15,489,320
1889	149,099	20,258	178,357	151,787	26,570		.039	13,911,846
1890	126,493	31,351	157,844	139,720	18,124		.045	14,205,960
1891	166,966	31,397	198,363	174,511	23,852		.043	17,059,218
1892	176,545	31,678	208,223	168,266	39,957		.041	17,074,286
1893	191,807	32,513	224,320	158,969	65,351		.037	16,599,680
1894	175,964	37,686	213,650	153,911	59,739		.033	14,100,900
1895	196,932	39,890	236,822	159,649	76,173		.032	15,092,608
1896	213,950	43,537	257,487	179,749	77,738	Lowest	.030	15,449,220
1897	238,616	43,553	282,169	198,498	83,671		.036	20,316,188
1898	259,369	42,779	302,148	202,203	99,945		.038	22,963,248
1899	257,481	40,566	298,047	202,121	95,926		.045	26,824,230
1900	319,752	48,021	367,773	260,918	106,855		.044	32,364,024
1901	313,134	57,898	371,032	258,610	112,422		.043	30,908,762
1902	293,842	74,050	367,892	267,296	100,606		.041	30,167,144
1903	285,495	83,444	368,939	280,615	88,324		.042	30,990,876
1904	304,283	89,169	393,452	297,602	95,850		.043	33,836,872
1905	302,852	85,455	388,307	307,514	80,793		.047	36,500,858
1906	313,886	90,860	404,746	336,200	28,803	39,743	.057	46,141,044
1907	313,552	99,801	413,389	352,381	24,041	36,967	.053	43,819,234
1908	295,558	101,012	396,564	311,666	11,609	73,389	.042	33,311,376
1909	329,751	117,158	446,909	352,839	21,754	72,316	.043	38,434,174
1910	328,954	141,318	470,272	375,402	18,065	76,805	.044	41,383,936
1911	331,032	155,947	486,979	391,995	10,764	84,220	.045	43,828,110
1912	339,646	141,248	480,894	392,517	11,572	76,805	.045	43,280,460
1913	330,593	131,867	462,460	411,878	13,223	37,356	.044	40,696,480
1914	383,903	158,219	542,122	512,794	7,639	21,689	.039	42,285,516
1915	388,594	161,461	550,055	507,026	9,853	33,176	.047	51,705,000
Total	8,606,578	3,350,727	11,987,305	9,977,081	2,010,224			\$1,059,288,188

MONTHLY AVERAGE PRICE OF LEAD

Month	New York			St. Louis			London		
	1913	1914	1915	1913	1914	1915	1913	1914	1915
January	4.321	4.111	3.729	4.171	4.011	3.548	17.114	19.665	18.606
February	4.325	4.048	3.827	4.175	3.937	3.718	16.550	19.906	19.122
March	4.327	3.970	4.058	4.177	3.850	3.997	15.977	19.651	21.883
April	4.331	3.810	4.221	4.242	3.688	4.142	17.597	18.225	21.094
May	4.342	3.900	4.274	4.226	3.808	4.182	18.923	18.503	20.347
June	4.325	3.900	5.032	4.190	3.810	5.886	20.226	19.411	25.170
July	4.323	3.891	4.659	4.223	3.738	5.631	20.088	19.051	24.611
August	4.624	3.875	4.656	4.550	3.715	4.520	20.406	*	21.946
September	4.698	3.828	4.610	4.579	3.658	4.490	20.648	*	23.151
October	4.402	3.828	4.600	4.258	3.384	4.499	20.302	*	23.994
November	4.293	3.933	5.155	4.148	3.585	5.078	19.334	18.500	26.278
December	4.047	3.800	5.356	3.929	3.662	5.266	17.798	19.097	28.807
Year	4.370	3.862	4.628	4.238	3.737	4.567	18.743	18.743	22.917

New York and St. Louis, cents per pound. London, pounds sterling per long ton.
 * London Exchange closed.

LEAD PRICES IN NEW YORK

Yearly highest, lowest and average prices of pig lead in New York				Yearly highest, lowest and average prices of pig lead in New York			
Year	High	Low	Average	Year	High	Low	Average
1886	4.95	4.00	4.63	1902	4.15	4.00	4.10
1887	5.15	4.15	4.50	1903	4.70	4.10	4.28
1888	5.25	3.60	4.42	1904	4.60	4.10	4.32
1889	4.10	3.62½	3.93	1905	6.25	4.45	4.70½
1890	5.25	3.77½	4.48	1906	6.35	5.25	5.68
1891	4.62½	4.05	4.35	1907	6.35	3.50	5.35
1892	4.22½	3.72½	4.09	1908	4.60	3.65	4.23½
1893	4.15	3.22½	3.73	1909	4.75	3.95	4.30
1894	3.65	3.02½	3.29	1910	4.75	4.37½	4.49
1895	3.55	3.02½	3.23	1911	4.60	4.25	4.48
1896	Lowest: 3.25	2.67½	2.98	1912	5.15	4.00	4.48½
1897	4.40	3.60	3.58	1913	4.85	4.00	4.40
1898	4.12½	3.55	3.78	1914	4.15	3.50	3.87
1899	4.77½	3.92½	4.47	1915 Highest	7.62½	3.70	4.87½
1900	4.75	3.75	4.41½	Average price for 30 years			4.25
1901	4.37½	4.00	4.36				

SUMMARY OF LEAD STATISTICS IN SHORT TONS (U. S. G. S.)

	1909	1910	1911	1912
Total production of refined lead in the United States	446,901	470,272	486,979	480,394
Production of desilverized lead in the United States	329,751	328,954	331,032	339,646
Production of soft lead in the United States (including desilverized soft)	149,690	169,270	191,614	171,037
Production of antimonial lead in the United States	12,896	14,069	14,078	13,552
Production of lead from domestic ores	352,339	375,402	391,995	392,517
Production of secondary lead in the United States	41,687	55,422	54,284	67,168
Consumption of lead in the United States (disregarding stocks)	367,504	397,763	353,328	394,159
World production (approximate)	1,164,903	1,210,504	1,227,648	1,332,513
World consumption (approximate)	1,182,212	1,209,055	1,218,914	1,279,746
United States (domestic) percentage of world production	30.3	31.0	32.0	35.6
United States percentage of world consumption	31.1	32.9	29.0	30.8
World rank of United States in production of lead	First	First	First	First
World rank of United States in consumption of lead	First	First	First	First

SUMMARY OF LEAD STATISTICS IN SHORT TONS (U. S. G. S.)

	1913	1914	1915
Total production of refined lead in the United States	462,460	542,122	550,055
Production of desilverized lead in the United States	330,593	333,903	338,584
Production of soft lead in the United States (including desilverized soft)	161,300	201,725	205,462
Production of antimonial lead in the United States	16,665	16,667	23,224
Production of lead from domestic ores	411,878	512,784	507,026
Production of secondary lead in the United States	72,334	61,062	*71,300
Consumption of lead in the United States (disregarding stocks)	414,281	451,371	
World production (approximate)	1,270,458		
World consumption (approximate)	1,290,499		
United States (domestic) percentage of world production	32.4		
United States percentage of world consumption	32.1		
World rank of United States in production of lead	First		
World rank of United States in consumption of lead	First		

* Subject to revision; statistics not yet complete.

	1914	1915	Increase
Lead production of United States (short tons)	542,122	550,055	7,933 or 1.3%
Lead stocks of United States (primary, short tons)	449,052	426,751	22,301 "
Value of lead production of United States	\$42,286,000	\$51,705,000	\$9,419,000 " 22%

LEAD PRODUCTION OF THE UNITED STATES, AND THE SOURCE OF ORE

United States Geological Survey Figures						
Domestic Ore:	1910	1911	1912	1913	1914	1915
Alaska	75	51	46	6	.....	353
Arizona	948	3,428	3,891	4,901	5,901	6,963
Arkansas .....	.....	15	.....	.....	52	51
California	1,207	615	811	3,294	3,698	5,606
Colorado	38,542	30,442	37,039	42,840	41,198	32,352
Idaho	109,951	117,335	127,780	137,802	177,327	160,680
Illinois	268	308	513	619	427	910
Iowa .....	.....	.....	.....	.....	34	.....
Kansas	1,308	2,522	1,937	1,504	1,043	1,320
Kentucky	50	.....	91	16	16	95
Missouri	161,659	182,208	162,610	152,430	194,275	195,684
Montana	1,848	2,484	2,517	3,256	4,386	4,853
Nevada	2,246	1,082	5,699	6,142	5,996	7,664
New Hampshire .....	.....	.....	.....	.....	.....	3
New Mexico	1,890	1,371	2,511	1,821	741	2,157
North Carolina	2	35	34	10	.....	.....
Oklahoma	1,805	1,925	2,500	3,214	3,916	4,246
Oregon .....	.....	11	21	37	17	11
South Dakota	8	33	12	7	2	5
Pennsylvania .....	.....	.....	.....	.....	.....	6
Tennessee .....	.....	.....	.....	.....	.....	8
Texas	86	57	30	108	89	111
Utah	60,605	54,933	60,664	71,069	88,976	106,105
Virginia	87	400	85	878	143	457
Washington	339	612	53	9	2	11
Wisconsin	3,909	3,966	3,301	2,639	1,319	2,632
Wyoming .....	.....	.....	.....	.....	.....	6
Undistributed	101	48	120	63	99	116
Zinc residues	2,237	1,987	3,131	3,785	4,125	4,567
Total from domestic ore.	339,211	405,863	415,395	436,430	534,482	537,012
Foreign Ore:						
Africa	3,310	582	1,774	5,976	2,942	.....
Canada	25	122	29	16	2	1,174
Central America	3	28	.....	.....	.....	1
Mexico	11,704	7,333	7,407	4,512	2,366	5,437
South America	2,996	2,677	2,332	2,617	1,821	2,829
Other foreign	27	22	30	102	488	140
Foreign Base Bullion:						
Mexico	76,805	84,220	76,805	37,359	21,689	33,176
South America .....	.....	.....	.....	.....	.....	275
Total from foreign ore and base bullion	94,870	94,984	88,377	50,532	29,338	43,029
Grand total, derived from all sources	434,081	500,847	503,772	487,012	563,810	580,044
* Primary lead is that smelted from ore.						
† The value is calculated upon the annual average of the daily quotation for spot lead at New York City.						

STOCKS OF REFINED LEAD AVAILABLE FOR CONSUMPTION IN THE U. S.

(U. S. Geological Survey figures)						
Supply:	1910	1911	1912	1913	1914	1915
Stock in bonded warehouses						
Jan. 1	17,405	35,972	4,481	10,492	5,310	7,668
Imports						
For consumption	15,359	13,281	14,146	11,990	7,336	9,630
For warehouse	98,249	76,671	69,414	45,165	20,952	41,816
Increase by liquidation .....	.....	.....	.....	.....	.....	2,250
Production from domestic ores	375,402	391,995	392,517	411,878	512,794	507,026
Total supply	501,415	517,919	480,558	479,515	546,442	568,440
Withdrawn:						
Exports of foreign lead—						
From warehouse	69,786	101,227	64,906	44,544	21,545	38,445
In manufactures, with benefit of drawback	8,309	12,080	11,320	9,757	9,399	3,993
Exports of domestic lead .....	.....	.....	.....	.....	53,722	57,092
Decrease by liquidation	7,661	14,812	5,692	419	56	.....
Stock in bonded warehouses						
Dec. 31	35,972	4,481	10,492	5,310	7,668	12,169
Total withdrawn	122,219	132,600	92,410	60,030	97,390	141,639
Available for consumption	379,196	385,319	388,148	419,485	449,052	426,751

Production of Secondary Lead in the United States

Pig lead	29,492	27,369	30,266	33,104	29,337	36,800
Lead in alloy.....	25,980	26,895	36,902	39,730	31,725	35,000
Total recovered lead.....	55,472	54,264	67,168	72,834	61,077	71,800

Lead Production of the World in Short Tons (U. S. G. S.)

Country	1906	1907	1908	1909	1910	1911	1912	1913
Australia	102,514	106,928	131,174	85,098	108,907	109,789	118,387	137,897
Austria.....	18,078	16,975	16,095	15,432	19,290	21,605	23,589	26,565
Belgium	24,471	28,417	39,352	44,428	44,864	48,832	56,488	55,907
Canada	26,235	18,338	18,849	22,928	16,555	11,795	17,968	18,849
France	28,219	25,858	28,770	29,652	22,266	26,014	34,282	30,864
Germany.....	168,117	157,156	185,076	184,745	174,604	181,218	194,666	199,627
Great Britain.....	26,455	30,208	32,738	31,085	32,628	28,680	32,187	33,620
Greece	18,888	15,212	17,637	16,865	18,519	18,768	15,988	20,232
Italy	23,479	25,248	28,060	24,861	15,933	18,408	23,099	23,282
Japan	3,358	3,358	3,197	3,748	3,353	4,630	4,960	3,938
Mexico.....	59,524	79,866	121,253	180,071	133,048	137,347	132,276	68,343
Russia.....	331	110	110	882	1,323	1,102	1,102	1,102
Spain	199,406	204,918	202,052	202,323	211,531	193,013	205,799	223,787
Sweden.....	832	832	331	220	441	1,218	1,433	1,633
Turkey in Asia.....	10,582	11,464	18,007	13,338	13,999	13,668	13,779	15,333
Other countries.....	220	220	551	6,393	17,306	22,597	13,448	6,394
United States (domestic refined).....	336,200	352,331	311,666	352,339	375,402	391,995	392,517	411,373
Total.....	1,089,909	1,072,019	1,150,517	1,164,903	1,210,504	1,227,643	1,282,513	1,270,458
United States percentage of world's production.....	32.3	32.9	27.1	30.3	31.0	32.0	30.6	32.4

No figures of the world's production in 1914 and 1915 are available.

IMPORTS OF LEAD, IN ORE, BASE BULLION, AND REFINED, BY COUNTRIES, IN POUNDS

Country	1910	1911	1912	1913	1914	1915
United Kingdom.....	1,374,750	401,686	279,546	404,594	245,543	185,236
Germany.....	421,377	56,236	494,237	262,182	439,919	.....
Other European countries.....	418,669	111,189	55,356	143,293	123,085	32,537
Total from Europe.....	2,714,796	569,161	829,139	810,019	4,898,552	217,773
British North America.....	206,979	270,947	319,497	383,569	394,007	2,303,170
Mexico.....	208,290,307	172,633,479	159,455,664	95,693,439	46,232,207	94,247,334
South America.....	6,598,233	4,778,221	3,207,936	3,766,337	2,417,744	5,420,597
Other countries.....	4,394,421	1,651,544	3,309,356	3,685,612	2,694,233	302,516
Total imports.....	21,204,766	179,908,352	167,121,592	114,293,966	56,676,303	102,991,410

1914 and 1915 figures for Germany, include German South Africa, which formerly went under "Other countries."

IMPORTS OF LEAD, BY CLASSES, IN POUNDS

Year.	Lead in ore (lead content)	Base bullion		Pigs, bars, sheets, and old	Total lead content*
		Gross weight	Lead content*		
1907.....	64,315,254	76,259,828	74,594,313	18,554,899	157,964,466
1908.....	64,708,204	153,921,829	150,560,176	5,518,621	220,787,001
1909.....	71,357,868	149,852,559	146,579,779	7,152,665	225,900,312
1910.....	94,751,054	118,061,415	115,483,542	6,970,170	217,204,766
1911.....	35,686,180	141,481,852	138,952,372	5,264,800	179,903,352
1912.....	19,577,499	152,420,624	146,999,168	544,925	167,121,592
1913.....	19,833,313	96,908,170	94,327,654	82,999	114,293,966
1914.....	23,649,637	38,444,503	32,730,320	296,843	56,676,303
1915.....	18,135,140	86,247,995	83,986,938	319,232	102,991,410

* Lead content of bullion for 1907-1909 estimated on the basis of average lead content of imports of base bullion in 1910.

EXPORTS OF LEAD FROM THE UNITED STATES—BY U. S. GEOLOGICAL SURVEY

Stocks—	1909	1910	1911	1912	1913	1914	1915
Stock in bond, January 1....	18,565	17,405	35,972	4,481	10,492	5,310	7,668
Imports—							
For consumption.....	18,036	15,359	13,281	14,146	11,980	7,386	.....
For export.....	96,145	93,249	76,671	69,414	45,165	20,952	60,850
Domestic production.....	352,839	375,402	391,995	392,517	411,878	512,794	516,662
Total supply.....	485,583	501,415	517,919	480,558	479,515	546,442	586,985
Exports, etc.—							
Exports of foreign lead.....	86,077	69,786	101,227	64,906	44,544	21,545	43,000
Exports under drawback.....	4,796	8,800	12,080	11,320	9,779	9,438	.....
Exports of domestic lead.....	.....	.....	.....	.....	.....	58,722	76,000
Decrease by liquidation.....	8,643	7,661	14,812	5,692	419	56	.....
Stocks in bond December 31..	17,405	35,972	4,481	10,492	5,310	7,668	16,000
Total withdrawn.....	116,921	122,219	132,600	92,410	60,052	97,429	135,000
Available for consumption...	368,664	379,196	385,319	888,148	419,463	449,013	451,985

CONSUMPTION OF LEAD, BY COUNTRIES, IN SHORT TONS

Country—	1907	1909	1909	1910	1911	1912	1913
Australia.....	5,952	8,601	5,401	7,937	10,031	11,133	10,532
Austria-Hungary.....	27,778	81,906	34,171	34,722	39,903	41,667	39,123
Belgium.....	36,596	28,880	48,060	35,274	47,899	49,493	47,239
Canada.....	16,658	15,102	28,589	19,621	23,259	33,069	35,248
France.....	89,897	114,749	112,765	96,986	109,789	115,411	118,007
Germany.....	206,180	287,215	284,680	280,270	256,726	255,644	246,394
Great Britain.....	214,287	252,595	223,486	229,719	218,586	216,381	210,980
Holland.....	5,732	5,961	6,504	7,165	7,496	6,944	10,472
Italy.....	38,290	40,296	34,612	31,085	40,013	36,376	35,935
Japan.....	18,988	10,582	12,676	18,198	20,883	24,080	30,393
Russia.....	27,668	49,349	42,328	53,792	47,289	50,265	64,315
Switzerland.....	5,842	6,514	5,842	6,504	5,512	7,055	6,393
Other European countries.....	3,417	4,416	4,409	4,740	3,856	4,850	6,944
Other countries.....	22,377	27,227	26,235	33,289	34,392	33,069	33,069
United States.....	867,908	824,176	867,504	897,768	853,828	894,159	414,231
Total world's consumption.....	1,078,005	1,157,469	1,182,212	1,206,055	1,218,914	1,279,746	1,290,499
Percentage U. S. production.....	84%	28%	30.3%	31%	32%	30.9%	32.4%

Lead Smelters and Refineries in North America in 1914

(Most important plants in blackface type.)

UNITED STATES

ARIZONA:

Mowry—Consolidated Mines, Smelter & Transportation Co. (Idle.)

CALIFORNIA:

Keeler—Four Metals Mining & Smelting Co. (Idle.)

- Needles—Needles Mining & Smelting Co. (Subsidiary of U. S. Sm. Ref. & Mng. Co. (Idle.)

Selby—Selby Smelting & Lead Co. Refinery also. Am. Smelters Sec'y Co.

COLORADO:

Denver—Globe plant, American Smelting & Refining Co.

Durango—Durango plant, American Smelting & Refining Co.

Georgetown—Western Metals Co. Malm dry chlorination process.

Leadville—Arkansas Valley plant, American Smelting & Refining Co.

Pueblo—Pueblo plant, American Smelting & Refining Co.

Salida—The Ohio & Colorado Smelting & Refining Co.

IDAHO:

Clayton—Red Bird Smelting Co.
 Enaville—North Fork Smelting & Mining Co. (Idle.)
 Ponderay—Idaho Smelting & Refining Co. (Idle.)
 Sea Foam—Greyhound Mining & Milling Co. (Idle.)

ILLINOIS:

Aurora—Aurora Metal Co. Secondary metals, but some ore also.
 Chicago—Goldsmith Bros.' Smelting & Refining Co. Secondary lead, but some ore.
 Chicago—Great Western Smelting & Refining Co. Secondary lead, but some ore.
 Chicago—National plant, American Smelting & Refining Co. Refinery only. Dismantled at end of 1914.
 Collinsville—St. Louis Smelting & Refining Co. Refinery also. Nat'l Lead Co.
 Federal—Federal Lead Co. Am. Smelters Sec. Co.
 Granite City—Hoyt Metal Co. Smelts secondary lead, but also some ore.

INDIANA:

East Chicago—International Lead Refining Co. Refinery only. Intern'l Sm. & Ref. Co.
 East Chicago—U. S. Reduction Co. Smelts secondary lead and some ore.
 Grasselli—United States Metals Refining Co. Refinery only. Betts electrolytic process.

IOWA:

Dubuque—J. W. Watters. Not operated for some years.

KANSAS:

Galena—Galena Smelting & Manufacturing Co.

MISSOURI:

Desloge—Desloge Consolidated Lead Co.
 Granby—Granby Mining & Smelting Co.
 Herculaneum—St. Joseph Lead Co.
 Joplin—Picher Lead Co.
 Valle Mines—Valle Mining Co. Not operated for some years.
 Webb City—Webb City Smelting & Manufacturing Co.

MONTANA:

Cooke—Western Smelting & Power Co. (Idle.)
 East Helena—East Helena plant, American Smelting & Refining Co.
 Helena—Northwestern Metals Co. Dry chlorination process. (Idle 1915.)

NEBRASKA:

Omaha—Omaha & Grant Smelting Co. Refinery only. Betts electrolytic process. Am. Sm. & Ref. Co.

NEVADA:

Nelson—Santa Barbara Searchlight Mining Co. (Idle.)
 Spruce—Black Forest Mines & Smelting Co. (Idle.)

NEW JERSEY:

Newark—Balbach Smelting & Refining Co. Refinery also.
 Perth Amboy—Perth Amboy plant, American Smelting & Refining Co. Refinery also.

NEW MEXICO:

Deming—National Mining & Smelting Co. (Idle.)

PENNSYLVANIA:

Carnegie—Pennsylvania Smelting Co. Refinery also.

TEXAS:

El Paso-Kansas City Consolidated Smelting & Refining Co. (Am. Sm. Ref. Co.)

UTAH:

Midvale—United States Smelting Co. (Subsid. U. S. Sm., Ref. & Mng. Co.)

Murray—Murray plant, American Smelting & Refining Co.

Silver City—Tintic Smelting Co. (Idle several years.)

Tooele—International Smelting Co.

WASHINGTON:

Keller—Keller & Indiana Consolidated Smelting Co. (Idle several years.)

Northport—Northport Smelting & Refining Co.

WISCONSIN:

Dodgeville—Blue Mounds Mining & Smelting Co. (Idle.)

Waukesha—Northern Smelting Co. (Idle.)

CANADA

BRITISH COLUMBIA:

Trail—Consolidated Mining & Smelting Co. of Canada (Ltd.). Refinery also. Betts electrolytic process.

ONTARIO:

Kingston—North American Smelting Co. (Ltd.)

MEXICO

AGUASCALIENTES:

Aguascalientes—American Smelting & Refining Co.

CHIHUAHUA:

Chihuahua—American Smelting & Refining Co.

Uruachic—Uruachic Mining & Smelting Co. (Ltd.)

COAHUILA:

Saltillo—Mazapil Copper Co. (Ltd.)

Torreón—Compañía Metalúrgica de Torreón.

DURANGO:

Asarco (Velardena)—American Smelters Securities Co.

Mapimi—Compañía Minera de Penoles. (Am. Metal Co.)

GUERRERO:

Campo Morado—Reforma Mining & Milling Co. (Idle.)

NUEVO LEON:

Monterey—American Smelting & Refining Co.

Monterey—Compañía Minera, Fundidora y Afinidora, S. A. Refinery also.

SAN LUIS POTOSI: Plant wrecked by revolutionists, 1914.

Matehuala—American Smelters Securities Co. (National Metallurgical Co.)

San Luis Potosi—Compañía Metalúrgica Mexicana.

SONORA:

Guaymas—Pacific Smelting & Refining Co. (Mexican-American Smelting & Refining Co., Ltd.) (Idle and never operated.)

Ures—Yaqui Smelting & Refining Co., S. A. Refinery also. (Idle.)

ZACATECAS:

Chalchihuites—National Smelting Co. (Idle.)

MANGANESE

Manganese ore, to be salable, must contain 35% or more manganese, and for ferromanganese or ferro, 40% or better, with less than 8% silica, and not over 0.2% phosphorus. As 90% of the manganese ore used in the U. S. goes into ferro, the demand is chiefly for high-grade ore. For dry batteries, the ore must contain 50% manganese, present as manganese dioxide, and less than 1% iron or ½% copper, nickel or cobalt.

MANGANESE ORE SOLD IN THE UNITED STATES, IN LONG TONS *

	1918			1914			1915		
	Tons	Value	Price	Tons	Value	Price	Tons	Value	Price
Arkansas.....							1,343	\$13,333	\$9.93
California.....							2,563	29,004	11.32
Georgia.....							3,168	33,927	10.71
Virginia.....	4,048	\$40,480	\$10.00	1,724	\$18,565	\$10.77	1,620	17,988	11.10
Other States†.....				911	8,812	9.67	1,015	19,057	18.78
	4,048	40,480	10.00	2,635	27,377	10.39	9,709	113,309	11.67

* Min. Res. U. S. Geol. Survey 1915, p. 32.

† 1914: California and South Carolina; 1915: Alabama, Arizona, Colorado, Tennessee, Texas, and Utah.

MANGANESE ORE PRODUCTION OF THE UNITED STATES

	Long tons		Long tons		Long tons
1838-1879.....	43,800	1892.....	13,613	1905.....	4,118
1880.....	5,761	1893.....	7,718	1906.....	6,921
1881.....	4,395	1894.....	6,808	1907.....	5,604
1882.....	4,582	1895.....	9,547	1908.....	6,144
1883.....	6,155	1896.....	10,088	1909.....	1,544
1884.....	10,180	1897.....	11,108	1910.....	2,253
1885.....	23,258	1898.....	15,957	1911.....	2,457
1886.....	30,193	1899.....	9,325	1912.....	1,664
1887.....	24,524	1900.....	11,771	1913.....	4,048
1888.....	29,194	1901.....	11,995	1914.....	2,635
1889.....	24,197	1902.....	7,477	1915.....	9,709
1890.....	19,287	1903.....	2,325		
1901.....	22,452	1904.....	3,146		427,082

IMPORTS OF MANGANESE ORE INTO THE U. S.

Country—	1913		1914		1915	
	Quantity (long tons)	Value	Quantity (long tons)	Value	Quantity (long tons)	Value
Brazil.....	70,200	\$445,680	113,924	\$736,769	268,786	\$2,218,143
Russia.....	124,337	712,324	52,981	490,331		
British India.....	141,587	710,024	103,583	504,981	36,450	194,626
Cuba.....					5,141	69,453
France.....	1,114	12,578	5	1,580		
Netherlands.....			2,505	52,213	50	1,792
Japan.....	3	78	40	1,320	2,810	106,434
Germany.....	2,014	108,612	1,713	92,278	258	23,590
United Kingdom.....	227	12,082	8,321	136,206	49	4,780
Canada.....	5	681	64	1,357	325	12,969
Belgium.....			450	5,913		
All other countries.....	5,603	32,671	8	1,177	116	1,529
Total imports.....	345,090	2,029,650	283,294	2,024,120	813,965	2,633,286

MANGANIFEROUS ORES PRODUCED IN THE UNITED STATES, IN LONG TONS

Year	Arkansas	Colorado*	Colorado†	Lake Superior region	Virginia	Other States	Total
1906.....	8,900	32,400	(‡)	\$1,000,000	.....	.....	1,041,300
1907.....	4,133	67,514	32,197	214,316	.....	(N. M.) 7,000	425,160
1908.....	4,066	15,973	35,581	467,140	274	.....	523,034
1909.....	3,325	12,905	52,119	775,035	305	.....	843,689
1910.....	5,030	.....	55,770	558,634	801	.....	619,735
1911.....	2,177	.....	41,758	477,920	507	.....	522,357
1912.....	1,332	.....	48,618	816,984	1,567	.....	868,501
1913.....	9,650	.....	49,753	612,748	.....	.....	672,146
1914.....	1,970	2,100	37,781	402,754	1,222	.....	445,827
1915.....	2,600	15,950	14,965	659,025	1,944	1106,800	801,290
	43,183	146,848	368,537	6,984,551	6,120	113,800	6,763,039

* Manganiferous silver ore used in the manufacture of spiegeleisen and ferromanganese. † Manganiferous silver ore used for flux. ‡ not recorded. § Estimated. ¶ Arizona, Georgia, and Nevada.

MANGANIFEROUS RESIDUUM PRODUCED FROM ZINC ROASTING IN THE UNITED STATES

	Long tons		Long tons
1889.....	43,848	1903.....	73,264
1890.....	48,560	1904.....	68,189
1891.....	38,228	1905.....	90,289
1892.....	31,859	1906.....	93,461
1893.....	37,512	1907.....	93,413
1894.....	26,981	1908.....	110,225
1895.....	48,249	1909.....	141,264
1896.....	44,953	1910.....	137,173
1897.....	33,924	1911.....	109,296
1898.....	48,502	1912.....	104,670
1899.....	65,010	1913.....	102,239
1900.....	87,110	1914.....	100,193
1901.....	52,811	1915.....	159,318
1902.....	65,246		
		Total.....	2,050,092

FERROMANGANESE AND SPIEGELISEN PRODUCED IN THE UNITED STATES

	Long tons		Long tons		Long tons
1872.....	4,072	1888.....	48,901	1903.....	192,661
1873.....	3,930	1889.....	76,628	1904.....	219,446
1874.....	4,070	1890.....	133,160	1905.....	289,983
1875.....	6,993	1891.....	127,768	1906.....	300,500
1876.....	5,907	1892.....	179,181	1907.....	339,948
1877.....	7,897	1893.....	81,118	1908.....	152,018
1878.....	9,580	1894.....	120,180	1909.....	225,040
1879.....	12,483	1895.....	171,724	1910.....	226,216
1880.....	17,503	1896.....	131,940	1911.....	178,615
1881.....	18,837	1897.....	173,695	1912.....	227,989
1882.....	19,619	1898.....	218,769	1913.....	226,476
1883.....	21,941	1899.....	219,768	1914.....	177,356
1884.....	30,262	1900.....	255,977	1915.....	258,816
1885.....	30,956	1901.....	291,461		
1886.....	42,841	1902.....	212,984	Total.....	5,731,860
1887.....	42,408				

Ore Buyers:

The principal purchasers of manganese ores are as follows: N. A. Adler, Batesville, Ark.; Alleghany Ore. & Iron Co., Iron Gate, Va.; American Carbon & Battery Co., E. St. Louis, Ill.; American Manganese Mfg. Co., Dunbar, Pa.; American Smelting & Refining Co., Murray, Utah; American Steel Foundries, Pittsburgh, Pa.; Burney & Smith, New York, N. Y.; Carnegie Steel Co., Pittsburgh, Pa.; Delaware River Steel Co., Chester, Pa.; Eureka Manganese Co., Birmingham, Ala.; Robert Gilchrist, Elizabethtown, N. J.; Harshaw, Fuller & Goodwin Co., Cleveland, Ohio; Hickman Williams & Co., St. Louis, Mo.; Illinois Glass Co., Alton, Ill.; Illinois Pacific Glass Co., San Francisco, Cal.; J. S. Lawson & Bro., Inc., 80 Maiden Lane, N. Y.; Manhattan Electrical Supply Co., New York, N. Y.; Napier Iron Works, Napier, Tenn.; National Alloys Co., Philadelphia, Pa.; National Paint &

Manganese Co., Lynchburg, Va.; Noble Electric Steel Co., Heroult, Cal.; Pulaski Iron Co., Pulaski, Va.; Sloss Sheffield Steel & Iron Co., Birmingham, Ala.; U. S. Steel Corporation, Pittsburgh, Pa.; U. S. Steel Corporation, South Chicago, Ill.; U. S. Steel Corporation, Birmingham, Ala.

MANGANESE MINES

Arps Group.....	California	Crimora Manganese Corp....	Virginia
Bunker Hill Mines Co.....	Arizona	Ponupo Mining Co.....	Cuba
Clark Mine (Idle).....	Michigan	U. S. Manganese Co.....	Virginia

MOLYBDENUM

The amount of molybdenum produced in the U. S. has never exceeded a few tons a year and the annual consumption is unknown. Imports comprise but small quantities of molybdenite, the sulphide ore, and some wulfenite, molybdenum metal, and ferro-molybdenum.

The world's supply, mostly molybdenite, comes from New South Wales, Queensland and Norway. In 1915, the Primos Chemical Co. operated a molybdenite mine at Camp Boericke near Empire, Colo., and several other properties in the same state were worked on a small scale. A little was mined in Washington. In British Columbia a molybdenum mine, 13 miles from Anyox, is reported to have a 50-ton flotation plant, which was expected to start operating by Aug., 1916.

Uses: Molybdenum has rather limited uses and while it can be used instead of tungsten in high speed steels and in the manufacture of ordnance, such use is practically prohibited in the U. S. by the Halcomb patent. The metal is also used in electric resistance furnaces as supports for filaments in electric light bulbs, and Roentgen ray tubes and in alloys such as stellite. The salts have a limited use in chemical technology.

As noted above the use of molybdenum by American steel manufacturers has been greatly retarded if not prohibited by the Halcomb patent, issued in 1903, and held by the Crucible Steel Co. This controls the manufacture of the best grades of molybdenum-steel, using quantities of 6 to 15% molybdenum, less than 1.2% carbon and 2% silicon; the patent also controls the use of chromium in practicable amounts in conjunction with steels of the composition specified. France and Germany make large quantities of molybdenum steel. The results in those countries make it certain that when the Halcomb patent expires the use of molybdenum in America will be quickly extended and its production receive a sudden stimulus. The metal is more abundant than tungsten, and the exhaustion of the richer bodies of tungsten ore is likely to result in a maintenance of a price so that molybdenum will become a strong competitor.

An average price for molybdenite cannot be given. Production and demand have been small and irregular; most of the molybdenite being bought by individual bargaining. The price has ranged in general, from 15 to 30c per lb. for molybdenite, containing 92% MoS₂, until the past couple of years; during 1915-16 it sold as high as \$2 per lb. for 92% molybdenite; such prices are of course ephemeral. In 1915 Canada produced 28,600 tons of molybdenite, valued at \$28,460.

Ore Buyers:

The following firms are users and buyers of molybdenite: J. T. Baker Chemical Co., Phillipsburg, N. J.; Baker & Adamson Chemical Co., Easton,

Pa.; Foote Mineral Co., 107 N. 19th St., Philadelphia, Pa.; Goldschmidt Thermit Co., 90 West St., New York; Primos Chemical Co., Primos, Pa.; S. Schaaf-Regelman, 21 State St., New York; Henry E. Wood & Co., 1734 Arapahoe St., Denver, Colo.; York Metal & Alloys Co., York, Pa.

The following companies and individuals are producers, 1916:

American Molybdenum Co., Yucca, Ariz.

Arizona Rare Metals Co., Tucson, Ariz.

Duquesne Mining & Reduction Co., Box 45, Pittsburgh, Pa. Claims 20 miles from Patagonia, in Patagonia district, Santa Cruz County, Arizona. Postoffice of claims, Duquesne, Ariz.

Thompson & Porter, 322 Story Building, Los Angeles, Cal.

Primos Chemical Co., Primos, Pa. Claims at Camp Boericke, in Clear Creek County, Colorado.

Pingrey Mines & Ore Reduction Co., Leadville, Colo. Claims are on Bartlett Mountains, $1\frac{1}{4}$ miles from Climax, 10 or 15 miles from Leadville, Colo., in Summit County.

Montana Molybdenum Mining Co., Chico, Mont. Claims are in Emigrant district, 9 miles from Chico, in charge of L. A. Van Horn.

Margarito Romero, Las Vegas, N. Mex.

C. H. Gibbs, Geologist, Utah Fuel Co., Salt Lake City, Utah. Interested with Fred Redmond in claims about 2 miles west of Alta, in Little Cottonwood canyon.

Empire Molybdenite Mining & Milling Co., Spokane, Wash. Claims in T. 37 N., R. 44 E., in Metaline district, Pend Oreille County, Washington.

Aurelia Crown Point Mines, Box 187, Seattle, Wash. Property at Lucerne, Lake Chelan district, Chelan County, Washington.

NICKEL

Nickel ores, as such are not mined in the U. S., though nickel is saved as a by-product in electrolytic refining of copper, and marketed both in the form of sulphate and as the metal. In 1914 an equivalent of 845,334 lbs metallic nickel, valued at \$313,000 was produced in this way; it collects in the electrolyte slime and is obtained from there.

Nickel occurs in small amounts in many copper ores, being found in blister copper (in pounds per hundred tons), from the following smelteries: Anaconda, Mont., 22; Great Falls, Mont., 68; Garfield, Utah, 40; Steptoe, Nev., 64; Omaha, Neb., 644; Mountain, Cal., 172; Tacoma, Wash., 770; Aguascalientes, Mex., 132; Cerro de Pasco, Peru, 32; Mount Lyell, Tasmania, 166.

The world's supply comes mainly from Ontario and is imported into the U. S., in the form of copper nickel matte, or as Monel metal from the International Nickel Co.'s smelter at Copper Cliff, Ont., from ores mined at Sudbury, Ont. The refineries are located at Constable Hook, Bayonne, N. J. A much smaller quantity of rich matte has also been imported from Belgium and refined at New Brunswick, N. J., by the United States Nickel Co.

Canada also produces nickel from the silver ores of the Cobalt district and those of the Alexo mine at Temiskaming. The smelters and refineries treating the Cobalt output make nickel oxide and in 1915 also made refined metallic nickel. The Sudbury, Ontario, smelters produced a Bessemer matte, the 1915 output being 67,703 tons holding 39,216,165 lbs. copper and 68,077,823 lbs. nickel. Exports amounted to 66,410,400 lbs. nickel, val-

ued at 11.13 cts. per lb., while the refined metal exported from the U. S. was valued at 37.95 cts. compared with 34 cts. in 1914.

The market price for 1915 varied from 45 to 50 cts. per lb. for ordinary forms.

Use: large amounts of nickel are used in the manufacture of armor plate which requires 3 to 4% nickel; it is used in bridge and structural steel; in automobile manufacture, in axles, steering gear, etc.; in the manufacture of German silver and is a constituent of Monel metal, the converter product of the Sudbury ores which carries 67% nickel, 28% copper, and 5% other metals.

NICKEL PRODUCTION OF CANADA (ONTARIO) IN TONS (2,000 POUNDS)

	Ore mined	Ore smelted	Bess. matte	Copper. in matte	Nickel in matte	Value
1911	611,511	610,834	32,607	8,966	17,049	\$ 4,945,592
1912	737,584	725,065	41,925	11,116	22,421	6,303,102
1913	784,697	823,403	47,150	12,938	24,838	7,076,945
1914	1,000,364	947,053	46,396	14,448	22,759	7,189,031
1915	1,364,048	1,272,283	67,703	19,608	34,039	10,352,344

CANADIAN NICKEL EXPORTS, IN POUNDS

	1911	1912	1913	1914	1915
Nickel contained in matte, etc.—	1911	1912	1913	1914	1915
Exported to Great Britain..	5,023,393	5,072,867	5,164,512	10,291,979	13,748,000
Exported to United States..	27,596,578	39,148,993	44,224,119	36,015,642	52,662,400
Exported to other countries..			70,386	220,706	
	32,619,971	44,221,860	49,459,017	46,588,327	66,410,400

U. S. IMPORTS AND EXPORTS OF NICKEL AND NICKEL OXIDE, IN POUNDS

	1911	1912	1913	1914	1915*
Imports of ore and matte.. Tons	23,993	33,101	37,623	29,564	41,053
Nickel contents..... Lbs.	29,545,967	42,168,769	47,194,101	35,006,700	50,099,707
Exports of nickel from United States—					
To France..... Lbs.	5,463,358	5,083,947	3,631,858	3,457,157	2,749,554
To Netherlands..... "	9,101,150	7,387,447	6,622,811	855,168	52,770
To United Kingdom.... "	7,196,259	8,191,364	8,221,640	10,836,369	13,570,574
To other countries.... "	3,338,819	5,152,258	10,096,779	12,446,458	8,130,687
Total..... "	25,099,586	25,815,016	29,173,088	27,595,152	24,503,585

* Eleven months only.

NICKEL MINES

American Smelting & Refining Co.	Deloro Mining & Reduction Co.....
Athabasca Mining Co.....Canada	..... Ontario
Baltimore Copper Smelting & Rolling Co., (Refinery).....Maryland	Hecla Consolidated Mines Co. (Idle)..... Wyoming
Beaver Mt. Mining Co., (Idle) Alaska	Independence Mining Co., (small quantities)..... Wyoming
British American Nickel Corp. (Not yet producing).....Canada	International Nickel Co.....U. S. and Canada
Canadian Copper Co.....Ontario	Metals Chemical Co.....Ontario
Canadian Smelting & Refining Co.... Ontario	Mine La Motte Co.....Missouri
Cobalt Comet Mines, Ltd.... Ontario	Mond Nickel Co.....Ontario
Conlagas Mines, Ltd.....Ontario	Nipissing Mining Co., Ltd....Ontario
Conlagas Reduction Co., Ltd..Ontario	

PALLADIUM—See Platinum.

PLATINUM

The U. S. production of platinum is very small and the supply comes chiefly from Russia. The 1915 domestic production of 6,495 ounces is obtained mainly from the refining of gold and copper bullion of both domestic and foreign origin, but placer mines supplied 742 ounces.

Use: One of the most important uses of platinum is as a catalyzer in the manufacture of fuming sulphuric trioxide; in this use it is technically known as "contact mass," some of which contains as much as 7 to 8% of platinum. The loss in good practice is small. Platinum dishes and utensils are a necessity in chemical laboratories. Its use in the electric industry and in dentistry is becoming less each year, nichrome replacing it in electrical appliances.

PLATINUM IMPORTS

	Quantity, Troy oz.	Value	Retorts, etc.	Total
1905.....	93,912	\$1,985,107	\$188,156	\$2,173,263
1906.....	137,928	3,601,120	187,639	3,788,759
1907.....	74,292	2,508,991	175,651	2,684,642
1908.....	50,844	1,095,754	134,119	1,229,873
1909.....	118,853	2,557,596	416,352	2,973,948
1910.....	118,280	3,320,699	333,965	3,654,664
1911 { Ore or crude.....	34,412	1,278,239	142,718	4,866,207
Unmanufactured, etc.....	88,339	3,445,250		
1912 { Ore or crude.....	45,280	1,781,585	169,119	4,503,682
Unmanufactured, etc.....	59,526	2,552,978		
1913 { Ore or crude.....	48,942	1,863,406	90,694	5,040,210
Unmanufactured, etc.....	69,551	3,086,110		
1914 { Ore or crude.....	72,032			2,934,060
Unmanufactured, etc. }				
1915.....	61,438	2,341,476		

The embargo placed upon the export of platinum from Russia at the beginning of the war is the cause of the greatly reduced imports in 1914.

U. S. PRODUCTION OF PLATINUM FROM DOMESTIC SOURCES, IN TROY OUNCES

Year	Quantity	Value	Year	Quantity	Value
1903.....	110	\$ 2,080	1909.....	638	\$15,930
1904.....	200	4,160	1910.....	773	25,277
1905.....	818	5,320	1911.....	940	40,890
1906.....	1,439	45,189	1912.....	1,005	45,778
1907.....	357	10,589	1913.....	1,034	46,530
1908.....	750	14,250	1914.....	3,430	
			1915.....	6,495	

WORLD'S PRODUCTION OF PLATINUM, BY COUNTRIES, IN TROY OUNCES

Country	1911	1912	1913	1914	1915
Russia, crude.....	*300,000	*300,000	*250,000	*241,200	124,000
Canada, crude.....	*30	130	50	*30	
New South Wales and Tasmania, crude†.....	470	*778	1,275	*1,248	
Colombia, crude.....	*12,000	*12,000	15,000	*17,500	
United States, domestic crude.....	628	721	483	570	2700
United States, refined from foreign and domestic matte and bullion‡.....	\$1,200	\$1,300	\$1,100	2,905	
Borneo and Sumatra and other crude§.....		*200	200	¶	

Total..... 314,328 315,029 268,108 263,453 \$235,000

* Estimated. † In addition to platinum contained in matte and bullion refined in the United States. ‡ Chiefly Iridosmine. § Does not include refined platinum from domestic crude. ¶ Includes small production in Madagascar. ¶ No basis for estimate. ‡ Estimated.

PLATINUM PRICES

Average monthly prices of platinum in New York, per troy ounce. From Eng. and Mining Journal:

	1910	1911	1912	1913	1914	1915
January.....	\$29.00	\$39.06	\$46.00	\$45.50	\$43.38	\$41.10
February.....	28.75	39.31	46.63	45.50	43.50	40.00
March.....	29.13	41.00	45.50	45.50	43.50	39.50
April.....	29.25	41.35	45.50	45.50	43.50	38.63
May.....	29.55	42.81	45.50	45.50	43.50	38.50
June.....	31.38	42.88	45.50	45.50	43.50	38.00
July.....	33.00	42.95	45.50	45.50	43.50	38.00
August.....	33.00	44.38	45.50	44.80	50.20	39.25
September.....	33.63	45.31	45.50	43.86	50.00	50.00
October.....	37.50	46.25	45.50	44.00	49.50	54.50
November.....	39.44	46.13	45.50	43.70	45.45	62.63
December.....	38.75	46.00	45.50	43.45	42.19	63.50
Year.....	\$32.70	\$43.12	\$45.55	\$44.88	\$45.14	\$49.63

THE PLATINUM METALS

Iridium: The price of iridium remains much higher than that of platinum, because of its relative scarcity and its usefulness in hardening platinum. It is a frequent mistake of the platinum miner to speak of iridosmine as "iridium." Iridosmine is an alloy of osmium and iridium, with osmium varying from 17 to 49%. There is practically no market for osmium, except the use as pen points; iridosmine is valuable for the iridium content only. The extraction of osmium is both very costly, and dangerous on account of the poisonous character of the osmium vapor.

Palladium: The marketable supply for 1915 increased on account of the greater care taken by the copper refineries in extracting it from the electrolytic slimes in which it occurs with gold, silver, etc., particularly in the slime of Canadian matte, and the base bullion from Australia and elsewhere. The use of palladium as a catalyzer is well known, and is largely used as an alloy for platinum, as it renders the platinum lighter and of a more brilliant white.

Osmium: The supply of this metal of the platinum group exceeds the demand, tungsten having replaced it in electric light bulbs, and its use in medicine and in silk dyeing being slight.

PLATINUM-GROUP METALS IMPORTED IN THE UNITED STATES

	Domestic		1913		1914		1915	
	1914	1913	1913	1914	1914	1915	1915	1915
	Troy oz.	Troy oz.	Troy oz.	Troy oz.	Troy oz.	Troy oz.	Troy oz.	Troy oz.
Iridium	64	4,094	\$295,864	1,785	\$112,430	4,158	\$243,266	
Osmiridium	195	151	11,872	1,348	84,363	130	5,737	
Osmium		580	42,924			32	787	
Palladium	2,635	8,891	364,788	1,613	69,547	3,020	103,623	
Rhodium		64	3,668	32	1,905			

Some of the more important buyers of crude platinum and sweeps are listed below:

- American Platinum Works, Newark, N. J.
- Baker & Co. (Inc.), Newark, N. J.
- J. Bishop & Co., Malvern, Pa.
- Commercial Research Co., Long Island City, N. Y.
- Thomas J. Dee & Co., Chicago, Ill.
- Elizabethtown Smelting Co., Newark, N. J.
- Goldsmith Bros. Smelting & Refining Co., Chicago, Ill.
- Pacific Platinum Works, Los Angeles, Cal.
- Roessler & Hasslacher Chemical Co., Perth Amboy, N. J.
- S. S. White Dental Manufacturing Co., Philadelphia, Pa.

PALLADIUM PRODUCERS

- American Smelting & Refining Co. Nevada
- Boss Gold Mining Co. Nevada
- Oro Amigo Platino Mining Co. Nevada

PLATINUM PRODUCERS

- American Smelting & Refining Co. Nevada
- Asurite Mining Co. Nevada
- Boss Gold Mining Co. Nevada
- Hecla Consolidated Mines Co. (Idle) Wyoming
- Irvington Smelting & Refining Co. (Refinery) New Jersey
- Oro Amigo Platino Mining Co. Nevada
- Platinum Mining & Milling Co. Wyoming

PYRITE

Pyrite mining is an important industry at several localities in the U. S., but its sole use being for sulphuric acid manufacture, the market is limited by transportation costs and by the competition of the copper and zinc smelting plants, at which such acid is made, the principal ones being at Ducktown, Tenn., and Hillsboro, Danville, Peru, La Salle, Springfield and East St. Louis, all in Illinois; Langeloth and Donora, Penna., Argentine, Kansas and Clarkesburg, W. Va. The bulk of the pyrite consumed in the U. S. still comes from Spain, the value and the amount of the imported article being over 3 times that of the domestic production.

PRODUCTION OF PYRITE IN THE UNITED STATES, 1882-1914, IN LONG TONS

1882...	12,000	\$ 72,000	1894...	105,940	\$ 363,134	1906...	261,422	\$ 931,805
1883...	25,000	137,500	1895...	99,549	322,845	1907...	247,387	794,949
1884...	35,000	175,000	1896...	115,483	320,168	1908...	222,598	857,113
1885...	49,000	220,500	1897...	143,201	391,541	1909...	247,070	1,028,157
1886...	55,000	220,000	1898...	193,364	593,801	1910...	241,612	977,978
1887...	52,000	210,000	1899...	174,784	543,249	1911...	301,458	1,164,571
1888...	54,331	167,658	1900...	204,615	749,991	1912...	350,928	1,334,259
1889...	93,705	202,119	1901...	*241,691	1,257,879	1913...	341,338	1,286,084
1890...	99,854	273,745	1902...	*207,874	947,089	1914...	386,662	1,283,346
1891...	106,536	338,880	1903...	*233,127	1,109,818	1915...	394,124	1,674,983
1892...	109,788	305,191	1904...	207,081	814,808			
1893...	75,777	256,552	1905...	253,000	938,492			

* Includes production of natural sulphur.

IMPORTS OF PYRITE, CARRYING LESS THAN 3½% COPPER

1910.....	808,551 long tons	1911.....	1,006,810 long tons
1912.....	970,785 long tons	1913.....	850,592 long tons
1914.....	1,026,617 long tons	valued at \$4,797,326	
1915.....	964,634 long tons		

PYRITE MINES

Arminius Chemical Co.....Virginia
Eagle Copper Co.....California
Eustis Mining Co.....Quebec
Northern Ore Co.....New York
St. Lawrence Pyrites Co.....New York
Sulphur Mining & R. R. Co.....Virginia
(Subsidiary of Virginia-Carolina
Chemical Co.)

Virginia-Carolina Chemical Co.
Virginia Mining Co.....Virginia
(Controlled by Gen. Chem. Co.)
Virginia Zinc & Chem. Corp., Ltd.

QUICKSILVER

Most of the domestic supply of quicksilver comes from California and Nevada, Texas producing the remainder, as Arizona has as yet only a very small output. In 1914 there were 30 producers, including small prospects, 7 more than in 1913. In recent years much of the California output has been from old mines, whose richest ore was extracted long ago and which are now difficult to operate profitably, except when the price is high.

Beside the new supply each year there is also recovered an annual output of old quicksilver in the clean-up of old amalgamation mills, and from other sources; this supply has but little effect on the market. Austria, Italy and Spain furnish 5/6 of the world's supply.

Quicksilver is used mainly in the manufacture of fulminate of mercury for explosive caps, of scientific and electric apparatus, of drugs and in the recovery of precious metals; the latter use is gradually diminishing. It is also used in manufacturing paints for protective coatings.

The primary domestic market for quicksilver is San Francisco; the price is averaged from the market quotations published in the Mining and Scientific Press. Prices are given in dollars per flask of 75 lbs.

MONTHLY AVERAGE PRICES OF QUICKSILVER

	—San Francisco—			—New York—		
	1914	1915	1916	1914	1915	1916
January	30.25	31.90	222.00	38.75	51.60	214.76
February	39.00	60.00	295.00	38.00	59.38	258.50
March	39.00	75.00	219.00	38.60	74.13	228.91
April	38.90	77.50	141.60	38.00	71.50	140.10
May	39.00	75.00	90.00	37.90	77.20	96.95
June	38.60	90.00	74.70	38.90	95.63	78.04
July	37.50	95.00	81.20	36.75	95.50	.....
August	30.00	83.75	.....	38.00	92.90	.....
September	76.25	81.00	.....	74.88	89.50	.....
October	58.00	92.90	.....	58.75	94.70	.....
November	55.00	101.50	.....	50.30	108.12	.....
December	63.10	128.00	.....	51.25	135.00	.....
Average	63.10	49.05	.....	48.51	87.01	.....

Note: San Francisco quotations from *Mng. & Sci. Press*; New York quotations, 1914 and 1915, *Eng. & Mng. Journal*; 1916 quotations from *The Steel & Metal Digest*.

QUICKSILVER PRODUCTION OF THE UNITED STATES, IN FLASKS OF 75 POUNDS

State—	1912		1913		1914	
	Quantity	Value	Quantity	Value	Quantity	Value
Arizona	(*)	(*)	(*)	(*)	(*)	(*)
California	20,524	\$ 863,084	15,591	\$627,228	11,308	\$554,414
Nevada	(*)	(*)	1,645	66,178	2,089	102,465
Texas	(*)	(*)	(*)	(*)	(*)	(*)
States not shown separately†	4,540	190,907	2,977	119,765	3,156	154,801
Total	25,064	\$1,058,941	20,218	\$818,171	16,548	\$811,680

* Included in States not shown separately.

† Nevada and Texas combined in 1912; Arizona and Texas in 1913 and 1914.

QUICKSILVER IMPORTED IN THE UNITED STATES, IN POUNDS

Year	Quantity	Value	Year	Quantity	Value
1905	2,690	\$1,710	1910	667	\$ 381
1906	84	50	1911	471,944	251,886
1907	16,667	6,719	1912	82,706	39,920
1908	15,113	8,216	1913	171,653	75,361
1909	15,968	8,203	1914	614,868	271,984

EXPORTS OF QUICKSILVER FROM THE UNITED STATES, IN FLASKS OF 75 POUNDS

Year	Quantity	Value	Year	Quantity	Value
1905	13,534	\$489,756	1910	1,923	\$ 91,077
1906	6,456	243,914	1911	291	18,995
1907	5,132	192,094	1912	810	13,380
1908	2,996	124,960	1913	1,140	43,574
1909	6,802	266,243	1914	1,446	70,753

WORLD'S PRODUCTION OF QUICKSILVER IN FLASKS OF 75 POUNDS (U. S. G. S.)

Country.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.
United States	30,534	26,083	21,564	19,752	21,075	20,601	21,256	25,064	20,213	16,548
Austria						20,400	23,310	23,016	26,790	.....
Hungary	16,755	16,961	16,667	18,519	17,902					
Italy	10,847	12,287	12,424	19,939	22,964	26,279	27,367	28,983	29,513	22,846
Russia	9,348	6,178	8,831	1,440	206		118			
Spain	26,074	46,062	35,627	31,394	40,947	32,746	43,681	43,799	43,799	.....
Mexico and other countries	5,585	5,979	5,879	5,879	4,409	4,409	4,409	4,409	4,409	.....
Total	98,143	118,445	95,982	96,973	107,203	104,553	120,023	126,271	124,654	.....

QUICKSILVER MINES

Chisos Mining Co.	..... Texas	Oceanic Quicksilver Mine	..... California
Colquitt-Tigner Quicksilver Mine	..... Texas	Patriquin Quicksilver Mine	..... Calif
Kings Quicksilver Mining Co., Ltd.	..... California	Quicksilver Investment Co., Inc.	..... California
L. & N. Group	..... Arizona	(The)	..... California
Mercury Mining Co.	..... Nevada	Quicksilver Mining Co.	..... California
New Idria Quicksilver Mining Co.	..... California	Ruby King Copper Co. (Ore contains cinnabar)	..... California
		St. Johns Mines Co.	..... California

RADIUM—(See Uranium, Vanadium)

Radium, uranium and vanadium are closely connected, in occurrence and always found together in an ore. Colorado and Utah contain the largest known radium-bearing deposits of the world, but Europe has been the chief market for the ore, which accounts for the greatly reduced output for 1915. In 1913, over 100 teams were hauling the waste dumps and tailing from the carnotite mines of Paradox Valley to the railway to be shipped to Germany for fertilizer.

PRODUCTION FROM CARNOTITE ORES

	Uranium Oxide	Radium	Vanadium
1915.....	29.4 tons	6 grams	685 tons
1914.....	87.2 tons	22.3 grams	435 tons
1913.....	41 tons	10.5 grams	.....
1912.....	26 tons	6.7 grams	.....

Carnotite is a complex ore consisting essentially of vanadium oxide or with potassium as double silicate, and associated with or loosely combined with uranium oxide. A ton of ordinary carnotite ore assaying about 2½% uranium oxide contains only 12.5 milligrams radium, or one part out of a hundred million, recoverable radium. For companies producing carnotite or other uranium ores, see Uranium, in this chapter. The following firms are producers of radium:

Standard Chemical Co., Pittsburgh, Pa.

W. L. Cummings Chemical Co., Lansdowne, Pa.

Radium Company of America, Sellersville, Pa.

Schlesinger Radium Co., Box 1316, Denver, Colo.

Carnotite Reduction Co., 2600 Iglehart Court, Chicago, Ill.

National Radium Institute, Inc., Longpark, Colo.

RADIUM MINES

National Radium Mines Co. (Uranium and Vanadium).....Utah
 National Radium Products Co.....Colorado
 Penna. Mining, Power & Reduction Co. (Ore contains uranium and vanadium).....Colorado

Radium Mines Co. (Vanadinite not found in commercial quantities).....Arizona
 Rare Metals Co. (Operates a custom mill).....Colorado

SELENIUM

The commercial supply of selenium is obtained from the slimes or muds, resulting from the electrolytic refining of blister copper.

SELENIUM RECOVERED FROM 100 TONS OF BLISTER COPPER

Smelter supplying blister copper—	Selenium Pounds	Smelter supplying blister copper—	Selenium Pounds
Garfield, Utah.....	56	Tacoma, Washington.....	42
Stephens, Nevada.....	110.1	Aguascalientes, Mexico.....	170
Omaha, Nebraska.....	28.	Cerro de Pasco, Peru.....	12.7
Mountain, California.....	38	Mount Lyell, Tasmania.....	42

Eilers, A., Notes on the occurrence of some of the rarer metals in blister copper: Am. Inst. Min. Eng. Trans., vol. 47, pp. 217-218, 1914.

Eilers comments as follows:

Garfield, Utah, copper comes from the Bingham porphyry copper mines.

Stephens, Nev., blister copper is from the Nevada Consolidated porphyry deposits.

Omaha, Nebr., blister copper comes from concentrated copper-lead mattes from the lead-silver plants of the Rocky Mountain region.

Iron Mountain, Cal., ores occur in connection with diorite(?).

Tacoma, Wash., the blister is produced from Pacific coast and Alaska copper ores.

Aguascalientes, Mexico, blister is produced from the smelting of silver and gold ores with mostly low-grade copper ores, coming from all parts of Mexico and from many different geological occurrences and connections.

Cerro de Pasco, Peru, blister from copper and lead-copper mattes produced at the Cerro de Pasco works. Ore originates in veins occurring in limestone near andesite masses.

Mount Lyell, Tasmania, blister is from the well-known low-grade copper deposit of Tasmania, in schists.

Selenium is ordinarily sold in small pigs, in sticks ½" thick by 4" in length, and also in a fairly coarse powder form. It is an amorphous brilliant black substance which looks much like pitch or one of the asphalts.

Use: Selenium is chiefly used in coloring glass to which it gives a red color. The unique property possessed by this metal of an increasing electrical resistance with decrease of light has led to the invention of many electrical wonders including Hammond's dirigible torpedo as well as in measuring Roentgen rays; in controlling electric signs, moving pictures, street lights and the flame on gas buoys; in transmitting pictures over a wire. It is also used medicinally to a small extent.

SILVER

Average monthly prices of silver per ounce, as published by "The American Metal Market":

	1903	1905	1910	1911	1912	1913	1914	1915	1916
January	47.57	60.89	52.37	53.79	58.22	62.38	57.56	48.89½	56.77
February	47.89	61.02	51.53	52.22	59.04	61.64	57.50½	48.48	56.75
March	48.72	58.05	51.45	52.74	58.37	57.87	58.07	50.24	57.03
April	50.56	54.60	52.22	53.33	59.23	59.49	58.52	50.25	64.41
May	54.11	57.83	53.37	53.31	60.88	60.36	58.18	49.31½	74.27
June	52.86	58.43	52.46	53.04	61.29	58.99	56.47	49.03	.....
July	53.92	58.92	54.15	52.63	60.60	58.72	54.68	47.52	.....
August	55.36	60.26	52.31	52.17	61.61	59.29	54.34	47.18	.....
September	58.00	61.69	53.30	52.43	63.08	60.64	53.29	48.68	.....
October	60.36	62.03	56.49	53.34	63.47	60.79	50.65	49.38½	.....
November	58.11	63.35	55.64	55.72	62.79	55.99	49.10	51.71	.....
December	55.37	64.35	54.43	54.90	63.37	57.76	49.38	54.97	.....
Average	53.57	60.35	53.49	53.30	60.83	59.79½	54.81	49.69	.....

The average price for 25 years past is not a true index, as it includes the artificial price of \$1.29 per oz., due to free coinage, giving a fictitious average of 60 cts. per oz. The average for 13 years, 1903-1915, is 56.9 cts. per oz.

SILVER PRODUCTION OF THE UNITED STATES, IN OUNCES

Year	Commercial		Year	Commercial	
	Quantity	Value		Quantity	Value
1880	30,318,700	\$ 34,717,000	1900	57,647,000	\$35,741,100
1881	32,257,800	37,657,500	1901	55,214,000	33,128,400
1882	36,196,900	41,105,900	1902	55,500,000	29,415,000
1883	35,782,800	39,618,400	1903	54,300,000	29,322,000
1884	37,743,800	41,021,300	1904	57,682,500	33,456,000
1885	39,909,400	42,693,500	1905	56,101,000	34,222,000
1886	39,694,000	39,482,400	1906	56,517,900	33,256,400
1887	41,721,800	40,867,200	1907	56,514,700	37,299,700
1888	45,792,700	43,045,100	1908	52,440,800	28,050,600
1889	50,094,500	46,838,400	1909	54,721,500	28,455,200
1890	54,516,300	57,242,100	1910	57,137,900	30,854,500
1891	58,380,000	57,630,000	1911	60,399,400	32,615,700
1892	63,500,000	55,662,500	1912	63,766,800	39,197,500
1893	60,000,000	46,800,000	1913	66,801,500	40,348,100
1894	49,500,000	31,422,100	1914	72,455,100	40,067,700
1895	55,727,000	36,445,500	1915	74,961,075	37,397,300
1896	58,884,800	39,654,600			
1897	53,860,000	32,316,000			
1898	54,488,000	32,118,400			
1899	54,764,800	32,858,700			
			Total	1,906,094,875	\$1,877,753,800

Silver Production of the United States

(Bureau of the Mint and the Geological Survey Figures)

	1915		1914	
	Fine Oz.	Value	Fine Oz.	Value.
Alabama			800	\$ 200
Alaska	1,054,684	\$ 526,100	865,900	478,800
Arizona	5,665,672	2,826,500	4,439,500	2,455,000
California	1,689,924	843,100	2,020,800	1,117,500
Colorado	7,199,745	3,591,900	8,804,400	4,868,800
Georgia	141	100	100	100
Idaho	13,042,466	6,508,800	12,573,800	6,953,800
Illinois	3,892	1,900	1,900	1,200
Maryland			100	100
Michigan	581,874	290,300	415,500	229,800
Missouri	55,534	27,700	60,000	33,200
Montana	14,423,173	7,195,900	12,536,700	6,932,800
Nevada	14,453,685	7,210,500	15,877,200	8,790,100
New Mexico	2,337,064	1,165,900	1,771,300	979,500
North Carolina	1,496	700	1,500	800
Oklahoma			6,200	3,400
Oregon	125,499	62,600	147,400	81,500
Philippine Islands	16,148	7,600	10,300	5,700
South Dakota	197,569	98,600	179,800	99,400
Tennessee	99,171	49,500	102,800	56,800
Texas	724,580	361,500	574,700	317,800
Utah	18,073,471	6,522,200	11,722,000	6,482,300
Vermont	150	100		
Virginia			1,500	800
Washington	218,877	106,700	341,300	188,700
Wyoming	2,910	1,400	100	100
Total	74,961,075	\$37,397,300	72,455,100	\$40,067,700

* At the average price of silver per fine ounce for the calendar year 1915, \$0.49889.

PRODUCTION OF GOLD AND SILVER IN ORES OF DIFFERENT KINDS, IN TONS

(U. S. G. S. FIGURES)*

	Dry or siliceous ores		Copper ores		Lead ores	
Alabama and Georgia	6,829	\$ 2.46				
Alaska	1,738,127	2.80	153,605	\$ 2.14		
Arizona	428,805	8.46	7,508,020	.88	26,637	\$11.92
California	2,050,797	5.53	397,868	1.84	16,820	16.99
Colorado	2,157,762	10.25	12,196	18.38	193,087	7.66
Idaho	48,513	8.85	93,040	1.66	1,421,893	8.42
Maryland and Virginia†	11	20.00	1,495	.84		
Michigan†			2,000,000	.20		
Montana	342,085	9.37	4,346,034	1.14	29,636	8.62
Nevada	1,594,486	11.39	2,882,121	.39	16,083	13.13
New Mexico	169,046	10.11	2,006,024	.20	2,491	6.20
North Carolina†	19,441	7.17	10	14.90		
Oklahoma	190	18.00				
Oregon	124,274	8.99			57	32.98
South Carolina	7,581	.92				
South Dakota	2,019,255	3.68			7	35.57
Tennessee†			653,621	.09		
Texas	40,375	7.09	231	16.34		
Utah	149,902	7.38	7,578,220	.39	600,481	7.91
Washington	73,892	8.66	21,752	2.51	303	10.41
Wisconsin†			87	.27		
Wyoming	845	9.22	78	.56		
Total, 1914	10,966,666	\$ 6.95	27,653,352	\$0.49	2,307,550	\$ 5.29
Percentage of tonnage	25.46		64.26		5.38	
Total, 1913	10,656,738	\$ 7.15	30,850,693	\$0.54	2,563,904	\$ 4.98
Percentage of tonnage	23.29		67.43		5.80	

	Zinc ores		Copper-lead and copper-lead-zinc ores		Lead-zinc ores		Total
Alabama and Georgia							6,829
Alaska							1,891,782
Arizona	18,079	\$2.86	4,892	\$ 4.08	23,444	\$2.58	8,009,927
California							2,465,486
Colorado	145,656	.004	1,192	48.11	167,638	1.72	2,677,526
Idaho	8,473	.34			668,430	2.91	2,255,348
Maryland and Virginia†	14,004						15,510
Michigan‡							2,000,000
Montana	9,066	3.05	168	18.17	401,967	3.40	5,128,956
Nevada	9,490	8.90	3,762	12.77	16,075	3.96	4,522,022
New Mexico	155,912		880	11.45			2,252,855
North Carolina||							19,451
Oklahoma							190
Oregon							124,881
South Carolina							7,531
South Dakota							2,019,262
Tennessee‡	857,437						1,011,058
Texas	24				1,640	2.21	42,270
Utah	4,670		1,183	18.76	209,558	2.75	8,544,014
Washington							95,947
Wisconsin‡							37
Wyoming							428
Total, 1914	622,811	\$0.19	11,577	\$12.87	1,488,747	\$2.90	43,050,703
Percentage of tonnage	1.44		.02		3.46		
Total, 1913	281,547	\$0.31	24,399	\$22.81	1,427,027	\$2.48	45,754,808
Percentage of tonnage	.51		.05		3.12		100.00

* Illinois, Missouri, the Philippines, and Porto Rico not included; crude-ore tonnage, containing precious metals not known. † Includes only copper ore yielding precious metals. ‡ Lead and zinc ores yielded no precious metals. ‡ Includes only copper ore yielding precious metals. || Lead and zinc ores yielded no precious metals.

PERCENTAGE OF OUTPUT OF SILVER BY PROCESSES IN THE UNITED STATES IN 1912, 1913, AND 1914

Production by—	Percentage of total output		
	1912	1913	1914
Placers	0.2	0.2	0.2
Gold and silver mills:			
By amalgamation	1.2	.6	.4
By cyanidation	17.8	19.7	22.1
Total milling	19.0	20.3	22.5
Smelting*	80.8	79.5	77.3
Total†	100.0	100.0	100.0

* Both crude ore and concentrates. † Philippine Islands and Porto Rico excluded.

AMERICAN SILVER-LEAD SMELTING WORKS

Company—	Place	Furnaces	Annual Capacity*
American Smelting and Refining Co.	Denver	7	510,000
American Smelting and Refining Co.	Pueblo	7	350,000
American Smelting and Refining Co.	Durango	4	210,000
American Smelting and Refining Co.	Leadville	10	510,000
American Smelting and Refining Co.	Murray	8	657,000
American Smelting and Refining Co.	East Helena	4	366,000
American Smelting and Refining Co.	Omaha†	2	82,000
American Smelting and Refining Co.	Chicago†	1	36,000
American Smelting and Refining Co.	Perth Amboy†	4	170,000
American Smelting and Refining Co.	El Paso	6	350,000
Selby Smelting and Lead Co.	Selby	3	210,000
Ohio & Colorado Smelting Co.	Salida, Colo.	4	345,000
United States Smelting Co.	Midvale, Utah	6	500,000
Needles Smelting Co.	Needles, Cal.	2	70,000
Northport Smelting and Refining Co.	Northport, Wash.	2 ‡
Pennsylvania Smelting Co.	Carnegie, Pa.	2	60,000
International Smelting Co.	Tooele, Utah	5	525,000
Totals, United States		78	4,951,000

AMERICAN SILVER-LEAD SMELTING WORKS—Continued

Company	Place	Furnaces	Annual Capacity*
American Smelting and Refining Co.	Monterey	10	584,000
American Smelting and Refining Co.	Aguascalientes	1	40,000
American Smelting and Refining Co.	Chihuahua	7	400,000
American Smelters Securities Co.	Velardeña	3	150,000
Compañía Metalúrgica Mexicana	San Luis Potosí	10	250,000
Compañía Metalúrgica de Torreon	Torreon	8	360,000
Compañía Minera de Peñoles	Mapimí†	6	325,000

Totals, Mexico			2,109,000
Consolidated Mining and Smelting Co.	Trall, B. C.	4	140,000

* Tons of charge. † Smelt chiefly refinery between-products. ‡ Not operated in 1914 and 1915. † Plant being remodeled.

SILVER PRODUCTION OF THE WORLD

(Report of the Director U. S. Mint)

	Quantity	Value		Quantity	Value
1882	86,472,091	\$98,232,300	1900	173,591,364	\$107,626,400
1883	89,175,023	98,984,300	1901	173,011,283	103,806,700
1884	81,567,801	90,785,000	1902	162,763,483	86,264,700
1885	91,609,959	97,518,800	1903	167,689,322	90,552,200
1886	93,297,290	92,793,500	1904	164,195,266	95,233,300
1887	96,123,586	94,031,000	1905	172,817,688	105,113,700
1888	108,827,606	102,185,900	1906	165,054,497	111,721,100
1889	120,213,611	112,414,100	1907	184,206,984	121,577,100
1890	126,095,062	131,937,000	1908	203,131,404	108,655,100
1891	137,170,000	135,500,200	1909	212,149,023	110,364,400
1892	153,151,762	133,404,400	1910	221,715,763	119,727,000
1893	165,472,621	129,119,900	1911	226,192,923	122,143,800
1894	164,610,394	104,493,000	1912	224,310,654	137,883,800
1895	167,500,960	109,545,600	1913	223,907,845	135,246,400
1896	157,061,370	95,859,300	1914	211,339,749	116,849,900
1897	160,421,082	96,252,700	1915		
1898	169,055,253	99,742,600			
1899	168,387,452	101,002,600			

The accompanying tables give the silver production of the important producers in the United States and Canada. Unless otherwise stated, the figures represent the production for 1915.—(From Engineering and Mining Journal.)

UNITED STATES

	Production, Oz.	No. of Shares Issued
American Smelting and Refining Co.	76,117,453	501,080 com. { 500,000 pf.
Anaconda Copper Mining Co. (Montana)	9,005,618	
International Smelting Co. (Tooele)	5,090,157	2,331,250 (Anaconda)
U. S. Smelting Co.	12,071,863	
Bunker Hill & Sullivan M. and C. Co.	1,300,000	327,000
Butte & Superior Mining Co.	3,895,090	272,697
Calumet & Arizona Mining Co.	1,831,078	617,412
Federal Mining and Smelting Co.	934,450 ^a	60,000 com. { 120,000 pf.
Hecla Mining Co.	692,444	
Kennecott Copper Corporation	591,692	2,780,583
Nevada Wonder Mining Co.	1,199,246 ¹	1,482,860
North Butte Copper Co.	944,285	480,000
Phelps, Dodge & Co.	1,388,149	450,000
Tonopah Belmont Development Co.	2,968,565 ²	1,500,000
Tonopah Mining Co.	3,000,000 ³	1,000,000

¹ Year ended Sept. 30, 1915. ² Year ended Feb. 28, 1916. ³ Estimated.

CANADA

	Production, Oz.	No. of Shares Issued
Beaver Consolidated	900,000 ¹	2,000,000
Ruffalo Mines	822,791 ⁷	1,000,000
Conlagas	2,002,054 ²	600,000
Crown-Reserve	657,395	1,999,957
McKinley-Darragh Savage	1,112,976 ⁵	2,247,692
Temiskaming & Hudson Bay	393,360 ³	7,761
Kerr Lake	2,036,962 ⁴	600,000
La Rose	1,368,247 ³	1,498,627
Nipissing	9,097,391	1,200,000
Seneca-Superior Silver Mines	2,047,150	478,884
Temiskaming Mining Co.	278,961 ⁵	2,600,000
Consolidated Mining and Smelting Co.	2,230,500 ⁶	58,952

¹ Year ended Feb. 28, 1915. ² Year ended Oct. 31, 1915. ³ Year ended Aug. 31, 1914. ⁴ Year ended Aug. 31, 1915. ⁵ Calendar year 1914. ⁶ Year ended Sept. 30, 1915. ar ended April 28, 1915.

The first four are metallurgical companies whose production is largely derived from ore purchased; the bulk of the Anaconda and U. S. Smelting productions comes from their own mines.

The Butte & Superior being a zinc-mining company, the silver actually recovered is considerably less than is the content of the ore.

TIN

Very little tin is produced in this country, and the most of it comes from Alaska; in 1914 South Dakota furnished a few hundred lbs. of stream tin. Workable deposits exist near Deeth, Nevada, and El Paso, Texas. Practically all the tin used in the U. S. is brought from Europe and the Straits Settlements. Bolivia ranks second to the Straits as a tin producer; its ores were formerly sent to Europe for reduction, but the reverberatory tin-smelting plant of the American Sm. & Ref. Co. at Perth Amboy, N. J., built to handle Bolivian concentrates, will materially change conditions. This plant was blown in March 1, 1915, and the first crude tin drawn off March 7. This metal is refined electrolytically, at the plant.

UNITED STATES TIN PRODUCTION (U. S. GEOL. SURVEY)

Year	Tons Concts.	Percent Tin	Value
1914	157.5	66	\$ 66,560
1818	84	60	36,970
1912	147	60	124,800
Secondary tin recovered in the United States:			
1915		Tons	Value
		18,650	\$10,544,180
1914		12,447	8,887,158

The U. S. is the largest user of tin among the countries of the world and hence a large importer of the metal. The U. S. Steel Corporation is the greatest single user of the metal.

Tin Prices in New York

Extreme fluctuations and yearly average prices of Pig Tin in New York:

Year	Highest	Lowest	Ave.	Year	Highest	Lowest	Ave.
1885	23.50	16.10	19.50	1901	33.50	23.12½	26.94
1886	23.25	20.45	21.55	1902	30.62½	22.60	26.95
1887	37.25	21.90	24.85	1903	30.80	24.95	28.19
1888	37.25	16.90	26.20	1904	30.12½	25.75	28.08
1889	22.25	19.50	20.93	1905	36.45	28.65	31.55
1890	25.10	19.50	21.42	1906	50.00	35.65	39.82
1891	22.00	19.50	20.25	1907	44.10	26.00	38.34
1892	22.15	19.40	20.60	1908	32.37½	26.45	29.54
1893	21.25	18.15	20.14	1909	34.12½	27.30	29.76
1894	20.45	13.45	18.08	1910	38.75	31.75	34.27
1895	15.15	13.00	14.06	1911	48.50	37.60	42.68
1896	13.70	12.62½	13.24	1912	51.05	42.05	46.43
1897	14.12½	13.00	13.60	1913	51.00	36.75	44.32
1898	19.00	13.70	15.64	1914	65.00	28.50	35.70
1899	33.12½	19.87½	27.19	1915	57.00	32.00	38.66
1900	35.00	25.20	30.00	Average price for 30 years 27.63			

From American Metal Market.

Monthly Average Prices of Tin
Engineering and Mining Journal.

Month	New York			London		
	1913	1914	1915	1913	1914	1915
January	50.298	37.779	34.260	238.273	171.905	156.550
February	48.766	39.830	37.415	220.140	181.556	176.925
March	46.832	38.038	48.426	213.615	173.619	180.141
April	49.115	36.154	47.884	224.159	163.963	166.225
May	49.038	33.360	38.790	224.143	150.702	162.675
June	44.820	30.577	40.288	207.208	138.321	167.636
July	40.260	31.707	37.423	183.511	142.517	167.080
August	41.582	*	34.389	188.731	*	151.440
September	42.410	32.675	33.125	193.074	*	152.625
October	40.462	30.284	33.080	184.837	*	151.554
November	39.810	33.304	39.224	180.869	139.391	167.670
December	37.635	33.601	38.779	171.786	147.102	167.000
Av. Year	44.252	.....	38.590	206.279	.....	163.960

New York in cents per pound; London in pounds sterling per long ton.
*No quotations.

Tin Imports in the United States, Short Tons

Year	Quantity	Value	Year	Quantity	Value
1906	50,477	\$37,447,315	1911	53,527	\$43,346,394
1907	41,257	32,074,263	1912	58,016	50,372,478
1908	41,267	23,923,560	1913	53,315	46,946,756
1909	47,662	27,558,546	1914	52,919	32,943,059
1910	52,528	33,913,255	1915	57,818	38,736,909

Consumption of Tin in the United States

Monthly deliveries of Tin in the United States exclusive of Pacific Coast.

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
January	3,950	1,500	3,200	3,500	3,200	3,700	3,700	3,600	2,300	4,452
February	2,600	2,400	2,700	3,600	3,800	4,050	3,500	3,300	3,375	6,388
March	3,900	3,150	3,900	4,000	5,100	4,000	5,900	4,450	3,200	4,726
April	3,650	3,000	3,200	4,100	3,300	5,400	3,450	4,300	3,200	4,202
May	2,500	4,000	3,900	3,600	3,400	4,250	3,350	3,800	5,600	5,455
June	3,050	3,000	3,200	5,000	2,900	2,850	3,800	3,650	3,900	6,398
July	3,800	2,300	3,600	3,800	4,300	5,150	3,900	3,900	5,300	.....
August	3,200	2,600	3,300	3,700	3,800	4,300	3,600	2,900	4,500	.....
September	2,800	2,300	3,200	3,300	4,200	3,600	3,100	3,600	4,300	.....
October	2,800	3,000	4,100	3,350	3,500	3,850	3,700	3,700	4,900	.....
November	1,550	3,300	4,000	3,800	3,100	4,300	2,800	2,600	2,975	.....
December	1,200	2,850	3,200	3,600	3,700	4,050	3,100	1,900	5,200	.....
Total	35,000	33,400	41,500	45,350	44,300	49,500	43,900	41,700	48,750	31,621
Average	2,916	2,783	3,458	3,779	3,692	4,125	3,658	3,475	4,062	5,270

From American Metal Market.

Visible Supply of Tin

Total visible supply of tin at the end of each month.

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	15,645	14,286	13,462	14,986	21,895	23,024	18,616	16,707	13,971	16,244	13,901	17,041
Feb.	14,911	13,414	13,189	14,760	20,746	21,288	17,260	14,996	12,304	17,308	14,548	16,512
March	14,592	11,848	13,130	15,385	19,208	20,203	16,682	15,694	11,132	16,989	15,467	18,782
April	13,063	11,104	9,839	13,241	18,825	17,932	14,441	11,893	9,822	15,447	15,785	19,739
May	12,967	12,607	12,015	15,424	19,208	18,998	15,938	14,345	13,710	17,862	14,646	19,614
June	11,938	11,956	11,876	14,155	18,208	15,700	16,605	12,920	11,101	16,027	15,927	19,363
July	12,270	12,184	13,025	15,962	20,244	17,433	16,707	13,346	12,063	14,167	16,084	.....
Aug.	11,572	12,840	11,865	17,257	19,182	17,943	16,619	11,285	11,261	14,452	15,127	.....
Sept.	14,508	12,209	12,498	18,109	21,419	18,999	16,672	13,245	12,943	14,613	15,191	.....
Oct.	12,812	11,162	11,072	17,524	18,724	18,183	14,161	10,735	11,857	10,894	13,154	.....
Nov.	13,174	12,395	12,840	19,953	20,025	18,875	16,630	12,348	14,470	11,483	16,451	.....
Dec.	13,451	12,998	12,058	19,928	20,918	17,194	16,514	10,977	13,893	13,396	16,216	.....
Average	13,492	12,417	12,239	16,390	19,883	18,815	16,404	13,207	12,377	14,907	15,208	.....

From American Metal Market.

TITANIUM

Titanium is obtained from the two minerals rutile, titanite, 60% titanium and ilmenite or titanite iron ore FeOTiO_2 , with 31.6% titanium. The supply of rutile comes from Virginia, being mined by the American Rutile Co. at Roseland, Nelson Co.

Rutile is used for making ferrotitanium, used in cast iron and steel, in electrodes for arc lamps, in dyeing leather and wool and in chemicals. A little ilmenite has been used in making ferrotitanium and arc lamp electrodes. Figures of output are not available.

TITANIUM MINE

American Rutile Co. Virginia

TUNGSTEN

The 1915 production of tungsten ores in the U. S. broke all previous records while that for the first six months in 1916 exceeded the production of the U. S. or that of any other country in any previous twelve months. This increased output was due to the demand for high-speed tungsten tool steel required for completing war orders in the U. S. and abroad. Prices soared with demand; starting from \$5.80 to \$9 per unit for 60% ore early in 1915 they reached \$66 per unit early in 1916; by the end of March some ore sold for \$93.50 per unit at the mills. Consumption could not keep pace with production; prices dropped and by July 60% ore was selling around \$25 per unit; by the middle of August sales were made as low as \$20 per unit. Previous to 1915 the highest price reported was \$15 per unit, paid in 1907; normal price has been \$6 to \$7.

All tungsten ores in Great Britain are under the control of the government and they are sold at the uniform price of 55 shillings per unit of a long ton, that is 55 shillings for 22.4 pounds of tungsten trioxide, WO_3 . George T. Holloway, 13 Emmett Street, Limehouse, London, England, probably would furnish a good connection between seller and government.

The demand is lessening and the prices are dropping. Fifteen dollars is probably the top price (per unit). The unit in the United States is 1 per cent of a short ton in tungsten trioxide, that is 20 pounds WO_3 .

During the first six months of 1916 Colorado led in production of tungsten ores with 1,505 tons valued at \$3,638,000; California output was 948 tons valued at \$3,005,000; Arizona, 175 tons, worth \$565,000. Smaller quantities were mined in a number of other states. During first five months of 1916 imports totaled about 1,520 tons valued at \$3,449,311; this came from South America, mainly, with some from Japan and Mexico.

Besides its use for high-speed tool steel a small amount of tungsten is used for incandescent electric lamp filaments, but the amount required is small, for contact points in automobile spark plugs, spark coils and telegraph relays.

There are 10 tungsten mills in the Nederland district, Boulder Co., Colo., 4 at Dragoon, 3 at Arivaca and one at Yucca, Ariz., and one each at Atolia, Bishop, Gaffs, Johannesburg and Nipton, Calif. The two mills working at Sodaville, Nev., complete the list as far as known. Connecticut, Alaska, South Dakota, Missouri, Idaho and Washington are small producers.

U. S. Production of Tungsten, 1916 (Six Months)

	Tons	Value
Arizona	175	\$ 56,500
California	984	3,006,000
Colorado	1,505	3,638,000
Nevada	461	1,432,000

1916 Production of Different Kinds of Tungsten Ores

	Tons	Value
Ferberite ore	1,495	\$3,590,000
Scheelite ore	1,404	4,322,000
Wolframite ore	201	613,000
Hübnerite ore	185	587,000

Buyers of tungsten ores include Primos Chemical Co., Foote Mineral Co. and others, whose addresses are given in the advertising pages of the book.

World's Production of Tungsten Ore, by Countries, Estimated in Short Tons Containing 60% Concentrates (U. S. G. S.)

Country.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Africa: South Africa.....		9	211	40	16					
Asia:										
Burma and the Shan States.....						407	1,119	2,095	1,905	2,055
Federated Malay States.....		151	89	83	99	105	205	275	273	317
French Indo-China (Tonkin).....						19		81		
India (not including Burma).....						7	23			
Japan	47	47	71	220	292	275	287	225	327	226
Siam			10				200	200	1	33
Trengganu (Malay Peninsula).....										173
Australia:										
New South Wales.....	251	270	451	269	431	413	512	298	220	
Northern Territory.....		71	230	177	40	49	78	71	44	
Queensland.....	1,582	865	703	516	679	1,145	750	944	587	442
Tasmania	36	22	46	5	20	75	86	87	89	
Victoria				3	15	31	33	13	1	
Western Australia.....		1	5		1	2	12		1	1
East Indies:										
Billiton			4	11	12	21		21		
Singkep			1	14	12	12		8		
Europe:										
Austria	65	63	50	44	43	54	50	73		
England	193	304	361	261	421	307	298	216	204	230
France	28	20	67	124	55	33	188	252		
German Empire (Saxony).....	42	57	68	46	106	105	89	111		
Italy	36	28	18							
Portugal	320	629	702	684	609	1,132	1,078	1,466	900	
Spain	413	222	303	249	142	169	106	202	179	
Oceania: New Zealand.....	64	121	153	87	78	187	184	181	297	274
North America:										
Nova Scotia.....						83		17	12	
United States.....	803	928	1,640	671	1,619	1,821	1,139	1,330	1,537	990
South America:										
Argentina		326	507	548	900	826	683	702	591	435
Bolivia	75	75	500	187	168	232	370	547	328	320
Brazil				16						
Peru						15	57	241	327	130
Total	4,026	4,367	6,137	4,113	5,774	7,570	7,517	9,654		

TUNGSTEN MINES

Allgrove Mining & Milling Co.....	Colorado
American Tungsten Consolidated Corporation	Washington
Atkins Kroll Co. (San Francisco).....	Nevada
Atolia Mining Co.....	California
Black Hawk Mine (Developing in 1915)	California
Boulder Tungsten Corporation Co.....	Colorado
Chicago-Nevada Tungsten Co.....	Nevada
Consolidated Mines Co.....	California
Consolidated Tungsten Co.....	Nevada
Crucible Steel Co., of America.....	Colorado
Degge Clarke Tungsten Mill.....	Colorado
Emery-Whitcomb Tungsten Co. (Acquired by International Tungsten Corp.).....	Arizona
Homestake Mining Co.....	S. Dakota
Idaho Tungsten Co. (Leases property of Ima Cons. Mng. and Mig. Co.)	Idaho
Ima Consolidated Mining and Milling Co. (Property leased by Idaho Tungsten Co.).....	Idaho
International Tungsten Corp.....	Arizona
Mojave Tungsten Co.....	California
National Tungsten Co. (Acquired by International Tungsten Corp.).....	Ariz.
Nederland-Beaver Tungsten Mining Co.....	Colorado
Nevada Hills Mining Co.....	Nevada
Nevada Scheelite.....	Nevada
Nevada Tungsten Mines Co.....	Nevada
Nobe Tungsten Mine.....	Nevada
Penna. Mining Power & Reduction Co.....	Colorado
Pilot Knob Group.....	Nevada
Pioneer Mining, Milling, Power & Tunnel Co.....	Colorado
Powers Gulch Development Co. (Prospect).....	Arizona
Primos Chemical Co.....	Colorado, etc.
Redlich Tungsten Co.....	Nevada
Rose Consolidated Mining Co.....	Montana
Saint Anthony Mines Co.....	Nevada
Saint Anthony Tungsten Mines (See Toy Tungsten).....	Nevada
Salt Lake Tungsten Mines Co.....	Utah
Scheelite Mines, Ltd.....	Nova Scotia
Silver Tungsten Mining Co. (A "mushroom company").....	Nevada
Standard Tungsten Co.....	California
Sun Tungsten Co.....	Colorado
Tip Top Consolidated Mining Co.....	Arizona
Toy Tungsten Mine.....	Nevada
Tungsten Co. of America.....	Connecticut
Tungsten Exploration Co.....	Colorado
Tungsten Girl Co.....	Colorado
Tungsten Metals Corporation.....	Colorado
Tungsten Mines Co.....	California
Union Hill Mining Co. (some tungsten)	California
U. S. Tungsten Corporation.....	Nevada
Utah Minerals Concentration Co.....	Utah
Uvada Tungsten Co.....	Nevada
Vasco Mining Co.....	Colorado
Wah-Chang Mining & Smelting Co.....	China
Wasp No. 2 Mining Co.....	S. Dakota
Western Tungsten Mines Co.....	Colorado
White Oaks Mines Cons. Co.....	N. Mexico
Wolf Tongue Mining & Milling Co.....	Colorado
Yucca Tungsten Co.....	Arizona

URANIUM

As Uranium is the source of radium, the production of uranium ore has already been given under radium. Uranium ores occur in many places in the United States, but are found in greatest abundance in the Paradox Valley region of Colorado and Utah. The following list of producing properties, practically covers the field.

Colorado-Utah Carnotite Mines Co., Grand Junction, Colo. Claims in Grand County, Utah.

Consolidated Uranium & Vanadium Co., Uranium, Colo.

German-Belcher Mines, Central City, Colo.

Curran & Hudson, Naturita, Colo.

A. C. Titcomb, Uranium, Colo.

Ike W. Stevens, Cedar, Colo.

Cliff Mines, Nucla, Colo.

American Rare Metals Co., Cedar, Colo.

A. M. Wilson, Naturita, Colo.

E. T. Herrmann, 1738 Broadway, Denver, Colo.

Ward & Reams, Nucla, Colo.

Ewing Williams, Redvale, Colo.

J. M. Belisle, Norwood, Colo.

J. S. McArthur & Co., Glasgow, Scotland. Claims at Greenriver, Utah.

VANADIUM

Vanadium occurs with uranium in carnotite, the mineral of greatest commercial importance. When vanadium is 14% and uranium but 3% the mineral is a dark olive green; when the uranium content is 20%, the mineral is a beautiful yellow. The ore is usually low-grade, 2% to 4%, but of widespread occurrence, the sandstone looking as if dusted with sulphur.

The American Vanadium Co. is said to control 92% of the world's vanadium supply, the metal selling for \$5,000 to \$6,000 per ton. The demand is for vanadium steel, used in aeroplane construction, in automobiles, for military helmets and wherever extreme strength and lightness are required.

The two principal producers in the United States are:

Primos Chemical Co., Primos Pa. Mines at Vanadium, San Miguel County, Colo.

Standard Chemical Co., Pittsburgh, Pa. Mines at Minas Ragra, Peru.

VANADIUM MINES

American Vanadium Co.	Shattuck-Arizona Copper Co. Arizona
..... Pennsylvania	Standard Chemical Co.
Primos Chemical Co. Colorado (etc.)	..... Colorado-Utah

ZINC (SPELTER)

Zinc mining has been a war industry in 1915-16, the prices exceeding those ever known. The American smelters handled 1,257,528 tons of ore in 1915, compared with 872,767 in 1914; 489,514 tons spelter in 1915, compared with 353,049 in 1914, and a production for the first half of 1916 of 316,205 tons, equivalent to only 622,410 tons of metal if production continues at the same rate. The production of electrolytic zinc, begun in 1916 with 252 tons, will be an important factor in 1916, probably reaching 60,000 tons. Prices having fallen, it is safe to say that production will diminish somewhat.

"Prime Western Spelter" shall be Virgin Spelter resulting from the distillation of zinciferous material and shall not contain on the average, in excess of 2% Lead and .08% Iron.

In case of dispute one Slab out of every ten shall constitute a proper sample.

Remelted Spelter shall not be a good delivery.

This ruling goes into effect at once, and replaces Rule 1 of the Spelter Trade Rules.

C. MAYER,

Secretary.

New York, August 31, 1916.

An illustration of the effect of the abnormal price upon the earnings of zinc companies is shown in the Butte & Superior returns. In 1914, with zinc averaging 4.94c per pound, the net profit was \$372,984 or \$3.90 per ton, treating 18.28% ore. In the first quarter of 1916, with zinc at 16.1c, the profit was \$3,554,939, or \$21.55 per ton, treating 15.69% ore.

The ore supply heretofore from many small mines is now in large part from a few large properties, the Butte and Superior mine and its neighbor the Elm Orlu at Butte, Mont., and the Consolidated Interstate-Callahan at Wallace, Idaho, these mines furnishing a third of the entire American production. The introduction of flotation concentration has entirely altered the ore situation at many mines. Oxidized or calamine ores furnish about 29% of the production.

Spelter Prices in New York

Highest, lowest and average yearly prices of spelter in New York:

Year	Highest			Lowest			Average
	1901	1902	1903	1904	1905	1906	
1885	4.62½c	4.00 c	4.34 c	4.50	3.90	4.08½	
1886	4.60	4.25	4.40	5.62½	4.10	4.90	
1887	5.62½	4.40	4.62½	6.25	4.70	5.62	
1888	5.50	4.50	4.91	6.12½	4.75	5.17	
1889	5.40	4.62½	5.02	6.65	5.30	6.00	
1890	6.17½	5.00	5.55	6.85	6.00	6.27½	
1891	6.00	4.65	5.02	7.25	4.35	6.20½	
1892	4.90	4.35	4.63	5.17½	4.35	4.74	
1893	4.50	3.55	4.08	6.50	4.75	5.52	
1894	4.00	3.25	3.52	6.35	5.25	5.66	
1895	4.35	3.10	3.63	7.00	5.50	5.91	
1896	4.25	3.60	3.94	7.65	6.45	7.11	
1897	4.35	3.75	4.12	7.35	5.10	5.80	
1898	5.30	3.87½	4.57	6.20	4.75	5.30	
1899	7.00	4.45	5.75	27.50	5.70	14.44	
1900	4.80	4.10	4.40				

Average price for 30 years, 5.36c.
From American Metal Market.

Monthly Average Price of Spelter

Month	NEW YORK			ST. LOUIS			LONDON			
	1913	1914	1915	1913	1914	1915	1913	1914	1915	
Jan.	6.931	5.262	6.386	16.915	6.854	5.112	6.211	16.745	26.114	21.533
Feb.	6.239	5.377	8.436	18.420	6.089	5.228	8.255	18.260	25.338	21.413
Mar.	6.078	5.250	8.541	16.846	5.926	5.100	8.366	16.676	24.605	21.460
Apr.	5.641	5.113	10.012	16.695	5.491	4.963	9.837	16.525	25.313	21.369
May	5.406	5.074	14.781	14.276	5.256	4.924	14.610	14.106	24.583	21.393
June	5.124	5.000	21.208	11.752	4.974	4.850	21.038	11.582	22.143	21.345
July	5.278	4.920	19.026	8.925	5.128	4.770	18.856	8.755*	20.592	21.368
Aug.	5.658	5.568	12.781	5.508	5.418	12.611	20.706	↑	67.786	.....
Sept.	5.694	5.380	13.440	5.544	5.230	13.270	21.148	↑	67.841	.....
Oct.	5.340	4.909	12.800	5.188	4.750	12.596	20.614	↑	66.536	.....
Nov.	5.229	5.112	15.962	5.083	4.962	15.792	20.581	25.016	88.409	.....
Dec.	5.154	5.592	15.391	5.004	5.430	15.221	21.214	27.369	89.409	.....

Year 5.648 5.213 13.230 5.504 5.061 13.054 22.746 67.553

New York and St. Louis, cents per pound. London, pounds sterling per long ton. †Not reported.

From Eng. and Mng. Journal.

Comparison of Foreign and Domestic Spelter Prices

Compiled from annual averages. Price per pound (Exchange \$4.87).

Year	New York			Difference	New York			Difference
	London	Difference	London		Difference			
1884	4.44c	3.14c	1.30c	1900	4.40	4.40	0	
1885	4.34	3.04	1.30	1901	4.08½	3.70	.38½	
1886	4.40	3.10	1.30	1902	4.90	4.03	.87	
1887	4.62½	3.30	1.32½	1903	5.62	4.56	1.06	
1888	4.91	3.93	.98	1904	5.17	4.91	.26	
1889	5.02	4.30	.72	1905	6.00	5.51	.49	
1890	5.55	5.05	.50	1906	6.27½	5.88	.39½	
1891	5.02	5.05	-.03	1907	6.20½	5.18	1.02½	
1892	4.63	4.52	.11	1908	4.74	4.38	.36	
1893	4.08	3.78	.30	1909	5.52	4.82	.70	
1894	3.52	3.35	.17	1910	5.66	5.01	.65	
1895	3.63	3.17	.46	1911	5.91	5.49	.42	
1896	3.94	3.60	.34	1912	7.11	5.74	1.37	
1897	4.12	3.80	.32	1913	5.80	4.94	.86	
1898	4.57	4.44	.13	1914	5.30	5.07	.23	
1899	5.75	5.40	.35	1915	14.44	14.34*	.10	

*Exchange figured at \$4.75.
From American Metal Market.

Annual Production of Spelter in the United States from Domestic and Foreign Ores, in Short Tons.

Year.	From foreign ore.	From domestic ore.	Total	Year.	From foreign ore.	From domestic ore.	Total
1873	7,343	7,343	1898	.....	115,399	115,399
1875	15,833	15,833	1899	.....	129,051	129,051
1880 (census)	23,239	23,239	1900	.....	123,886	123,886
1882	33,765	33,765	1901	.....	140,822	140,822
1883	36,872	36,872	1902	.....	156,927	156,927
1884	38,544	38,544	1903	.....	159,219	159,219
1885	40,688	40,688	1904	.....	186,702	186,702
1886	42,641	42,641	1905	.....	203,849	203,849
1887	50,340	50,340	1906	25,076	199,694	224,770
1888	55,903	55,903	1907	26,115	223,745	249,860
1889	58,860	58,860	1908	19,675	190,749	210,424
1890	63,683	63,683	1909	25,535	230,225	255,760
1891	80,873	80,873	1910	16,705	252,479	269,184
1892	87,260	87,260	1911	14,905	271,621	286,526
1893	78,832	78,832	1912	14,899	323,907	338,806
1894	75,328	75,328	1913	9,424	337,252	346,676
1895	89,686	89,686	1914	9,631	343,418	353,049
1896	81,499	81,499	1915	31,384	458,135	489,519
1897	99,980	99,980				

Receipts of Zinc Ore

(In tons of 2,000 lb. This table includes the receipts of ore by the smelters only and does not include the production of ore exported or what was taken by the manufacturers of zinc oxide.)

State	1910(a)	1911(a)	1912	1913	1914	1915	1916(e)
Arizona	7,568	6,395	11,937	9,347	6,357	14,718	
Arkansas	190	860	1,567	1,500	1,737	7,017	
California	(d)	3,754	6,639	6,796	8,827	27,445	
Colorado	77,065	158,528	212,423	220,166	164,739	148,359	
Idaho	10,248	9,667	19,482	31,835	57,001	78,767	
Kentucky	179	575	947	441	434	1,863	
Missouri-Kansas	289,913	268,500	289,177	280,000	247,723	278,099	
Montana	33,514	56,593	34,034	91,257	125,663	200,528	
Nevada	4,915	5,666	20,654	22,313	20,447	24,949	
New Mexico	15,959	10,184	25,889	14,593	15,369	37,042	
Oklahoma	1,640	8,750	4,325	23,500	26,247	25,231	
Tennessee	2,775	3,439	6,635	8,297	18,708	38,527	
Utah	27,318	19,933	24,539	27,073	20,322	21,535	
Wisconsin (b)	51,383	71,565	90,762	89,662	74,311	90,128	
Others	46,905	44,896	56,099	57,241	57,936	122,490	
Totals	569,572	669,305	805,109	884,021	845,821	1,116,698	
Mexico	29,198	28,596	29,436	19,965	16,414	49,171	79,663
Canada	11,795	2,356	9,707	6,012	10,532	14,000	12,863
Australia	.....	.....	.....	.....	.....	68,448	83,775
Other foreign	.....	.....	.....	.....	.....	9,211	55,544

Grand totals (c) 610,565 700,257 844,252 909,998(c)872,767 1,257,528

(a) Smelters' receipts: reports missing from three small smelters. (b) Including Illinois and Iowa. (c) In addition to the ore reported from Canada and Mexico, zinc smelters received a few thousand tons from Europe and Eastern Siberia in 1913. (d) Included in "Others." (e) First six months. Figures are from Engineering & Mining Journal.

Production of Spelter

(In tons of 2,000 lb.)

By Ore Smelters Only.

States	1911	1912	1913	1914	1915
Colorado	7,477	8,860	8,637	8,152	8,984
Illinois	88,681	94,902	111,551	130,587	161,665
Missouri-Kansas	106,173	111,761	85,157	53,424	111,052
Oklahoma	46,333	76,837	83,230	92,467	111,405
East (a)	47,172	56,278	69,687	85,682	114,036
Totals	295,836	348,638	358,262	370,312	507,142

(a) Includes Anaconda production in 1915.
Figures are from Eng. & Mining Journal.

World's Production of Spelter

The figures are those of Henry R. Merton & Co., except for the United States, where the figures of the U. S. Geological Survey have been used; in tons of 2,000 lbs.

	1885	1890	1895	1900	1905	1910	1912	1913
Belgium	145,324	154,145	192,791	131,437	160,496	190,233	220,678	217,928
Germany—West	(a)	(a)	(a)	57,607	(b)	(b)	(b)	(b)
Germany—East	89,177	97,972	104,854	112,789	217,356	251,046	298,794	312,075
Holland				7,666	15,176	23,121	26,380	26,811
Great Britain	27,214	32,642	33,034	33,409	56,140	69,531	63,086	65,197
France and Spain	16,628	20,428	25,842	46,429	55,524	65,191	79,543	78,289
Austria and Italy	6,283	7,991	9,357	7,812	10,315	14,666	21,609	23,928
Poland	5,621	4,054	5,555	6,580	8,422	9,514	9,659	8,389
Norway							8,959	10,237
Total Europe	290,247	317,232	371,233	403,729	523,429	623,302	728,708	742,854
*United States	40,688	63,683	89,685	123,885	203,849	269,184	338,806	346,676
Australia						560	2,531	4,105
World's Total	330,935	380,915	460,918	527,614	727,278	893,046	1,070,045	1,093,635

(a) Included with Belgium; (b) Included with East Germany. (*)

Includes spelter made from Mexican ore. Figures for 1914 and 1915 have not been published.

World's Consumption of Spelter, by Countries, 1907-1913, in Short Tons.

(Stocks disregarded except in the United States.)

	1907	1908	1909	1910	1911	1912	1913
Austria-Hung'y	34,171	35,925	36,155	37,258	47,950	51,588	44,533
Belgium	60,627	74,936	71,209	84,326	81,240	85,098	84,216
France	76,720	85,956	73,744	62,059	90,389	90,389	89,286
Germany	192,792	198,580	207,343	196,320	241,734	248,899	255,734
Great Britain	154,653	152,627	171,408	195,989	193,674	204,146	214,508
Holland	4,189	4,189	4,409	4,409	4,409	4,409	4,409
Italy	7,496	9,257	9,039	8,929	11,133	11,795	12,015
Russia	19,290	19,946	20,282	27,447	31,856	30,754	36,707
Spain	5,180	5,512	4,960	4,630	5,291	5,181	6,503
Other countr's	13,228	11,020	9,921	13,668	19,621	21,715	23,038
United States	226,969	214,167	270,730	245,884	280,059	340,341	295,370

Total 795,315 812,115 879,200 880,919 1,007,356 1,094,315 1,066,319

Figures for 1914 and 1915 have not been published.

Active Zinc Smelters in the United States, and Capacity in 1916
(Includes plants working on ore alone, on ore and drosses, and on drosses alone.)

Arkansas		Retorts at Close of 1915	Retorts June 30, 1916	Planned
Operating Company	Location			
Fort Smith Spelter Co.....	Fort Smith .....	.....	2,560	.....
Arkansas Zinc Co.....	Van Buren .....	.....	2,400	.....
Colorado				
United States Zinc Co.....	Pueblo	2,208	1,944	.....
Illinois				
American Zinc Co. of Illinois†.....	Hillsboro	4,000	4,864	.....
Collinsville Zinc Smelter.....	Collinsville	1,792	2,304	.....
Granby Mining & Smelting Co.†.....	E. St. Louis.....	3,220	3,220	2,400
Hegeler Zinc Co.†.....	Danville	3,600	5,400	.....
Illinois Zinc Co.†.....	Peru	4,640	4,640	800
Matthiesson & Hegeler Zinc Co.†.....	La Salle	6,168	6,168	.....
Missouri Zinc Co.....	Beckemeyer	352	352	.....
Mineral Point Zinc Co.†.....	Depue	9,068	9,068	.....
National Zinc Co.†.....	Springfield	3,200	4,480	.....
Robert Lanyon Zinc & Acid Co.†.....	Hillsboro	1,840	3,200	.....
Sandoval Zinc Co.....	Sandoval	672	672	.....
Kansas				
American Spelter Co.....	Pittsburg	896	992	.....
American Zinc, Lead & Smelting Co.....	Caney	6,080	6,080	.....
.....do.....	Dearing	4,480	4,480	.....
Chanute Spelter Co.....	Chanute	1,280	1,280	.....
Cherokee Smelting Co.....	Bruce	896	896	.....
Edgar Zinc Co.....	Cherryvale	4,800	4,800	.....
Granby Mining & Smelting Co.....	Neodesha	3,760	3,760	.....
Iola Zinc Co.....	Concrete	660	1,320	.....
Joplin Ore & Spelter Corporation.....	Pittsburg	1,444	1,792	.....
Lanyon Smelting Co.....	.....do.....	448	448	.....
Owen Zinc Co.....	Caney	1,280	1,280	640
Pittsburg Zinc Co.....	Pittsburg	910	910	.....
Prime Western Spelter Co.†.....	Gas	4,868	4,868	.....
United States Smelting Co.....	Altoona	3,960	4,600	.....
.....do.....	Iola	3,440	3,440	.....
.....do.....	La Harpe	1,924	1,924	.....
Weir Smelting Co.....	Weir .....	.....	.....	448
Missouri				
Edgar Zinc Co.....	St. Louis	2,000	2,000	.....
Missouri Zinc Smelting Co.....	Rich Hill .....	.....	448	.....
Nevada Smelting Co.....	Nevada	672	672	.....
Oklahoma				
Bartlesville Zinc Co.....	Bartlesville	5,184	6,336	.....
.....do.....	Blackwell .....	.....	1,600	4,800
.....do.....	Collinsville	10,752	13,440	.....
Bartlesville Zinc Co. (Lanyon-Starr plant)	Bartlesville	3,456	3,456	.....
Eagle-Picher Lead Co.....	Henryetta .....	.....	.....	4,000
Henryetta Spelter Co.....	.....do.....	.....	3,000	.....
J. B. Kirk Gas & Smelting Co.....	Checotah .....	.....	2,560	2,560
Kusa Spelter Co.....	Kusa	3,720	3,720	.....
La Harpe Spelter Co.....	.....do.....	.....	4,000	.....

Oklahoma—Continued

Operating Company	Location	Retorts at Close of 1915	Retorts June 30, 1916	Planned
National Zinc Co.	Bartlesville	4,970	4,970	....
Oklahoma Spelter Co.	Kusa	....	1,600	....
Quinton Spelter Co.	Quinton	....	....	1,340
Tulsa Fuel & Manufacturing Co.	Collinsville	6,232	6,232	....
United States Zinc Co.	Sand Springs	5,680	8,000	....

Pennsylvania

American Steel & Wire Co.†	Donora	3,648	9,120	....
American Zinc & Chemical Co.†	Langeloth	3,648	6,384	912
New Jersey Zinc Co. (of Penna.)	Palmerton	6,720	6,960	....

West Virginia

Clarksburg Zinc Co.	Clarksburg	3,648	3,648	....
Grasselli Chemical Co.†	do	5,760	5,760	....
do	† Meadowbrook	8,592	8,592	....
United Zinc Smelting Corporation†	Moundsville	....	....	6,912
Total for all States		156,568	196,640	24,812

Plants with special retorts:

Michael Hayman & Co.	Buffalo, N. Y.	12	12	....
Trenton Smelting & Refining Co.	Trenton, N. J.	96	60	....
William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa.	32	32	....

(†) Has acid plant.

STATE MINE INSPECTORS, COMMISSIONERS, ETC.

State	Name and Address
Alabama	C. H. Nesbit, Chief Mine Inspector, Birmingham.
Alaska	Sumner S. Smith, Mine Inspector, Juneau.
Arizona	C. H. Boltin, State Mine Inspector, Phoenix.
Arkansas	Charles F. Willis, Director, State Bureau of Mines. John H. Page, Commissioner, Bureau of Mines, Manufactures and Agriculture, Little Rock; John T. Fuller, State Mineralogist; Tom Shaw, State Mine Inspector, Midland.
California	F. McN. Hamilton, State Mineralogist, San Francisco.
Colorado	Fred Carroll, Commissioner.
Idaho	James Dalrymple, State Inspector of Coal Mines, Denver. R. N. Bell, State Mine Inspector, Boise.
Indiana	Michael Scollard, Deputy Inspector of Mines, Indianapolis.
Iowa	E. M. Gray, President, State Mining Board, Des Moines.
Kansas	John Pellegrino, Chief Mine Inspector, Pittsburg.
Kentucky	C. J. Norwood, Chief Inspector of Mines, Lexington.
Maryland	William Walters, State Mine Inspector, Midland.
Minnesota	F. A. Wildes, State Mine Inspector, Hibbing.
Missouri	George Bartholomaeus, Secretary, Bureau of Mines and Mine Inspection, Jefferson City. George Hill, Chief Mine Inspector, Berier.
Montana	W. B. Orem, State Mine Inspector, Helena.
Nevada	A. J. Stinson, State Mine Inspector, Carson City.
New Mexico	Rees H. Beddow, State Mine Inspector, Gallup.
New York	W. W. Jones, State Mine Inspector, Albany.
North Dakota	James W. Bliss, State Engineer, Bismarck.
Ohio	J. M. Roan, Chief Deputy, Division of Mines, Columbus.
Oklahoma	Ed. Boyle, Chief Inspector, McAlester.
Oregon	H. M. Parks, Director, Bureau of Mines, Corvallis.
Pennsylvania	James Roderick, Chief, Department of Mines, Harrisburg.
South Dakota	Otto E. Ellerman, State Mine Inspector, Lead.
Tennessee	R. A. Shiffett, Chief Mine Inspector, Nashville.
Texas	I. J. Broman, State Mine Inspector, Austin.
Utah	J. E. Pettit, State Mine Inspector, Salt Lake City.
Virginia	Capt. Richard E. Roane, Mine Inspector, Richmond.
Washington	James Bagley, State Inspector of Coal Mines, Seattle.
West Virginia	Earl Henry, Chief, Department of Mines, Charleston.

STATE GEOLOGISTS

Alabama	Eugene A. Smith, University.
Arkansas	N. F. Drake, Fayetteville.
Connecticut	William N. Rice, Supt., State Geol. and Nat. History Survey, Hartford.
Colorado	R. D. George, Director, Boulder.
Florida	E. H. Sellards, Tallahassee.
Georgia	S. W. McCallie, Atlanta.

Illinois.....	F. W. DeWolf, Director, Urbana.
Indiana.....	Edward Barrett, Indianapolis.
Iowa.....	George F. Kay, Des Moines.
Kansas.....	W. H. Twenhofel, Lawrence.
Kentucky.....	J. B. Hoeing, Frankfort.
Maryland.....	William Bullock Clark, Baltimore.
Michigan.....	R. C. Allen, Lansing.
Minnesota.....	W. H. Emmons, Minneapolis.
Mississippi.....	E. N. Lowe, Jackson.
Missouri.....	H. A. Buehler, Rolla.
Nebraska.....	E. H. Barbour, Lincoln.
New Jersey.....	H. B. Kimmel, Trenton.
New York.....	John M. Clarke, Albany.
North Carolina.....	Joseph Hyde Pratt, Chapel Hill.
North Dakota.....	A. G. Leonard, Fargo.
Ohio.....	J. A. Bownocker, Columbus.
Oklahoma.....	C. W. Shannon, Norman.
Pennsylvania.....	R. R. Hice, Beaver.
Rhode Island.....	Charles W. Brown, Providence.
South Dakota.....	Freeman Ward, Vermillion.
Tennessee.....	A. H. Purdue, Nashville.
Texas.....	J. A. Udden, Director, Bureau of Economic Geology, Austin.
Vermont.....	G. H. Perkins, Burlington.
Virginia.....	Thomas L. Watson, Charlottesville.
Washington.....	Henry Landes, Seattle.
West Virginia.....	I. C. White, Morgantown.
Wisconsin.....	W. O. Hotchkiss, Madison.
Wyoming.....	L. W. Trumbull, Cheyenne.

CHAPTER VI

RESUME OF THE COPPER INDUSTRY

In this chapter, the essential, vital facts concerning the Copper Industry, both of the United States and of all countries of the world are presented in a series of tables, giving price and production with trade statistics, covering imports, exports, and consumption. A list of copper smelting plants and refineries and their capacities and outputs, and of copper stocks, is supplemented by the figures for the Michigan field, and the Porphyry coppers.

The figures presented are mainly those of the Mineral Statistics Division of the U. S. Geological Survey, but the prices given are those reported by the Eng. & Mining Journal, for the excellent reason that all ore sales are settled upon these figures, and no other journal or organization has access to reports of sales, made by the four or five greatest selling agencies, handling 95% of the North American output.

The following table (from the Eng. & Mng. Journal) gives the essential figures of the Copper Industry for the past eleven years. The column headed "Pounds Reported" represents the sales of the eight largest producers aggregating 40% of the U. S. production, so that the prices given may be considered as representative of the entire industry.

Production, Sale and Price for Copper for 11 Years

Year	Total Production	Pounds Reported	Average Realized	Quotational Average
1905	219,000,000	82,372,955	15.597	15.699
1906	224,071,000	113,411,645	19.146	19.616
1907	220,317,041	66,316,025	18.043	20.661
1908	222,267,444	125,949,248	13.348	13.424
1909	226,602,134	136,005,773	13.211	13.335
1910	221,400,864	126,710,763	12.96	13.039
1911	216,412,867	135,329,098	12.657	12.634
1912	1,228,333,298	552,155,308	15.841	16.341
1913	1,406,448,665	658,533,402	15.222	15.269
1914	1,342,634,206	566,687,750	13.458	13.602
1915	1,411,652,418	619,832,987	17.299	17.275

Up to 1912 the figures represent Lake copper production and sales, 1912, and later figures represent electrolytic copper only. The figures for "pounds reported" and "average realized" do not include the United Metals Selling Co. (Anaconda), but John D. Ryan has stated that in the 10 years ending with 1913 his companies sold 5,560,000,000 lbs. of copper at an average of 14.82c, delivered to the buyers in Europe and America. This would be equivalent to 14.62 @ 14.67c, net cash, New York. During the same 10-year period, Phelps, Dodge & Co. reported an average of 14.56c per lb., net cash, New York, actually realized. The arithmetical mean of the quotational averages for electrolytic copper in this period is 15.06c.

The 1914 price is an average for nine months. Nb quotations in August, September and October. The bulk of the copper sold in 1914 was disposed of before and after those months. So the nine month's basis is approximately correct.

The figure for each company for 1915, a year of violent fluctuation with war demands and unusual conditions of delivery are given below.

Copper Sales in 1915

Company	Lb.	Proceeds	Av. Price
Chino	64,887,788	\$11,303,957	17.42c (a)
Miami	41,907,754	7,262,884	17.331 (b)
Nevada Consolidated	62,726,651	11,069,671	17.647 (a)
North Butte	19,725,510	3,294,752	16.703 (c)
Phelps, Dodge & Co.	194,925,668	31,342,098	16.079 (d)
Ray Consolidated	60,338,936	10,470,274	17.352 (a)
U. S. Sm., Ref. and Min.	26,923,674	4,895,532	18.183 (e)
Utah Copper Co.	148,397,006	26,235,331	17.679 (a)
Total	619,832,987		17.299
E. & M. J. average			17.275

(a) Probably figured on copper produced and sold in 1915 but partly delivered and paid for in 1916. Whether gross price or net price not stated. (b) Gross price. (c) Produced and delivered in 1915. Whether gross price or net price not stated. (d) Produced and delivered in 1915. Net price. (e) Average of sales. Whether gross price or net price not stated.

Commenting editorially on these figures, the E. & M. Journal says that it is uncertain whether the price given is gross, including freight to delivery point of the refined copper or is net, and it is probable that the figures given do not represent the same thing. The Phelps-Dodge report 16.079c, realized from copper produced, sold and delivered, while others include copper sold, but not delivered and paid until 1916. A further discrepancy between the prices shown in the above table is due to differences in reported sales. Steadily rising prices were accompanied by increased production, partly sold in 1915, but not delivered and paid for until 1916, is by some companies all included in 1915 figures; thus the North Butte Co. delivered 19,725,510 lbs. @ 16.703c per pound but sold 27,805,869 lbs. @ 18.114c.

The Utah, Nevada, Chino and Ray report an "aggregate 336,350,381 lbs. @ 17.524c. All this copper was sold by the American Smelting and Refining Co., which reported a production of 551,798,000 lbs. valued at 16.13c. The returns of other companies selling through that agency were more in line with the latter figure than the former. In 1914 there was no such discrepancy, for the matter of carry-over does not make so great a difference when the prices over the turn of the year is not very different, as often is the case. The Hayden-Jackling companies in 1914 reported 275,938,710 lbs. of copper sold at an average of 13.313c, while the American Smelting and Refining Co. reported a production of 529,686,000 lbs., valued at 13.46c."

COPPER-SMELTING WORKS OF NORTH AMERICA

Company	Situation of Works	Blast Furnaces	Annual Fur. Capac-ity	Re-verb. Furnaces	Annual Fur. Capac-ity	Con-verts	Annual Capac-ity in Ore*
American Sm. & Ref. Co.	Aguascalientes, Mex.	10	800,000			4	†
American Sm. & Ref. Co.	Perth Amboy, N. J.	1	90,000			3	†
American Sm. & Ref. Co.	Omaha, Neb.					2	†
American Sm. & Ref. Co.	El Paso, Tex.	3	300,000	3	435,000	3	†
American Sm. & Ref. Co.	Matehuala, S.L.P., Mex.	3	325,000				
American Sm. & Ref. Co.	Hayden, Ariz.			2	290,000	3	†
American Sm. Sec. Co.	Garfield, Utah.	4	800,000	6	875,000	6	†
American Sm. Sec. Co.	Tacoma, Wash.	2	375,000			7	†
American Sm. Sec. Co.	Velardeña, Dgo., Mex.	3	258,000				
Anaconda C. Mg. Co.	Anaconda, Mont.	3	1,750,000	8	1,750,000	7	105,000
Anaconda C. Mg. Co.	Great Falls, Mont.	2	280,000	2	330,000	2	49,000

COPPER-SMELTING WORKS OF NORTH AMERICA—Continued

Company	Situation of Works	Blast Furnaces	Annual Capacity	Re-verb. Furnaces	Annual Capacity	Con-ity v'trs	Annual Capacity in Ore*
Arizona Cop. Co.	Clifton, Ariz.			3	360,000	3	
Balakala Cons. Cop. Co.††	Coram, Calif.	3	630,000	1	52,500	2	
Compagnie du Boleo	Santa Rosalia, Mex.	8	650,000				
Brit. Col. Cop. Co.	Greenwood, B. C.	3	912,500			2	
Calumet & Ariz. Mining Co.	Douglas, Ariz.	2	649,500	4	486,500	6	33,500
Canadian Copper Co.	Coppercliff, Ont.	7	1,020,000	2	300,000	5	43,200
Cananea Cons. Cop. Co.	Cananea, Son.	8	868,000	2	153,000	6	35,000
Cons. Ariz. Sm. Co.	Humboldt, Ariz.			2	150,000	2	10,000
Cons. Mg. & Smg. Co.	Trail, B. C.		5 450,000			2†	
Copper Queen Cons. C. Co.	Douglas, Ariz.	10	1,225,000	3	275,000	7	34,160
Detroit Copper Mng. Co.	Morenci, Ariz.	1	132,657			3	7,578
Ducktown Sulph., C. & I. Co.	Isabella, Tenn.		2 171,500				
East Butte Cop. Mng. Co.	Butte, Mont.		2 350,000			3	5,000
Granby Con. M., S. & P. Co.	Grand Forks, B. C.	8	1,440,000			4	7,000
Granby Con. M., S. & P. Co.	Anoyx, B. C.	4	1,080,000			3	28,000
International Smg. Co.	Tooele, Utah			5	525,000	5	14,000
International Smg. Co.	Miami, Ariz.			3	420,000	5	7,000
Mammoth Cop. Mng. Co.	Kennett, Calif.	5	730,000			2	28,500
Mason Valley Mines Co.††	Thompson, Nev.	2	800,000			2	22,000
Mazapil Copper Co.††	Concepcion del Oro, Zac. Mex.	4	250,000				
Mond Nickel Co.	Coniston, Ont.	3	630,000			3	70,000
Mountain Cop. Co.	Martinez, Calif.			3	125,000	2	*
Nevada Cons. Cop. Co.	McGill, Nev.	1	175,000	5	900,000	4	40,000
Nichols Copper Co.	Laurel Hill, N. Y.	2	94,500			2	
Norfolk Smelting Co.	West Norfolk, Va.	1	140,000			2	4,200
Old Domin. C. M. & S. Co.	Globe, Ariz.	5	562,500			1	6,062
Orford Wks., Int. Nickel Co.	Constable Hook, N. J.	2	94,500			3	
Penn Mining Co.	Campo Seco, Calif.	1	50,000	2‡	96,000		
Pioneer Smelting Co.	Corwin, Ariz.	1	60,000				
Santa Fe G. & Cop. Co.	San Pedro, N. M.	1	45,000				
Shannon Copper Co.	Clifton, Ariz.	3	500,000			2	8,000
Swansea C. G. & C. M. Co.††	Bouse, Ariz.	1	190,000			2	
Tennessee Copper Co.	Copperhill, Tenn.	7	1,000,000			4	15,000
Teziutlan C. M. & S. Co.††	Teziutlan, Puebla, Mex.	2	350,000			3	
Cia. Metal. de Torreon	Torreon, Coah., Mex.	2	175,000			2	
Tyee Copper Co.††	Ladysmith, B. C.	2	175,000				
U. S. Metals Refining Co.	Chrome, N. J.	2	200,000			2	†
U. S. Smelting Co.††	Midvale, Utah	6	670,000	1	40,000	4	36,000
United Verde Copper Co.	Clarkdale, Ariz.	4	720,000	3	324,000	5	54,000
Wanakah Mining Co.	Ouray, Colo.	2	105,000				
Western Sm. & P. Co.‡	Cooke, Mont.	1					

* Raw ore smelted as flux. † Included in furnace tonnages. ‡ Under construction.
 †† Penn. Min. Co. has 2 reverberatories, each with capacity of 48,000 tons per annum, but only one is run at a time. ** No raw ore charged. †† Not in operation.
 From Engineering and Mining Journal. (Corrected Dec. 1, 1915.)

ELECTROLYTIC COPPER REFINERIES OF THE UNITED STATES

(Engineering and Mining Journal.)

Name	Location	Capacity in lbs.†	
		1914	1915
Nichols Copper Co.	Laurel Hill, N. Y.	400,000,000	400,000,000
Raritan Copper Works	Perth Amboy, N. J.	400,000,000	400,000,000
Baltimore Copper Smelting & Rolling Co.	Canton, Md.	336,000,000	354,000,000
American Smelting & Refining Co.	Perth Amboy, N. J.	216,000,000	240,000,000
U. S. Metals Refining Co.	Chrome, N. J.	200,000,000	200,000,000
Balbach Smelting & Refining Co.	Newark, N. J.	48,000,000	48,000,000
Anaconda Copper Mining Co.	Great Falls, Mont.	65,000,000	165,000,000
Tacoma Smelting Co.	Tacoma, Wash.	48,000,000	120,000,000
Calumet & Hecla Mining Co.	Calumet, Mich.	65,000,000	65,000,000

Total 1,778,000,000 1,892,000,000
 † New refinery of Anaconda company, now in construction, will have a capacity of about 180,000,000 pounds.
 ‡ All of the figures were officially furnished.

GRADES OF COPPER

LAKE.—Copper from the native copper mines of the Lake Superior district. The standard range of conductivity is 99.5%.

ELECTROLYTIC.—Copper refined by the electrolytic process and running 99.93% upwards for cathodes. Conductivity to 103%.

CASTING.—Copper analyzing 99 to 99.75% made from ore and scrap. Used for casting purposes.

BEST SELECTED.—British copper averaging 99.75% fine. Largely used in the British brass trades.

TOUGH.—British copper largely used for casting, rolling and drawing. Runs about 99.25%.

CHILI BARS.—Copper smelted in CHILI running 95 to 99% pure and in some cases carrying bullion.

STANDARD.—Practically anything running from 96% upwards, dealt in on London Metal Exchange.

MATTE.—A semi metallic compound made from ores and usually running from 25 to 55% copper. An intermediate product between the ore and the finished copper.

DESCRIPTION OF COPPER

WIRE BARS.—About 3" to 4" square and 3' to 7' long. Average weight 135 to 175 lbs. Used for wire drawing.

INGOTS.—Average weight about 18 to 20 lbs. Notched. Used for casting.

INGOT BARS.—Notched bars for casting. Weight about 55 to 60 lbs.

CAKES.—Weight 100 lbs. and upward. Used for rolling.

ANODES.—About 2' by 3', 1½" thick, weighing 250 lbs. Crude copper. Used by electrolytic refiners.

CATHODES.—About 2' by 3' but thicker at the top than the bottom. Refined copper from the electrolytic tanks which is run down to wire bars, etc.—From American Metal Market.

BRANDS OF COPPER IN UNITED STATES

Lake Superior

	Refined at:	Branded.
Adventure	Hancock, Mich.	Adv. C. Co.
Atlantic	Houghton, Mich.	A.
Calumet & Hecla	Hubbell, Mich.	C. & H. M. Co.
Centennial	Hancock, Mich.	C. C. M. Co.
Copper Range	Houghton, Mich.	C. R.

Lake Superior

	Refined at:	Branded.
Franklin	Hancock, Mich.	F. M. Co.
Isle Royale	Dollar Bay, Mich.	I. R. C. Co.
Mass.	Hancock, Mich.	Mass.
Michigan	Houghton, Mich.	M. C.
Mohawk	Houghton, Mich.	M. M.
Osceola	Dollar Bay, Mich.	T. O.
Quincy	Hancock, Mich.	Q. M. Co.
Tamarack	Dollar Bay, Mich.	T. O.
Victoria	Hubbell, Mich.	V. C.
Winona	Hubbell, Mich.	W. A.
Wolverine	Houghton, Mich.	W.

BRANDS OF COPPER—Continued

Electrolytic

	Refined at	Branded
American S. & R. Co.	Perth Amboy, N. J.	P. A.
Balbach S. & R. Co.	Newark, N. J.	P. B.
Baltimore Copper Works	Baltimore, Md.	B. E. R.
Boston & Montana Co.	Great Falls, Mont.	B. & M.
Chicago Copper Ref. Co.	Blue Island, Ill.	C. C. R.
Copper Queen	Laurel Hill, L. I.	C. * Q.
Miami	Laurel Hill, L. I.	A. L. S.
Nichols Copper Co.	Laurel Hill, L. I.	L. N. S.
Orford Copper Co.	Chrome, N. J.	O. E. C.
Raritan Copper Works	Perth Amboy, N. J.	N. E. C.
U. S. Metals Ref. Co.	Chrome, N. J.	D. R. W.
United Metals Selling Co.	Laurel Hill, L. I.	R. M. C.

Casting

	Refined at:	Branded
Balbach S. & R. Co.	Newark, N. J.	N. B. C.
Boston & Montana Co.	Great Falls, Mont.	M. A.
Chicago Copper Ref. Co.	Blue Island, Ill.	C. C. R.
Duquesne Reduction Co.	Pittsburgh, Pa.	D. E. C.
Nichols Copper Co.	Laurel Hill, L. I.	C. N. C.
Phelps, Dodge & Co.	Laurel Hill, L. I.	P. D. Co.
Tottenville Copper Co.	Tottenville, N. Y.	C. T. C.
U. S. Metals Ref. Co.	Chrome, N. J.	D. S.
Philadelphia, Pa.	White & Bro., Inc.	W. B.

Above table from American Metal Market.

PRICE TABLES

Month	Monthly Average Price of Copper					London Standard				
	1912	1913	1914	1915	1916	1913	1914	1915	1916	
January	14.094	16.488	14.223	13.641	24.008	62.760	71.741	64.304	60.756	88.083
February	14.084	14.971	14.491	14.394	26.440	62.893	65.519	65.259	63.494	102.667
March	14.698	14.713	14.131	14.787	26.310	65.884	65.329	64.276	66.152	107.714
April	15.741	15.291	14.211	16.811	27.895	70.294	68.111	64.747	75.096	124.819
May	16.031	15.436	13.996	18.506	28.625	72.352	68.807	63.182	77.600	135.457
June	17.234	14.672	13.603	19.477	26.601	78.259	67.140	61.336	82.574	112.432
July	17.190	14.190	13.223	18.796	23.865	76.636	64.166	60.540	76.011	95.119
August	17.498	15.400	*	16.941	.....	78.670	69.200	*	68.673	.....
September	17.508	16.328	*	17.502	.....	78.762	73.125	*	68.915	.....
October	17.314	16.337	*	17.686	.....	76.389	73.383	*	72.601	.....
November	17.326	15.182	11.739	18.627	.....	76.890	68.275	53.227	77.744	.....
December	17.376	14.224	12.801	20.133	.....	75.516	65.223	56.841	80.773	.....
Year	16.341	15.269	13.602	17.275	.....	72.942	68.335	.....	72.532	.....

New York, cents per pound. London, pounds sterling per long ton of standard copper. * No quotations.

In explanation of the prices given in the Engineering and Mining Journal, the following quotation from that magazine is of interest:

"On any given day copper is apt to be sold at a range of price even when the market is stationary, such range exhibiting the competition among sellers and the shopping among buyers; also there are differences in price according to conditions of sale. In periods of activity there are, moreover, changes in price between the beginning and end of a day. In quoting figures in this annual review we have reference to what we have in our weekly market reports during the year computed as the daily average price. Quotations are reduced in terms of net cash, New York. Copper for domestic delivery is commonly sold on "regular terms." "Regular terms" in the sale of copper means that the seller delivers the copper to the buyer, paying the freight on it, and allows him 30 days after his receipt of the copper in which to make payment, or if he chooses to pay

cash, the bill is discounted at the rate of $\frac{1}{2}\%$. To arrive at the difference between a sale upon these terms and a cash sale f.o.b. refinery, which is regarded as being f.o.b. New York, the interest on the value of the copper while in transit is commonly reckoned. This is a matter of 10 days. When copper sells at $18\frac{1}{4}c$, regular terms, the equivalent net price is therefore about $18.03c$, there being $0.09125c$ discount, $0.1c$ freight and 0.0304 loss of interest, a total of $0.22c$. The freight rate is naturally a variable, being less to some nearby factories and more to some of the more remote ones. About $10c$ per 100 lbs. is regarded as being an average transportation cost."

In discussing the copper producing mines of America it is worth while remembering that a very large part of the silver production of the U. S. and a respectable part of the gold output come from our copper mines. In the last year, several copper companies have also become zinc producers. The new metallurgy has made the recovery of the latter metal profitable in ores formerly worthless because of the presence of zinc. Thus the copper mines around Kennett, Calif. yielded 315,549 tons copper ore in 1915 with a value of \$17.97 per ton, made up as follows: gold, \$1.51 per ton; silver, \$1.26 per ton; copper, \$11.96 per ton; zinc, \$3.24 per ton.

HIGH, LOW AND AVERAGE PRICES OF LAKE COPPER

Year	Prices per cts. per lb...	Highest		Lowest		Average
		Price	Month	Price	Month	
1860		24.000	January	19.750	December	22.875
1861		27.000	December	17.500	July	22.250
1862		32.875	November	20.750	May	21.875
1863		38.750	December	29.000	July	33.875
1864	Highest	55.000	July	39.000	January	47.000
1865		50.500	January	28.000	July	39.250
1866		42.000	January	26.500	November	34.250
1867		29.250	January	21.500	December	25.375
1868		24.500	December	21.500	January	23.000
1869		27.000	February	21.500	December	24.250
1870		23.375	November	19.000	March	21.188
1871		27.000	December	21.250	April	24.125
1872		44.000	April	27.125	January	35.563
1873		35.000	January	21.000	November	28.000
1874		25.000	January	19.000	August	22.000
1875		23.875	September	21.500	January	22.688
1876		23.250	January	18.750	August	21.000
1877		20.500	February	17.500	December	19.000
1878		17.625	January	15.500	October	16.563
1879		21.750	November	15.500	January	18.625
1880		25.000	January	17.875	June	21.438
1881		20.375	December	16.000	July	18.188
1882		20.375	January	17.875	April	19.125
1883		18.125	January	14.875	November	16.500
1884		15.000	December	11.000	December	13.000
1885		11.875	February	9.800	May	10.838
1886		12.125	December	10.000	May	11.063
1887		17.750	December	9.950	May	13.850
1888		17.600	November	15.850	January	16.775
1889		17.500	January	11.000	September	13.490
1890		17.250	July	14.000	March	15.600
1891		15.000	January	10.250	December	12.760
1892		12.375	December	10.500	February	11.560
1893		12.500	January	9.600	August	10.750
1894	Lowest	10.250	January	9.000	June	9.520

HIGH, LOW AND AVERAGE PRICES OF LAKE COPPER—Continued

Year	Highest		Lowest		Average
	Price	Month	Price	Month	
1895	12.250	August	9.375	April	10.730
1896	12.000	June	9.750	January	10.980
1897	12.000	January	10.750	November	11.360
1898	13.250	December	11.000	January	12.050
1899	19.375	April	13.250	January	17.760
1900	17.250	April	16.000	February	16.650
1901	17.000	January	13.000	December	16.720
1902	13.500	February	11.000	January	12.160
1903	15.375	March	12.000	December	13.720
1904	15.375	November	12.250	February	13.010
1905	18.875	December	15.000	May	15.890
1906	24.000	December	17.875	February	19.616
1907	26.250	March	12.500	October	20.004
1908	14.750	December	12.500	February	13.500
1909	14.750	January	12.500	March	13.480
1910	14.125	January	12.500	July	13.125
1911	14.250	December	12.250	June	12.779
1912	18.000	October	14.250	January	16.695
1913	17.250	October	14.500	July	16.695
1914	14.491	February	11.739	November	13.602*
1915	20.133	December	13.641	January	17.275

*9 months. No quotations in Aug., Sept., Oct., 1914.

HIGH AND LOW MONTHLY PRICES OF LAKE COPPER

Year	January		February		March		April		May		June	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
1860	24	23½	24	23¾	23¾	23	23¾	23	23¾	22¾	22½	21¾
1861	20	19	19½	19	19¾	19½	19¾	19	19¾	19½	19	18
1862	28	27	28	25	25	23	23	21½	21¾	20¾	23	20¾
1863	35	31	37	35	37	31	31	30	30½	30	30¾	30
1864	41¼	39	42	41¼	42½	41½	44	42½	44	43	49	44
1865	50½	46	46	44	44½	34	35	34	34	30	30¾	28½
1866	42	38	38	35½	35½	29½	30	28½	31	29	33	31
1867	29¾	27	27¾	27½	27½	24	24½	23½	24½	24	24½	24
1868	23¾	21½	24	22¾	24	23¾	24½	23¾	24½	24	24	23½
1869	26¼	23¾	27	26	26¾	24	24	23¾	24½	23¾	23¾	22
1870	22	21½	21¼	20¾	20¾	19	19¾	19¾	19½	19	20½	19
1871	22¾	22	22¾	21¾	22	21½	21¾	21½	21¾	21½	21½	21½
1872	28½	27½	28¾	28¾	30¾	28¾	44	30¾	42	36	34¾	33
1873	35	32½	35	34	35	34½	34½	30¾	33½	32	31½	29½
1874	25	24½	25	24¾	24¾	24	25	24¾	25	24½	24¾	24½
1875	23½	21½	22¾	21¾	21¾	21½	21¾	21½	23½	22¾	23	23
1876	23¾	23	22¾	22¾	22¾	22	22¾	22	22¾	21	21	19¾
1877	19¾	19	20¾	19¾	19¾	19	19¾	19¾	19¾	19	19¾	19
1878	17½	17¼	17¼	17¼	17¼	16¾	17	16¾	16¾	16¾	16¾	16¾
1879	16	15½	15½	15½	15¾	15¾	16	15¾	16½	16	16½	16½
1880	25	21¾	24¾	24	24	22¾	22¾	21	21	18	18½	17½
1881	19¾	19¾	19¾	19¾	19¾	19	19	18¾	18¾	18¾	18¾	16¾
1882	20¾	20¼	20	19	19¾	18¾	18¾	17¾	18¾	18	18¾	18
1883	18¾	18	17¾	17¾	17¾	17¾	16	15¾	16	15¾	15¾	15
1884	15	14¾	15	14¾	15	14¾	15	14¾	14¾	14¾	14¾	14
1885	11¼	10¾	11¾	10¾	11¾	10¾	11¼	10¾	11¼	10¾	11¼	11
1886	11¾	11¾	11¾	11¾	11¾	11¾	11¾	11¾	11¾	10	10½	10
1887	12	11¾	11¾	10¾	10¾	10¾	10¾	10	10	9½	10½	10
1888	17%	15½	16½	16	16½	15½	16½	16	16¾	16½	16½	16½

HIGH AND LOW MONTHLY PRICES OF LAKE COPPER (Continued)

Year	January		February		March		April		May		June	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
1889	17 1/2	16 1/2	16 1/2	16 1/2	15 3/4	15	16	15 1/2	12 1/2	12	12 1/2	12
1890	14 1/2	14 1/2	14 1/2	14 1/2	14 1/2	14	14 1/2	14 1/2	15 1/2	14 1/2	16 1/2	15 1/2
1891	15	14 1/2	14 1/2	14 1/2	14 1/2	13 3/4	13 3/4	13 3/4	13 3/4	12 3/4	13	12 3/4
1892	11	10 1/2	10 1/2	10 1/2	12	10 1/2	12	11 1/2	12 1/2	12	11 1/2	11 1/2
1893	12 1/2	12 1/2	12 1/2	12	12	11 1/2	11 1/2	11 1/2	11 1/2	11	11	10 3/4
1894	10 1/2	10	10	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9
1895	10	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	10 1/2	9 1/2	10 1/2	10 1/2
1896	10 1/2	9 1/2	11 1/2	10	11 1/2	10 1/2	11	10 1/2	11 1/2	10 1/2	11 1/2	11 1/2
1897	12	11 1/2	12	11	11 1/2	11 1/2	11 1/2	11	11 1/2	10 1/2	11 1/2	10 1/2
1898	11	10 1/2	11 1/2	11 1/2	12	11 1/2	12 1/2	11 1/2	12 1/2	12	11 1/2	11 1/2
1899	17	13 1/2	18 1/2	17	18	17 1/2	19 1/2	18	19 1/2	18 1/2	18 1/2	17 1/2
1900	16 1/2	16 1/2	16 1/2	16	17	16 1/2	17 1/2	17	17 1/2	16 1/2	16 1/2	16 1/2
1901	17	17	17	17	17	17	17	17	17	17	17	17
1902	13	11	13 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12	12 1/2	12	12 1/2	12 1/2
1903	12 1/2	12 1/2	13 1/2	12 1/2	15 3/4	13 3/4	15 1/2	14 3/4	15 1/2	14 3/4	15 1/2	14
1904	13	12 1/2	12 1/2	12 1/2	13	12 1/2	13 1/2	13	13 1/2	13	13 1/2	12 1/2
1905	15 1/2	15 1/2	15 1/2	15 1/2	15 1/2	15 1/2	15 1/2	15 1/2	15	15	15	15
1906	19	18 1/2	18 1/2	17 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2
1907	25 1/2	25	25 1/2	25 1/2	26 1/2	25 1/2	25 1/2	25 1/2	25 1/2	25 1/2	24 1/2	24 1/2
1908	14 1/2	13 1/2	14 1/2	12 1/2	13 1/2	12 1/2	13 1/2	13	13 1/2	12 1/2	13 1/2	12 1/2
1909	14 1/2	14	14 1/2	12 1/2	13 1/2	12 1/2	13 1/2	13	13 1/2	13	13 1/2	13 1/2
1910	14 1/2	13 1/2	14	13 1/2	14	13 1/2	13 1/2	13	13 1/2	12 1/2	13 1/2	12 1/2
1911	13 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	13	12 1/2
1912	14 1/2	14 1/2	14 1/2	14 1/2	15 1/2	14 1/2	16 1/2	16	17	16	17 1/2	16 1/2
1913	18	16 1/2	16 1/2	15 1/2	15 1/2	15 1/2	15 1/2	15 1/2	16	15 1/2	16 1/2	14 1/2
1914*	15 1/2	14	15	15	15	15	.....	.....	.....	.....	.....	.....
1915*	14 1/2	13	15	14 1/2	16 1/2	14 1/2	19	16	19 1/2	18 1/2	20 1/2	18 1/2
1916*	25 1/2	23	28 1/2	25 1/2	28 1/2	27 1/2	30	28 1/2	29 1/2	28 1/2	29 1/2	27 1/2
Year	July		August		September		October		November		December	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
1860	21 1/2	21 1/2	21 1/2	21 1/2	22	21 1/2	22	21 1/2	21 1/2	20 1/2	20 1/2	19 1/2
1861	18	17 1/2	19	17 1/2	20 1/2	19	20 1/2	20	22 1/2	20 1/2	27	22 1/2
1862	24 1/2	22 1/2	24 1/2	24	27	24 1/2	32 1/2	27	32 1/2	30 1/2	31 1/2	30 1/2
1863	32	29	31	29	32 1/2	31	34 1/2	32 1/2	38 1/2	34 1/2	38 1/2	38 1/2
1864	55	49	52 1/2	50	52 1/2	47 1/2	48	47	49	47	50	48 1/2
1865	30 1/2	28	32	30 1/2	32 1/2	31 1/2	33	32 1/2	45 1/2	33	45 1/2	39 1/2
1866	33 1/2	31	31	30	31 1/2	30 1/2	31	30 1/2	30 1/2	26 1/2	29	26 1/2
1867	26	24	26 1/2	25 1/2	27 1/2	26 1/2	26 1/2	22 1/2	23	22 1/2	23	21 1/2
1868	24 1/2	23 1/2	24 1/2	24	24	23 1/2	24	23	24	22 1/2	24 1/2	24 1/2
1869	22 1/2	21 1/2	23 1/2	21 1/2	23	22	22 1/2	22	22 1/2	22	22	21 1/2
1870	20 1/2	20 1/2	21 1/2	20 1/2	21 1/2	20 1/2	21 1/2	21 1/2	23 1/2	21 1/2	22 1/2	22 1/2
1871	22 1/2	21 1/2	23	22 1/2	22 1/2	22 1/2	23 1/2	23 1/2	24 1/2	23 1/2	27	24 1/2
1872	34	33	35	32 1/2	35 1/2	33	34 1/2	31 1/2	32 1/2	30 1/2	32 1/2	30 1/2
1873	29	26 1/2	27 1/2	27	27	25 1/2	25 1/2	24	24	21	25	23
1874	24 1/2	20	21	19	21 1/2	21	22 1/2	21 1/2	23 1/2	22 1/2	23 1/2	23 1/2
1875	23	22 1/2	23 1/2	23	23 1/2	23 1/2	23 1/2	23	23 1/2	23	23 1/2	23 1/2
1876	20	19 1/2	19 1/2	18 1/2	21	18 1/2	21 1/2	20	20 1/2	20	20	19 1/2
1877	19 1/2	19	19	17 1/2	18 1/2	17 1/2	18	17 1/2	17 1/2	17 1/2	17 1/2	17 1/2
1878	16 1/2	16	16	16	16 1/2	16	16	15 1/2	15 1/2	15 1/2	16	15 1/2
1879	16 1/2	16	16 1/2	16	17	16 1/2	21 1/2	18	21 1/2	21	21 1/2	21
1880	18 1/2	18 1/2	19 1/2	19	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	19 1/2	18 1/2
1881	16 1/2	16	16 1/2	16 1/2	18 1/2	16 1/2	18 1/2	18	19	18 1/2	20 1/2	19 1/2
1882	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18 1/2	18	18 1/2	18	18	17 1/2
1883	15 1/2	15	15	15	15 1/2	15 1/2	15 1/2	15 1/2	15	14 1/2	15	14 1/2
1884	14 1/2	13 1/2	14	13 1/2	13 1/2	13	13 1/2	12 1/2	13	12 1/2	12 1/2	11
1885	11 1/2	10 1/2	11 1/2	11	11 1/2	10 1/2	11 1/2	10 1/2	11 1/2	10 1/2	11 1/2	11 1/2
1886	10 1/2	10	10 1/2	10	11 1/2	10 1/2	11 1/2	11 1/2	12	11 1/2	12 1/2	11 1/2

*Mining and Eng. World.

HIGH AND LOW MONTHLY PRICES OF LAKE COPPER—Continued

Year	July		August		September		October		November		December	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
1887.....	10¾	10¼	10¾	10¾	11	10¾	12¾	10¾	14½	11½	17¾	14½
1888.....	16½	16½	17	16¾	17½	16¾	17½	17½	17½	17½	17½	17½
1889.....	12	12	12	12	12	11	11	11	13¾	11½	14½	14
1890.....	17¾	16¾	17¾	17	17	17	16¾	16¾	16¾	16¾	16	15
1891.....	12¾	12¾	12¾	12	12½	12½	12½	11¾	11½	11	11¾	10¾
1892.....	11¾	11¾	11¾	11¾	11¾	11¾	11¾	11¾	12	11¾	12¾	12¾
1893.....	10½	10¼	10¾	9¾	9¾	9¾	9¾	9¾	10¼	9¾	10½	10¾
1894.....	9¾	9	9¾	9	9¾	9¾	9¾	9¾	9¾	9¾	10	9¾
1895.....	11¾	10¾	12¾	11¾	12¾	12	12	11¾	11¾	11	11	10
1896.....	11¾	11	11¾	10¾	10¾	10¾	10¾	10¾	11½	10¾	11½	11¾
1897.....	11¾	11	11¾	11	11¾	11¾	11¾	11	11	10¾	11	10¾
1898.....	11¾	11¾	12¾	11¾	12¾	12¾	12¾	11¾	12¾	11¾	12¾	12¾
1899.....	18½	18¼	18¾	18½	18½	18¾	18½	17	17¼	17	17	16¾
1900.....	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	17	16¾	17	16¾
1901.....	17	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	17	13
1902.....	12¾	12	12¾	11¾	12¾	11¾	12¾	11¾	12	11¾	12	11¾
1903.....	14¾	13	13¾	13	13¾	13¾	14	13	13¾	12¾	12¾	12
1904.....	12¾	12¾	12¾	12¾	13	12¾	14	12¾	15¾	13¾	15¾	14¾
1905.....	15¾	15	16¾	15¾	16¾	16¾	16¾	16¾	17¾	16¾	18¾	17¾
1906.....	18½	18½	18½	18½	20½	18½	22½	20½	22½	22½	24	22½
1907.....	24¾	22¾	22¾	20	19¾	15¾	15¾	12¾	14¾	13¾	14	13¾
1908.....	13¾	12¾	14	13¾	14	13¾	14	13¾	14¾	14	14¾	14¾
1909.....	13¾	13¾	13¾	13¾	13¾	13	13¾	12¾	14	13¾	14¾	13¾
1910.....	12¾	12¾	13	12¾	13	12¾	13¾	12¾	13¾	13	13	12¾
1911.....	13	12¾	13	12¾	12¾	12¾	12¾	12¾	13¾	12¾	14¾	12¾
1912.....	17¾	17	17¾	17¾	17¾	17¾	18	17¾	17¾	17¾	17¾	17¾
1913.....	15¾	14¾	16¾	15¾	17	16¾	17¾	16¾	17¾	15	15¾	15
1914*					12¾	12	12¾	11¾	12¾	11¾	13¾	12¾
1915*	20	18¾	18¾	16¾	18½	17¾	18½	17¾	20	18	23	19¾
1916*												

*Mining and Eng. World.

AVERAGE AMERICAN AND ENGLISH PRICES

The following table of average annual prices of copper in England and the United States is based upon the New York price for Lake copper and the London price for Standard copper. The two last columns give the American prices in cents and fractions and the English equivalent in sterling. English prices are for long tons of 2,240 pounds, and American prices for pounds avoirdupois, the last column, giving English equivalent of the American prices, being figured in long tons.

Year.	Lowest.	English Prices—				Average.	American Prices.	
		Highest.	Fluctuation.	Cents.	English.			
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
1880.....	54 10 0	74 0 0	10 10 0	62 14 7	21.438	99 0 8		
1881.....	57 0 0	72 10 0	15 10 0	61 16 9	18.188	84 0 8		
1882.....	63 0 0	71 10 0	8 10 0	66 10 5	19.125	88 6 11		
1883.....	57 0 0	67 10 0	9 10 0	62 17 11	16.500	76 3 7		
1884.....	47 5 0	58 0 0	10 15 0	53 17 6	13.000	59 19 0		
1885.....	38 10 0	61 12 6	23 2 6	43 11 0	10.838	49 6 5		
1886.....	38 10 0	43 15 0	5 5 0	40 1 8	11.063	51 1 10		
1887.....	38 7 6	85 5 0	46 17 6	46 0 6	13.850	64 0 0		
1888.....	73 0 0	105 0 0	32 0 0	81 11 3	16.775	77 10 1		
1889.....	35 0 0	80 0 0	45 0 0	49 14 8	13.490	62 6 5		
1890.....	46 10 0	61 12 6	15 2 6	54 5 3	15.600	72 1 10		
1891.....	44 1 3	56 10 0	12 8 9	51 9 4	12.760	58 19 1		
1892.....	43 10 0	47 18 9	4 8 9	45 13 2	11.560	53 8 4		

AVERAGE AMERICAN AND ENGLISH PRICES—Continued

Year.	Lowest.	English Prices			American Prices	
		Highest.	Fluctuation.	Average.	Average.	Average.
1893	40 12 6	46 16 3	6 3 9	43 15 6	10.750	49 13 10
1894	37 17 6	43 0 0	5 2 6	40 7 4	9.520	44 0 0
1895	38 13 9	47 8 9	8 15 0	42 19 7	10.730	49 12 0
1896	40 10 0	50 8 9	9 18 9	46 18 1	10.790	50 14 9
1897	47 0 0	51 15 0	4 15 0	49 2 6	11.980	52 10 2
1898	49 5 0	57 8 9	8 3 9	51 16 7	12.360	55 13 10
1899	58 1 3	79 2 6	21 1 3	73 13 9	17.760	82 0 11
1900	70 14 2	78 7 1	7 12 11	73 12 6	16.650	76 18 2
1901	47 0 0	72 17 6	25 17 6	66 19 8	16.720	77 4 7
1902	47 10 0	56 15 0	9 5 0	52 11 5	12.160	56 3 8
1903	53 13 7	64 0 7	10 7 0	58 3 2	13.720	63 4 8
1904	55 5 0	68 7 6	13 2 6	62 12 2	13.010	60 2 6
1905	64 2 6	80 12 6	16 10 0	69 9 2	15.890	73 7 9
1906	78 5 1	105 4 3	26 19 2	87 8 6	19.610	90 4 10
1907	55 0 0	113 0 0	58 0 0	84 0 0	20.040	91 19 10
1908	57 7 8	63 8 10	6 1 2	59 18 3	13.500	62 7 0
1909	54 15 0	63 17 6	9 1 6	58 15 3	13.480	62 5 10
1910	52 15 0	62 0 0	9 5 0	57 7 6	13.125	60 12 6
1911	54 0 8	62 1 3	8 0 7	56 1 9	12.779	59 0 4
1912	62 15 2	78 15 3	16 0 1	73 1 2	16.695	77 2 1
1913	61 15 0	77 2 6	15 7 6	68 5 9	15.70	70 10 4
1914	49 0 0	66 15 0	17 15 0	59 11 3	13.61	62 17 3
1915	57 2 6	86 7 6	29 5 0	72 10 7	17.64	81 9 6

English prices for 1913, 1914, 1915 are from American Metal Market.

CONVERSION TABLE FOR AMERICAN AND ENGLISH PRICES

This table gives the equivalents, in American and English currency, for the prices of copper, from £35 to £150 per ton. The American basis of weight is the avoirdupois pound; the English basis is the long ton of 2,240 pounds avoirdupois. The rate of exchange is figured at £1=\$4.85:

Pounds Sterling and cents.		£ 93.....	20.14c.	£ 122.....	26.41c.		
£ 35.....	7.58c.	£ 64.....	13.86c.	£ 94.....	20.35c.	£ 123.....	27.63c.
£ 36.....	7.80c.	£ 65.....	14.07c.	£ 95.....	20.57c.	£ 124.....	27.85c.
£ 37.....	8.01c.	£ 66.....	14.29c.	£ 96.....	20.79c.	£ 125.....	27.06c.
£ 38.....	8.23c.	£ 67.....	14.51c.	£ 97.....	21.00c.	£ 126.....	27.28c.
£ 39.....	8.45c.	£ 68.....	14.72c.	£ 98.....	21.22c.	£ 127.....	27.50c.
£ 40.....	8.66c.	£ 69.....	14.94c.	£ 99.....	21.43c.	£ 128.....	27.71c.
£ 41.....	8.88c.	£ 70.....	15.16c.	£ 100.....	21.65c.	£ 129.....	27.93c.
£ 42.....	9.10c.	£ 71.....	15.37c.	£ 101.....	21.87c.	£ 130.....	28.14c.
£ 43.....	9.31c.	£ 72.....	15.59c.	£ 102.....	22.08c.	£ 131.....	28.36c.
£ 44.....	9.53c.	£ 73.....	15.81c.	£ 103.....	22.30c.	£ 132.....	28.58c.
£ 45.....	9.75c.	£ 74.....	16.02c.	£ 104.....	22.52c.	£ 133.....	28.80c.
£ 46.....	9.96c.	£ 75.....	16.24c.	£ 105.....	22.73c.	£ 134.....	29.01c.
£ 47.....	10.18c.	£ 76.....	16.46c.	£ 106.....	22.95c.	£ 135.....	29.23c.
£ 48.....	10.39c.	£ 77.....	16.67c.	£ 107.....	23.16c.	£ 136.....	29.45c.
£ 49.....	10.61c.	£ 78.....	16.89c.	£ 108.....	23.38c.	£ 137.....	29.66c.
£ 50.....	10.83c.	£ 79.....	17.10c.	£ 109.....	23.60c.	£ 138.....	29.88c.
£ 51.....	11.04c.	£ 80.....	17.32c.	£ 110.....	23.82c.	£ 139.....	30.10c.
£ 52.....	11.26c.	£ 81.....	17.54c.	£ 111.....	24.03c.	£ 140.....	30.31c.
£ 53.....	11.48c.	£ 82.....	17.75c.	£ 112.....	24.25c.	£ 141.....	30.53c.
£ 54.....	11.69c.	£ 83.....	17.97c.	£ 113.....	24.47c.	£ 142.....	30.75c.
£ 55.....	11.91c.	£ 84.....	18.19c.	£ 114.....	24.68c.	£ 143.....	30.96c.
£ 56.....	12.12c.	£ 85.....	18.40c.	£ 115.....	24.90c.	£ 144.....	31.18c.
£ 57.....	12.34c.	£ 86.....	18.62c.	£ 116.....	25.12c.	£ 145.....	31.39c.
£ 58.....	12.56c.	£ 87.....	18.84c.	£ 117.....	25.33c.	£ 146.....	31.61c.
£ 59.....	12.77c.	£ 88.....	19.05c.	£ 118.....	25.55c.	£ 147.....	33.83c.
£ 60.....	12.99c.	£ 89.....	19.27c.	£ 119.....	25.77c.	£ 148.....	34.04c.
£ 61.....	13.21c.	£ 90.....	19.49c.	£ 120.....	25.98c.	£ 149.....	34.26c.
£ 62.....	13.42c.	£ 91.....	19.70c.	£ 121.....	26.20c.	£ 150.....	34.48c.
£ 63.....	13.64c.	£ 92.....	19.92c.				

PRODUCTION TABLES

PRODUCTION OF COPPER IN THE UNITED STATES
SINCE 1845 (U. S. G. S.)

Year.	Production. Pounds.	Increase.		Average annual increase, by decades.	
		Pounds.	Per cent.	Pounds.	Per cent.
1845	224,000	246,400	50.0
1846	336,000	112,000	50.1		
1847	672,000	336,000	100.0		
1848	1,120,000	448,000	67.0		
1849	1,568,000	448,000	47.0		
1850	1,456,000	-112,000	-7.1		
1851	2,016,000	560,000	38.4	1,472,200	28.5
1852	2,464,000	448,000	22.2		
1853	4,480,000	2,016,000	81.8		
1854	5,040,000	560,000	12.5		
1855	6,720,000	1,730,000	33.3		
1856	8,960,000	2,240,000	33.3		
1857	10,752,000	1,792,000	20.0		
1858	12,320,000	1,568,000	14.6		
1859	14,112,000	1,792,000	14.5		
1860	16,128,000	2,016,000	14.3		
1861	16,800,000	672,000	4.1	1,209,600	6.2
1862	21,160,000	4,360,000	26.0		
1863	19,040,000	-2,120,000	-10.0		
1864	17,920,000	-1,120,000	-5.9		
1865	19,040,000	1,120,000	6.3		
1866	19,936,000	896,000	4.7		
1867	22,400,000	2,464,000	12.3		
1868	25,984,000	3,584,000	16.0		
1869	28,000,000	2,016,000	7.7		
1870	28,224,000	224,000	.8		
1871	29,120,000	896,000	3.2	3,225,600	8.2
1872	28,000,000	-1,120,000	-3.8		
1873	34,720,000	6,720,000	24.0		
1874	39,200,000	4,480,000	12.9		
1875	40,320,000	1,120,000	2.9		
1876	42,560,000	2,240,000	5.6		
1877	47,040,000	4,480,000	10.0		
1878	48,160,000	1,120,000	2.4		
1879	51,520,000	3,360,000	7.0		
1880	60,480,000	8,960,000	17.4		
1881	71,680,000	11,200,000	18.5	18,928,949	14.8
1882	90,646,232	18,966,232	26.5		
1883	115,526,053	24,879,821	27.4		
1884	144,946,653	29,420,600	25.5		
1885	165,875,766	20,929,113	14.4		
1886	156,735,381	-9,140,385	-5.5		
1887	180,920,524	24,185,143	15.4		
1888	226,361,466	45,440,942	25.0		
1889	226,775,962	414,496	.2		
1890	259,763,092	32,987,130	14.5		

PRODUCTION OF COPPER IN THE UNITED STATES
SINCE 1845 (U. S. G. S.)—Continued

Year.	Production.		Increase.		Average annual increase, by decades.	
	Pounds.	Pounds.	Per cent.	Pounds.	Per cent.	
1891	284,121,764	24,358,672	9.4			
1892	344,998,679	60,876,915	21.4			
1893	329,354,398	-15,644,281	-4.5			
1894	354,188,374	24,833,976	7.5			
1895	380,613,404	26,425,030	7.4			
1896	460,061,430	79,448,026	20.0	34,635,407	9.4	
1897	494,078,274	34,016,844	7.4			
1898	526,512,987	32,434,713	6.6			
1899	568,666,921	42,153,934	8.0			
1900	606,117,166	37,450,245	6.6			
1901	602,072,519	-4,044,647	-7			
1902	659,508,644	57,436,125	9.5			
1903	698,044,517	38,535,873	5.8			
1904	812,537,267	114,492,750	16.4			
1905	888,784,267	76,247,000	11.0	47,404,234	6.1	
1906	917,805,682	15,897,839	1.7			
1907	868,996,491	-48,809,191	-5.3			
1908	942,570,721	73,074,230	8.4			
1909	1,092,951,624	150,380,903	15.9			
1910	1,080,159,509	-12,792,115	-1.2			
1911	1,097,232,749	17,073,240	1.6			
1912	1,243,268,720	146,035,971	13.3			
1913	1,224,484,098	-18,784,622	1.5			
1914	1,150,137,192	-74,346,906	6.1			
1915	1,388,009,527	237,872,335	20.7			
Total	21,395,623,629					

- Decrease.

AMERICAN COPPER PRODUCTION. (Long Tons)

United States				United States			
Year	Production	Michigan		Year	Production	Michigan	
		Production	Per cent			Production	Per cent
1850	650	572	88	1868	11,600	9,346	80
1852	1,100	792	72	1869	12,500	11,886	95
1854	2,250	1,819	81	1870	12,600	10,992	87
1855	3,000	2,593	86	1871	13,000	11,942	91
1856	4,000	3,666	91	1872	12,500	10,961	87
1857	4,800	4,255	88	1873	15,500	13,433	86
1858	5,500	4,088	74	1874	17,500	15,327	87
1859	6,300	3,985	63	1875	18,000	16,089	89
1860	7,200	5,388	74	1876	19,000	17,085	89
1861	7,500	6,713	89	1877	21,000	17,422	83
1862	9,000	6,065	67	1878	21,500	17,719	82
1863	8,500	5,797	68	1879	23,000	19,129	83
1864	8,000	5,576	69	1880	27,000	22,204	82
1865	8,500	6,410	75	1881	32,000	25,439	76
1866	8,900	6,138	69	1882	40,467		62
1867	10,000	7,824	78				

United States				Montana		Arizona	
Year	Production	Michigan		Production	Per cent	Production	Per cent
		Production	Per cent				
1883	51,574	26,653	51	11,011	21	10,658	21
1884	64,708	30,961	47	19,256	30	11,935	18
1885	74,052	32,209	43	30,267	41	10,137	14
1886	70,430	36,124	51	25,362	36	6,990	10
1887	81,017	33,941	42	35,133	43	7,910	10

AMERICAN COPPER PRODUCTION. (Long Tons)—Continued

Year	United States	Michigan		Montana		Arizona	
	Produc- tion	Produc- tion	Per cent	Pro- duction	Per cent	Pro- duction	Per cent
1888....	101,054	38,604	38	43,704	43	14,195	14
1889....	101,239	39,364	38	43,849	43	13,654	13
1890....	115,966	45,273	39	50,437	43	15,534	13
1891....	126,839	50,992	40	50,028	39	17,800	14
1892....	154,018	54,999	36	72,860	47	17,160	11
1893....	147,033	50,270	34	69,290	47	19,200	13
1894....	158,120	51,031	32	81,729	52	19,873	13
1895....	169,917	57,737	34	84,900	50	21,408	13
1896....	205,384	63,418	31	99,071	48	32,560	16
1897....	220,571	63,706	29	102,807	47	36,398	17
1898....	235,050	66,056	28	92,041	39	49,624	21
1899....	253,870	65,603	26	100,503	40	59,399	23
1900....	269,111	63,461	24	120,865	45	52,820	20
1901....	268,522	69,501	26	102,620	38	58,383	22
1902....	294,297	76,050	26	128,975	44	53,546	18
1903....	311,582	85,848	27	121,677	39	65,914	21
1904....	362,739	93,001	26	133,176	38	85,179	23
1905....	402,704	102,874	25	140,514	35	105,316	26
1906....	409,414	102,514	25	131,563	32	117,216	29
1907....	386,655	96,480	25	100,118	26	114,633	30
1908....	420,953	99,408	23	112,724	27	129,251	30
1909....	485,473	101,342	21	140,561	29	129,959	27
1910....	484,935	99,019	21	126,374	26	132,701	28
1911....	483,865	97,741	20	121,346	24	135,358	29
1912....	554,835	96,701	18	137,844	25	160,858	30
1913....	546,645	69,516	12	127,553	23	180,482	33
1914....	513,454	70,540	14	105,717	21	170,736	33
1915....	619,647	106,577	17.	119,760	19	193,066	31

WORLD'S PRODUCTION OF COPPER (*)

(In Metric Tons)

Country	1912	1913	1914	1915
United States	563,260	555,990	525,529	646,212
Mexico	73,617	58,323	36,337	30,969
Canada	34,213	34,880	34,027	47,202.
Cuba	4,393	3,381	6,251	8,836
Australasia	†47,772	†47,325	37,592†	32,512
Peru	26,483	25,487	23,647	††32,410
Chile	39,204	39,434	40,876	47,142
Bolivia	4,681	3,658†	1,306†	**3,000
Japan	62,486*	73,152†	72,938§	§75,000
Russia	33,550†	34,316†	31,933†	**16,000
Germany	24,303†	25,308†	30,480†	**35,000
Africa	16,632†	22,870†	24,135†	**27,000
Spain and Portugal	59,873†	54,696†	37,099†	**35,000
Other countries	29,555†	27,158†	25,176†	**25,000
Totals	1,020,022	1,005,978	923,888	1,061,283

* The statistics in this table are Engineering & Mining Journal figures.
 † As reported by Henry R. Merton & Co. ‡ As officially reported. § Privately communicated to us from Japan. ** Estimated. †† Communicated by L. Vogelstein & Co.

WORLD'S COPPER PRODUCTION FOR NINETEENTH CENTURY

Decade	Average Price of Rough Copper		World's Increase of Product'n of Each Previous Decade.		Avge. Annual Product'n for Each Decade.	Increase Annual Production.
	£	Cents per lb.	Each Decade.	Over Previous Decades.		
1801 to 1810...	£160	30.31	91,000	.....	9,100	.....
1811 to 1820...	130	28.14	96,000	5,000	9,600	500
1821 to 1830...	101	21.87	135,000	39,000	13,500	3,900
1831 to 1840...	94	20.35	218,400	83,400	21,840	8,340
1841 to 1850...	83	17.97	291,000	72,600	29,100	7,260
1851 to 1860...	111	24.03	506,999	215,999	50,699	21,599
1861 to 1870...	87	18.84	900,000	393,001	90,000	39,300
1871 to 1880...	79	17.10	1,189,000	289,000	118,900	28,900
1881 to 1890...	60	12.99	2,373,398	1,084,398	237,339	108,439
1891 to 1900...	52	11.26	3,708,901	1,335,503	370,890	133,550
Totals and Averages...	£ 96	.....	9,507,299	.....	95,073	361,790

U. S. COPPER SMELTERS' PRODUCTION. (In Pounds)

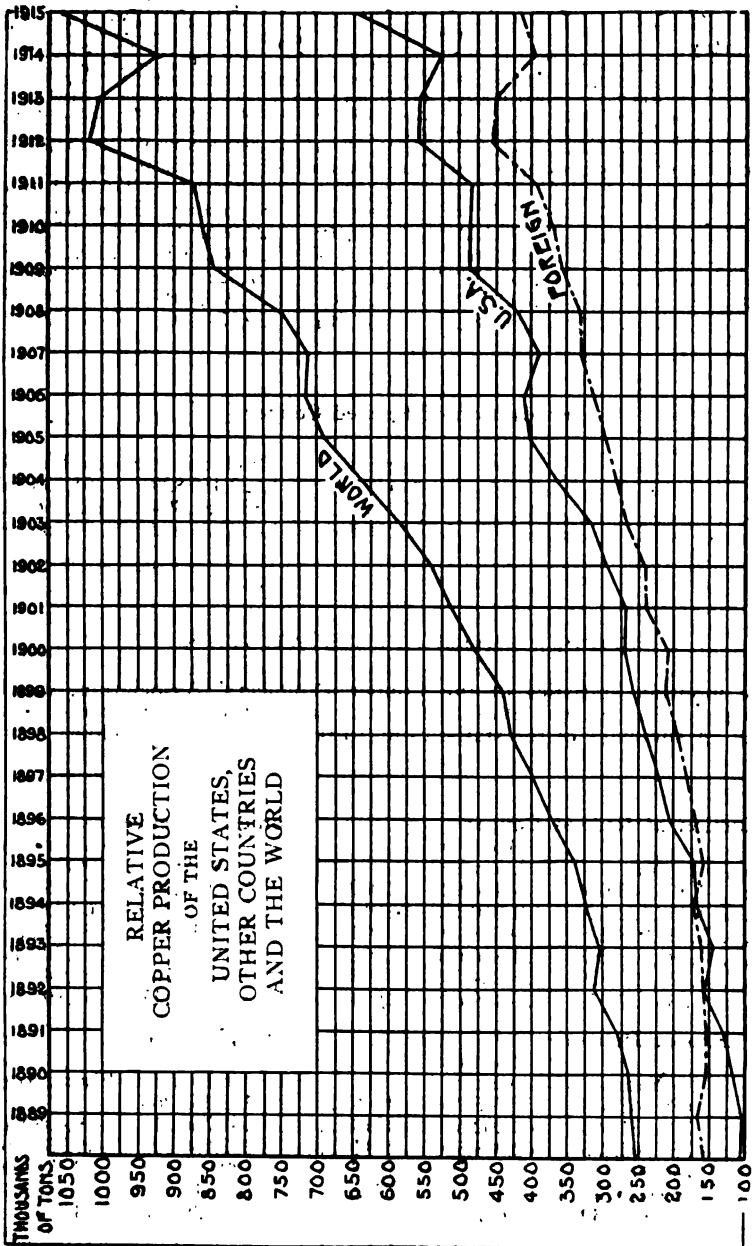
	N. Amer. Ore	Foreign Ore	Scrap	To Foreign Refiners	Crude Imported	Total Crude
1915	1,616,499,571	44,538,207	15,275,991	40,062,900	140,000,000	1,776,250,869
1914	1,327,488,479	50,101,308	20,894,559	36,765,920	131,125,076	1,492,843,502
1913	1,438,565,881	55,803,202	22,427,889	36,682,605	169,315,869	1,649,430,236
1912	1,489,176,562	53,701,307	11,949,348	45,735,673	144,480,144	1,653,471,688

Above statistics from Engineering and Mining Journal.

PRODUCTION OF COPPER IN THE UNITED STATES IN 1913-1915
(Smelter output, in pounds fine, U. S. G. S. figures.)

	1913	1914	1915
Alaska	23,423,070	24,985,847	70,695,286
Arizona	404,278,809	382,449,922	432,467,690
California	32,492,265	29,784,173	37,658,444
Colorado	9,052,104	7,316,066	7,272,178
Idaho	8,711,490	5,875,205	6,217,728
Maryland .....	.....	12,248	15,426
Michigan	155,715,286	158,009,748	238,956,410
Missouri	576,204	53,519	306,406
Montana	285,719,918	236,805,845	268,263,040
Nevada	85,209,536	60,122,904	67,757,322
New Mexico	50,196,881	64,204,703	62,817,234
North Carolina	180	19,712	33,383
Oregon	77,812	5,599	797,471
Pennsylvania	245,337	422,741	.....
Tennessee	19,489,654	18,661,112	18,205,308
Texas	39,008	34,272	38,971
Utah	148,057,450	160,589,660	175,177,695
Vermont	5,771	.....	23,995
Virginia	46,961	17,753	50,008
Washington	732,742	683,602	903,661
Wyoming	362,235	17,082	351,871
Undistributed	51,385	65,479	.....
	1,224,484,098	1,150,137,192	1,388,009,527
From imported ores and mattes	408,778,954	306,350,827	†246,498,925

Grand totals 1,633,263,052 1,456,488,019 1,634,508,452
 †Production of primary and secondary copper by the regular refining plants.



**PRODUCTION OF PRIMARY AND SECONDARY COPPER BY THE
REGULAR REFINING PLANTS, IN POUNDS**

Primary:						
	Electrolytic	Lake	Casting	Pig	Foreign	Total
1911	823,507,764	218,185,236	22,977,534	36,600,269	332,604,223	1,433,875,026
1912	914,935,371	231,112,228	24,777,266	32,852,080	260,000,000	1,668,104,478
1913	1,022,497,601	155,715,286	22,606,040	36,004,986	378,243,869	1,615,067,782
1914	991,573,073	158,009,748	21,506,325	39,334,043	322,358,205	1,533,181,394
1915	1,114,345,342	236,757,062	21,555,129	15,047,990	246,498,925	1,634,204,448

Secondary: includes copper of domestic and foreign origin.

	Electrolytic	Casting	Total Secondary	Total Output Prim. and Sec.
1911	19,093,622	8,803,105	27,896,727	1,461,771,753
1912	23,932,166	5,150,137	29,082,303	1,597,186,781
1913	14,862,577	22,360,182	37,222,759	1,652,290,541
1914	27,702,928	4,224,052	31,926,980	1,565,708,374
1915	38,156,789	21,417,901	59,574,690	1,693,779,138

Production of Refined Copper

	Supplies	Production	Stock, Dec. 31
1913	1,649,430,326	1,622,450,829	91,438,867
1914	1,492,843,502	1,533,781,394	162,566,683
1915	1,776,250,869	1,652,775,822	84,666,380

COPPER PRODUCERS' STATISTICS

The monthly statistics of the Copper Producers' Association, which were suspended in August, 1914, at the outbreak of the war, have not been resumed. A summary of the statistics up to that time is given below:

Production of Refined Copper			Domestic Deliveries		
	Year	Monthly Average		Year	Monthly Average
1909	1,405,403,056	117,116,921	1909	705,051,591	58,754,299
1910	1,452,122,120	121,010,177	1910	749,426,542	62,452,212
1911	1,431,938,338	119,328,195	1911	709,611,605	59,134,300
1912	1,581,920,287	131,826,690	1912	819,665,948	68,305,495
1913	1,622,450,829	135,204,235	1913	767,351,760	63,945,980
1914*	835,137,652	139,189,609	1914*	330,643,117	55,107,186

Export Deliveries			Surplus Stocks		
	Year	Monthly Average		At beginning of year	Fluctuation
1909	680,942,620	56,745,218	1909	122,357,266	
1910	722,431,494	60,202,624	1910	141,766,111	+19,408,845
1911	754,902,233	62,908,520	1911	122,030,195	-19,735,916
1912	746,396,452	62,199,705	1912	89,454,695	-32,575,500
1913	869,062,784	72,421,898	1913	105,312,582	+15,857,887
1914*	489,822,739	81,637,123	1914	91,438,867	-13,873,715
			June 30, 1914	106,110,663	+14,671,796

*For six months ending June.

AMERICAN COPPER SUPPLY

The following table gives the figures of American copper supply, deliveries and stocks, according to the statistics gathered by the American Copper Producers' Association:

(Pounds Avoirdupois.)

	Stocks	Production	Deliveries	Changes
1909				
January	122,357,266	112,135,200	90,362,421	+ 21,772,779
February	144,130,045	103,700,817	74,546,614	+ 29,154,203
March	173,284,248	117,058,661	108,063,007	+ 8,995,654
April	182,279,902	113,574,292	112,656,121	+ 918,171
May	183,198,073	118,356,146	131,706,078	- 13,349,932
June	169,848,141	116,567,493	131,557,573	- 14,990,080
July	154,858,061	118,277,603	150,539,057	+ 32,261,454
August	122,596,607	120,597,234	107,996,911	+ 12,600,323
September	135,196,930	118,023,139	102,182,932	+ 15,840,207
Adjustment		3,007,738	2,572,103	+ 435,635
October	151,472,772	124,657,709	122,620,855	+ 2,036,854
November	153,509,626	121,618,369	122,124,468	- 506,094
December	153,003,527	117,828,655	129,066,071	- 11,237,416
1910				
January	141,766,111	116,547,287	159,850,059	- 43,302,772
February	98,463,339	112,712,493	103,987,840	+ 8,724,653
March	107,187,992	120,067,467	103,430,585	+ 16,636,882
April	123,824,874	117,477,639	99,318,354	+ 18,159,285
May	141,984,159	123,242,476	104,800,662	+ 18,441,814
June	160,425,973	127,219,188	119,259,144	+ 7,960,044
July	168,386,017	118,370,003	116,115,342	+ 2,254,661
August	170,640,678	127,803,618	129,563,051	- 1,759,433
September	168,881,245	119,519,983	139,607,514	- 20,087,531
October	148,793,714	126,469,284	136,001,084	- 9,531,800
November	139,261,914	119,353,463	128,226,308	- 8,872,845
December	130,389,069	123,339,219	131,698,093	- 8,358,874
1911				
January	122,030,195	115,696,591	95,287,296	+ 20,409,295
February	142,439,490	109,828,297	95,630,017	+ 14,198,280
March	156,637,770	130,532,080	125,161,916	+ 5,370,164
April	162,007,934	118,085,223	114,537,249	+ 3,547,974
May	165,555,908	126,962,544	126,522,520	+ 440,024
June	165,995,932	124,554,312	133,616,080	- 8,561,768
July	157,434,169	112,167,934	131,863,240	- 19,695,306
August	137,738,858	125,493,667	129,791,024	- 4,297,357
September	133,441,501	115,588,950	108,135,595	+ 7,453,355
October	140,894,856	118,255,442	124,152,656	- 5,897,214
November	134,997,642	111,876,601	135,089,055	- 23,212,454
December	111,785,188	122,896,697	145,227,190	- 22,330,493
1912				
January	89,454,695	119,337,753	142,511,805	- 23,174,052
February	66,280,643	116,035,809	119,376,464	- 3,340,655
March	62,939,988	125,694,601	126,267,032	- 572,431
April	62,367,557	125,464,644	122,766,172	+ 2,698,472
May	65,066,029	126,737,836	142,188,222	- 15,450,386
June	49,615,643	122,315,240	127,595,879	- 5,280,639
July	44,335,004	137,161,129	131,215,712	+ 5,945,417
August	50,280,421	145,628,521	149,207,568	- 3,579,047
September	46,701,374	140,089,819	123,725,606	+ 16,364,213
October	63,065,587	145,405,453	131,726,076	+ 13,679,377
November	76,744,964	134,695,400	125,276,345	+ 9,419,095
December	86,164,059	143,354,042	124,205,519	+ 19,148,523

AMERICAN COPPER SUPPLY—Continued

1913				
January	105,312,582	143,479,625	125,593,875	+ 17,885,750
February	123,198,332	130,948,881	131,845,015	— 896,134
March	122,302,198	136,251,849	154,284,777	— 18,032,928
April	104,269,270	135,333,402	164,053,564	— 28,720,162
May	75,549,108	141,319,416	149,394,299	— 8,074,883
June	67,474,225	121,860,853	136,520,470	— 14,569,619
July	52,904,606	138,074,602	137,384,263	+ 690,339
August	53,594,945	131,632,362	146,913,270	— 15,280,908
September	38,314,037	131,401,229	139,922,172	— 8,520,943
October	29,793,094	139,070,481	136,297,193	+ 3,773,288
November	32,556,382	134,087,708	118,724,661	+ 15,363,047
December	47,992,429	138,990,421	95,480,983	+ 43,509,438
1914				
January	91,438,867	131,770,274	135,912,456	— 4,142,182
February	87,296,685	122,561,007	131,485,840	— 8,924,833
March	78,371,852	145,651,982	159,414,515	— 13,762,533
April	64,609,319	151,500,531	145,772,849	+ 5,727,682
May	70,337,001	142,308,287	128,302,647	+ 14,005,640
June	84,342,641	141,345,571	119,577,549	+ 21,768,022
†July	106,110,663			

†Latest statistics published by the Copper Producers' Association.

AMERICAN COPPER SUPPLY

(Pounds Avoirdupois)

Year	Domestic Production	Imports	Total Supply	Exports	Net Supply
1892	344,998,679	8,066,647	353,065,326	96,515,736	256,549,590
1893	329,354,398	11,045,297	340,399,695	188,984,128	151,415,567
1894	354,188,374	11,445,441	365,633,815	168,143,000	197,490,815
1895	380,613,404	14,616,223	395,229,627	136,528,390	258,701,237
1896	460,061,430	17,297,272	477,358,702	282,105,860	195,252,842
1897	494,078,274	28,578,420	522,656,694	288,662,340	233,994,354
1898	526,512,987	73,916,467	600,429,454	321,023,873	279,405,581
1899	568,666,921	95,722,340	664,389,261	252,876,480	411,512,781
1900	606,117,166	105,176,808	711,293,974	348,402,853	362,891,121
1901	602,072,519	137,826,406	739,898,925	222,137,911	517,761,014
1902	659,225,014	194,501,757	853,726,771	354,668,849	499,057,922
1903	729,943,131	168,707,995	898,651,126	310,729,524	587,921,602
1904	812,537,267	181,292,205	993,829,472	554,550,030	439,279,442
1905	902,057,843	210,724,685	1,112,782,528	534,907,619	577,874,909
1906	917,086,889	225,843,281	1,142,930,170	454,752,018	688,178,152
1907	865,818,368	238,031,320	1,103,849,688	508,924,401	594,925,287
1908	942,936,449	218,705,487	1,161,641,936	661,876,127	499,765,809
1909	1,087,453,906	325,456,533	1,412,910,437	682,846,726	730,063,711
1910	1,080,159,509	344,435,771	1,424,595,280	708,316,543	716,278,737
1911	1,097,232,749	334,607,538	1,431,840,287	786,553,208	645,287,079
1912	1,228,766,243	410,241,295	1,639,007,538	775,000,658	864,005,880
1913	1,224,484,098	408,778,954	1,633,263,052	926,241,092	707,021,960
1914	1,150,137,192	306,350,827	1,456,488,019	840,080,922	616,407,097
1915	1,388,009,527	246,498,925	1,634,508,452	681,953,301	952,555,151

(a)

(b)

(a) Production by the regular refining plants in 1915; (b) refined copper exported; both figures are from the advance statement, U. S. G. S., of production of copper in 1915.

AMERICAN COPPER IMPORTS

The following table, showing imports of copper, in various forms, into the United States, is summarized from the official figures of the United States government. The government statisticians have seen fit to vary the methods employed in presenting these figures, from time to time, but the present plan of giving contents in fine copper of imported ore and matte is preferable to the old plan of giving actual weight of imported ore and matte:

Year	(Pounds Avoirdupois)		Old Copper	Total Fine Copper
	Copper Contents Ore and Matte	Raw Copper		
1890	3,448,237	5,189	284,789	3,960,053
1891	8,391,554	2,556	134,407	11,472,436
1892	7,669,978	22,097	71,485	8,066,647
1893	7,256,015	554,348	59,375	11,045,297
1894	4,804,614	606,415	160,592	11,445,441
1895	5,300,000	7,979,322	1,336,901	14,616,223
1896	5,900,000	9,074,379	2,422,554	17,396,933
1897	12,000,000	12,646,552	1,780,390	28,923,098
1898	19,750,000	5,892,944	1,986,133	73,916,467
1899	23,800,000	64,282,583	6,678,145	95,722,340
1900	36,380,000	62,404,489	3,354,756	105,176,808
1901	64,000,000	71,001,713	2,818,757	137,826,406
1902	40,000,000	112,420,253	2,119,031	194,501,757
1903	32,000,000	133,472,398	3,235,597	168,707,995
1904	38,947,772	142,344,433	4,000,000	181,292,205
1905	50,105,300	156,358,243	4,561,142	210,724,685
1906	49,034,891	176,558,390	6,487,226	225,843,281
1907	59,718,787	192,901,267	.....	252,620,054
1908	56,481,343	162,224,144	.....	218,705,487
1909	81,087,393	240,713,722	.....	321,801,115
1910	85,224,975	259,210,796	.....	344,435,771
1911	68,626,778	265,980,760	.....	334,607,538
1912	104,871,703	305,369,592	.....	410,240,295
1913	108,710,105	300,068,849	.....	408,778,954
1914	104,801,324	201,549,503	.....	306,350,827
1915	114,331,441	201,367,008	.....	315,698,449

AMERICAN COPPER EXPORTS

The United States government estimates of exports of copper, including ingot and various forms of refined copper, matte, blister copper and ores, and manufactured products, are as follows: (Pounds avoirdupois.)

Year Ending—	Ore and Matte	Refined	Value
June 30, 1864	10,958,100	102,831	\$ 432,570
1865	22,519,700	1,572,382	1,544,870
1866	21,508,000	123,444	936,211
1867	8,773,100	4,637,867	791,901
1868	9,261,200	1,350,896	922,409
1869	12,141,800	1,134,360	592,698
1870	1,919,800	2,214,658	1,042,246
1871	5,444,500	581,650	915,431
1872	3,556,400	267,868	287,735
1873	4,525,200	38,958	259,076
1874	1,332,600	503,160	467,208
1875	5,130,500	5,123,470	1,815,266
1876	1,530,400	14,304,160	3,526,410
1877	2,143,200	13,461,553	3,023,394
1878	3,294,700	11,297,876	2,488,921
1879	2,307,000	17,207,739	2,933,205

AMERICAN COPPER EXPORTS—Continued

Year Ending—	Ore and Matte	Refined	Value
1880	2,162,300	4,206,258	849,218
1881	995,800	4,865,407	876,395
1882	2,593,600	3,340,531	748,456
1883	11,292,300	8,221,363	2,348,004
1884	38,614,000	17,044,760	5,595,859
1885	43,230,000	44,731,858	10,187,024
Dec. 31, 1886	41,752,000	19,553,421	4,380,322
1887	50,128,000	12,471,393	4,114,456
1888	79,496,000	31,706,527	11,897,240
1889	81,850,000	16,813,410	10,209,722
1890	43,141,100	10,971,899	5,918,395
1891	67,212,000	69,279,024	15,703,543
1892	94,304,000	30,515,736	10,162,870
1893	83,504,000	138,984,128	18,935,497
1894	8,704,000	162,393,000	16,143,094
1895	27,648,000	121,328,390	14,938,309
1896	41,426,500	259,223,924	31,035,211
1897	18,128,000	277,255,742	32,755,053
1898	18,686,000	291,955,905	35,545,251
1899	7,454,000	246,826,331	43,485,654
1900	20,014,000	337,973,751	58,875,439
1901	24,602,592	194,249,828	36,071,448
1902	40,398,400	354,668,849	46,811,729
1903	27,531,840	310,729,524	44,365,155
1904	42,396,480	554,550,030	74,816,934
1905	84,421,320	534,907,619	86,408,731
1906	106,666,560	454,752,018	90,950,403
1907	222,075,840	508,929,401	106,875,174
1908	141,453,760	661,876,127	89,353,260
1909	134,131,200	682,846,726	88,770,074
1910	98,076,160	708,316,543	92,081,140
1911	129,729,600	786,553,208	98,319,125
1912	148,223,040	775,000,658	126,211,104
1913	147,051,520	926,241,092	146,377,621
1914	97,504,960	840,080,922	117,633,145
1915	36,169,280	681,953,301	(a)117,398,062

(a) Does not include value of ore, matte and regulus exported during last 6 months of 1915.

AMERICAN COPPER EXPORTS BY DESTINATIONS

Pounds Avoirdupois

Destination	1910.	1911.	1912.	1913.	1914.	1915.
Holland	221,764,806	230,693,649	152,618,177	178,940,289	126,001,150	4,018,841
Germany	175,861,028	190,428,008	252,156,012	307,150,761	176,698,948	.....
France	116,193,850	135,038,893	131,362,694	160,000,345	150,839,897	236,236,135
Gt. Britain	98,030,213	108,061,603	95,422,292	133,679,641	198,382,459	201,182,655
Italy	34,110,237	38,216,773	47,251,432	41,568,713	67,415,944	107,101,230
Austria-Hungary	.....	44,200,202	38,568,151	34,648,205	26,989,548	.....
British N. A.	5,628,487	8,931,582	30,302,856	35,982,207	24,221,498	24,127,182
Russia	6,848,311	15,601,688	4,961,473	7,907,672	8,731,272	37,430,702
Belgium	7,176,258	5,125,004	7,674,273	7,102,120	5,429,717	.....
China	.....	.....	.....	.....	.....	.....
Mexico	.....	.....	.....	.....	.....	.....
Misc. Europe	42,203,861	9,254,363	8,960,973	14,357,014	45,634,229	56,013,517
Miscellaneous	499,492	1,001,443	5,732,325	4,904,125	9,736,260	15,843,039
Totals	708,316,543	786,553,208	775,000,658	926,241,092	840,080,922	681,953,301

COPPER EXPORTS

The exports of copper to the various foreign countries for the six months ended June 30 in tons of 2,240 lbs. follow:

	1916.	1915.
United Kingdom	31,732	47,109
France	76,127	49,148
Germany	none	none
Holland	1,138	457
Belgium	none	none
Austria	none	none
Italy	23,723	23,965
Denmark	898	1,050
Norway and Sweden.....	7,223	10,567
Russia	5,053	3,151
China and Japan.....	71	49
Sundries	1,978	1,031
Total	147,943	136,527

OUR COPPER AND SPELTER EXPORTS

Copper has for years been an important factor in our foreign trade, but neither spelter nor brass was prominent in this respect until after the outbreak of the war.

From government statistics the Boston News Bureau has compiled figures giving a three years' comparison of 11 months' exports of copper, spelter and brass:

	1915-16	1914-15	1913-14
Copper, lbs.	631,457,750	627,211,836	893,776,295
Value	\$ 138,007,251	\$ 87,293,720	\$ 133,423,679
Spelter, lbs.	246,196,999	237,749,016	3,457,619
Value	\$ 40,563,710	\$ 18,281,791	\$ 369,667
Brass, lbs.	119,512,499	50,506,918	28,074,291
Value	\$ 132,909,153	\$ 16,284,267	\$ 6,842,434
Total value	311,480,114	121,859,778	140,635,780
Value, total exports.....	\$3,814,454,114	\$2,452,033,414	\$2,175,578,565

The recent monthly swing of copper, spelter and brass exports may be seen in the following pounds (000,000 omitted):

	—1916—			—1915—		
	Copper	Spelter	Brass	Copper	Spelter	Brass
January	57	28	12	58	31	5
February	56	28	19	56	30	6
March	65	17	20	67	16	12
April	47	20	17	68	18	8
May	74	27	18	51	15	7

Imports of copper from other countries have also been increasing, 1915-16, particularly from Peru and Chile, where the rapidly growing operations of Cerro de Pasco, Braden and Chile companies have swelled the shipments to this country. More than 238,000,000 pounds of zinc have been brought into the United States since June, 1915, against 52,000,000 pounds in the preceding year. The bulk of these imports came from Australia.

MICHIGAN MINES COPPER PRODUCTION IN 1913 AND 1914, IN POUNDS

Company	1913		1914		1915		
	Pounds	Pounds	Cost per lb. Cents	Rec'd per lb. Cents	Pounds	Cost per lb. Cents	Rec'd per lb. Cents
Ahmeek	9,220,874	13,634,605	9.71	13.08	21,800,492	7.96	18.28
Allouez	4,091,129	6,056,548	11.18	12.853	10,043,459	9.31	18.166
Atlantic	44,370						
Baltic	7,736,126	7,001,945	11.17	13.38	12,028,947	9.50	17.40
Calumet & Hecla	45,016,890	53,691,562	11.35	14.01	71,030,518	9.33	18.11
Centennial	1,612,262	2,287,130	12.56	12.111	2,347,500	12.45	18.14
Champion	12,080,594	15,807,206	9.21	13.38	33,407,599	6.30	17.40
Franklin	1,021,440	93,283		13.99	1,314,969		
Isle Royale	4,158,548	6,601,235	13.05	13.16	9,342,106	14.94	18.36
Lake	287,200						
La Salle	43,906	540,731		12.797	782,493		
Mass.	1,213,545	2,955,952	13.53	12.75	4,638,452	14.37	18.363
Mohawk	5,778,235	11,094,859	8.58	12.47	15,882,914	7.48	17.0
Osceola	11,325,010	14,970,737	10.79	13.14	19,781,472	10.03	18.19
Quincy	12,184,128	15,356,380	11.51	13.3	22,054,813	9.42	18.01
South Lake Min. Co.					61,637		
Superior	2,992,765	3,217,635	12.43	12.645	3,866,484	12.29	18.125
Tamarack	4,168,743	1,074,808	29.08	12.80	3,888,150	17.07	19.10
Trimountain	4,990,938	5,048,306	12.21	13.38	8,302,896	9.53	17.40
Victoria	1,428,693	1,486,242	16.00		1,499,695	15.66	
White Pine Cop. Co.					2,824,145	16.64	18.353
Winona	1,448,737	1,352,085		14.2	1,722,638		
Wolverine	b8,350,312	c3,435,459	11.72	14.09	{ d7,250,866 e6,541,492	8.43 9.43	
Avg. cost per lb.	13.44		f10.94	f13.4			
Average yield per ton milled	19.4	17.7					

a As this table includes mines reporting their output both for the calendar and for the fiscal year, and as some of the companies report the refined copper equivalent of mineral produced and others report refined copper, the totals do not necessarily agree with the total of either mine or smelter output.

b Figures for fiscal year ending June 30, 1913.

c Figures for fiscal year ending June 30, 1914. d Figures for fiscal year ending June 30, 1915.

e Figures for fiscal year ending June 30, 1916. f Does not include figures for Mass.

ORE MILLED AND COPPER PRODUCED IN MICHIGAN

Company	1913		1914		1915	
	Quantity Short tons	Yield per ton Lbs.	Quantity Short tons	Yield per ton Lbs.	Quantity Short tons	Yield per ton Lbs.
Ahmeek	383,749	24.0	590,519	23.1	948,874	23.0
Allouez	236,663	17.29	354,457	17.09	534,705	18.78
Baltic	333,289	23.21	324,433	21.58	378,443	31.79
Calumet & Hecla	2,035,625	22.11	2,592,462	20.70	3,188,583	22.28
Centennial	85,443	18.87	138,136	16.56	150,191	15.63
Champion	421,849	28.64	614,854	25.71	923,743	36.17
Franklin	123,179	8.29	7,324	12.73	122,018	
Isle Royale	314,679	13.2	474,349	13.9	680,270	13.7
Lake	19,211	14.95				
La Salle	2,221	19.76	45,509	11.88	80,959	9.67
Mass.	78,250	15.51	209,354	14.07	323,335	14.35
Mohawk	366,458	15.76	649,649	17.08	829,789	19.15
Osceola	735,044	15.4	1,108,447	13.5	1,361,089	14.5
Quincy					1,269,000	17.38
South Lake Mining Co.					3,993	15.4
Superior	130,826	22.87	191,628	16.79	212,051	18.23
Tamarack	227,563	18.3	57,410	18.7	217,027	17.9
Trimountain	229,149	21.78	277,251	18.21	349,684	23.75
Victoria	137,163	10.42	124,842	11.9	133,984	11.1
White Pine Copper Co.					114,039	24.76
Winona	120,806	11.99	123,339	10.96	102,594	16.79
Wolverine			a182,127	a18.86	b403,219 c391,898	18.23 17.07

a Figures for fiscal year ending June 30, 1914. b Figures for fiscal year ending June 30, 1915. c Figures for fiscal year ending June 30, 1916.

PRODUCTION, VALUE AND DIVIDENDS OF LAKE COPPER

Year	Gross product fine copper (Pounds)	Gross value of production (Dollars)	Total dividends paid (Dollars)	Percentage of dividends to gross value	Dividends per pound of copper (Cents)
1845	24,880	5,000	.....	....	....
1846	58,240	10,000	.....	....	....
1847	297,120	55,000	.....	....	....
1848	1,032,640	200,900	.....	....	....
1849	1,505,280	336,000	60,000	17.0	3.98
1850	1,281,280	286,000	84,000	29.0	6.55
1851	1,744,960	289,500	60,000	12.0	3.43
1852	1,774,080	396,000	60,000	15.0	3.38
1853	2,905,280	648,500	90,000	14.0	3.09
1854	4,074,560	909,500	198,000	21.0	4.85
1855	5,809,334	1,586,160	168,000	10.0	2.89
1856	8,217,392	2,218,320	380,000	17.0	4.62
1857	9,530,830	2,382,500	480,000	20.0	5.03
1858	9,159,916	2,129,235	460,000	21.0	5.00
1859	8,937,995	1,950,355	360,000	18.0	4.02
1860	12,068,375	2,654,960	120,000	5.0	0.99
1861	15,182,837	3,487,995	260,000	7.0	1.70
1862	13,586,318	3,634,255	440,000	12.0	3.23
1863	12,985,444	4,415,600	720,000	16.0	5.54
1864	12,491,965	5,870,300	1,150,000	19.0	9.20
1865	14,358,592	5,635,515	510,000	9.0	3.55
1866	13,750,063	4,629,375	170,000	3.7	1.23
1867	17,515,607	4,442,841	110,000	2.4	0.63
1868	20,934,124	4,940,424	100,000	2.0	0.47
1869	26,625,301	6,230,016	210,000	3.4	0.78
1870	24,622,759	5,096,752	700,000	13.0	2.86
1871	25,746,448	5,728,485	1,640,000	29.0	6.34
1872	24,553,523	7,979,400	3,080,000	38.0	11.54
1873	30,291,505	8,726,100	2,330,000	27.0	7.69
1874	34,334,389	8,009,356	1,940,000	24.0	5.06
1875	36,039,497	8,180,625	1,920,000	23.0	5.32
1876	38,270,997	7,998,430	1,870,000	23.0	4.88
1877	39,026,671	7,327,880	1,840,000	25.0	4.71
1878	41,687,266	6,920,540	1,860,000	27.0	4.46
1879	42,671,529	7,327,350	1,818,620	25.0	4.26
1880	49,718,337	9,947,673	3,080,000	30.9	6.19
1881	54,548,909	9,971,702	2,665,000	26.7	4.88
1882	57,155,980	10,522,416	2,850,000	27.1	4.99
1883	59,702,404	9,457,853	2,670,000	28.1	4.47
1884	69,353,202	9,494,306	1,327,500	12.9	1.91
1885	72,147,889	7,942,597	1,970,000	24.8	2.73
1886	80,918,460	8,788,476	1,900,000	21.5	2.34
1887	76,028,697	8,530,342	1,370,000	16.1	1.80
1888	86,472,034	14,510,001	3,260,000	22.4	3.77
1889	88,175,675	11,894,942	2,670,000	22.4	3.03
1890	101,410,277	15,819,960	3,415,000	21.6	3.36
1891	114,222,709	14,574,727	3,540,000	24.3	3.10
1892	123,198,460	12,431,624	3,260,000	26.2	2.64
1893	112,605,078	12,105,145	3,520,000	29.1	3.12
1894	114,308,870	10,852,122	2,380,000	21.9	2.08
1895	129,330,749	13,877,109	3,280,000	23.6	2.54
1896	142,057,500	15,758,935	3,985,000	25.3	2.80
1897	142,702,586	16,530,843	5,431,000	32.8	3.80
1898	147,965,738	17,829,871	6,857,250	38.4	4.63

PRODUCTION, VALUE AND DIVIDENDS OF LAKE COPPER

(Continued)

Year	Gross product fine copper (Pounds)	Gross value of production (Dollars)	Total dividends paid (Dollars)	Percentage of dividends to gross value	Dividends per pound of copper (Cents)
1899	146,950,338	26,098,382	12,318,450	47.2	8.39
1900	142,151,571	23,691,928	9,811,200	41.3	6.90
1901	155,716,848	26,038,857	7,496,900	28.8	4.81
1902	170,325,598	20,711,592	3,440,000	16.6	2.02
1903	192,299,191	26,383,449	4,980,000	18.8	2.59
1904	208,355,935	27,107,107	5,432,300	20.0	2.64
1905	230,437,992	36,616,586	9,224,600	25.2	4.02
1906	229,632,608	43,044,732	13,911,500	30.9	6.07
1907	216,116,747	43,319,940	13,469,950	31.1	6.23
1908	222,674,918	30,239,253	4,837,300	16.0	2.17
1909	231,870,496	31,256,141	6,309,200	20.2	2.72
1910	221,508,205	29,072,951	6,974,000	23.9	3.14
1911	218,939,985	27,965,206	5,376,125	19.2	2.45
1912	216,609,751	35,617,182	9,601,875	26.9	4.43
1913(a)	130,844,131	21,057,278	9,536,573	45.3	7.29
1914(a)	165,706,708	21,857,759	4,663,450	21.3	2.81
1915(a)	265,283,378	46,421,591	14,601,203	31.4	5.50
Totals....	6,119,862,355	\$879,768,856	\$226,603,996	25.8	3.70

(a) Copper Range Co. owns practically all the stock of the Baltic Mining Co. and Trimountain Mining Co., and 50,000 shares of Champion Copper Co.; St. Mary's Mineral Land Co. owns the remaining 50,000 shares of Champion stock. Dividends of the operating companies have not been deducted from the totals; this duplicates a portion of the "Total dividends paid."

The average price received for all Lake Superior copper, from 1845 to 1916, inclusive, was 14.375 cents per pound, with average dividends of 3.702 cents per pound, leaving an estimated cost of 10.673 cents for all years. While this may be accepted as an arbitrary figure, the cost might very properly be figured materially higher. By adding \$60,000,000 to the cost of production, for money lost in unproductive ventures, the cost of copper produced would be made almost 11.5 cents per pound. By adding another \$15,000,000 for assessments on mines that have since repaid in dividends the original assessments, cost of copper would be increased to about 11.85 cents per pound, leaving a net margin of profit, for the entire production, of almost exactly 2 cents per pound, plus the present aggregate values of the mines, which would be about equal to total dividend disbursements to date, or about 3.5 cents per pound.

Omitting the production of mines that have not proven profitable, the average cost of copper produced by dividend-paying Lake Superior mines probably has been about 9.5 cents per pound, for all years.

CONSUMPTION OF COPPER IN EUROPE

European consumption of copper according to A. Hirsch & Sohn; in tons of 2,240 lbs.

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
Germany	138,636	129,169	155,101	149,780	178,005	184,980	206,831	222,027	243,173	999,992
France	64,235	61,010	68,927	70,712	80,509	85,688	92,838	106,997	106,753	107,283
England	135,327	111,388	121,256	119,582	134,492	110,648	148,187	159,736	147,551	147,434
Austria-										
Hungary	26,366	25,830	27,976	30,472	36,972	34,605	35,700	40,000	50,590	41,021
Italy	18,162	20,284	25,237	31,984	29,496	25,189	23,788	30,437	34,378	30,891
Russia	31,370	28,797	24,532	18,739	2,300	21,705	28,227	31,845	38,818	39,475
Belgium & Holland	10,590	11,980	12,798	11,500	9,500	9,500	14,000	13,000	13,000	13,000
Scandinavia	3,500	3,500	7,000	10,200	9,700	9,700	*7,500	*7,500	*7,500	*8,500
Rest of Europe	1,800	2,500	3,000	2,500	2,500	3,000	*2,500	*2,500	*2,500	*3,000
Total	429,986	394,458	455,827	445,469	502,474	485,015	559,571	614,042	644,263	647,170

*Estimated. (No statistics published for 1914.)

ENGLISH COPPER TRADE (in long tons) *

	Production	Imports	Gross Supply	Exports	Net Supply	Actual Consumption
1880	3,662	92,734	96,396	59,482	36,914	.....
1881	3,875	86,227	90,102	61,689	28,413	.....
1882	3,464	93,875	97,339	55,683	41,656	.....
1883	2,620	99,146	101,766	59,350	42,416	.....
1884	3,350	109,390	112,740	64,691	48,049	.....
1885	2,733	123,549	126,282	62,080	64,202	.....
1886	1,471	108,015	109,486	60,511	48,975	.....
1887	389	103,089	103,478	69,453	34,025	.....
1888	1,456	135,470	136,926	72,066	64,860	3,667
1889	905	139,983	140,888	75,627	65,261	66,513
1890	935	141,249	142,184	89,747	52,437	84,930
1891	900	138,616	139,515	76,056	63,459	72,422
1892	495	134,371	134,866	82,542	52,324	54,254
1893	425	129,832	130,257	70,986	59,271	67,399
1894	445	125,008	125,453	54,689	70,764	62,617
1895	580	119,941	120,521	65,990	54,531	62,502
1896	580	135,856	136,436	59,334	57,102	61,370
1897	518	136,555	137,073	56,542	80,531	86,245
1898	640	139,704	140,344	63,256	77,088	81,312
1899	637	141,610	142,247	75,271	66,976	61,042
1900	765	154,941	155,706	56,997	98,709	105,586
1901	532	149,578	150,110	70,396	79,714	83,935
1902	482	160,201	160,683	69,156	91,527	97,639
1903	536	132,926	133,462	76,305	57,157	54,050
1904	493	157,897	158,390	73,447	131,000	127,900
1905	700	155,200	155,900	77,800	100,200	103,300
1906	700	145,400	146,100	66,300	111,100	107,600
1907	700	153,100	153,800	42,800	109,500	106,100
1908	700	193,000	193,700	34,400	158,000	127,600
1909	650	200,600	201,250	36,600	163,900	108,300
1910	460	159,800	160,260	43,000	116,800	146,000
1911	400	167,400	167,800	33,500	133,900	159,100
1912	400	157,400	157,800	27,400	130,800	144,600
1913	300	158,500	158,800	34,700	123,800	140,300

FRENCH COPPER TRADE

The following table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A-G.: (Metric tons.)

Year	Production	Imports	Gross Supply	Exports	Net Supply	Actual Consumption
1892	6,400	24,154	30,554	2,116	28,438	25,580
1893	6,600	26,060	32,660	2,204	30,456	28,596
1894	6,400	26,756	33,156	2,467	30,689	28,854
1895	8,245	32,656	40,901	3,163	37,738	32,388
1896	6,544	40,136	46,680	3,456	43,224	35,099
1897	7,400	48,028	55,428	3,559	51,868	43,100
1898	7,800	45,575	53,375	4,044	49,331	39,700
1899	6,600	49,515	56,115	6,882	49,233	42,600
1900	6,400	51,962	58,362	5,736	52,626	46,500
1901	7,000	41,196	48,196	5,122	43,074	34,300
1902	7,300	49,094	56,394	3,485	52,909	43,900
1903	6,900	46,834	53,734	4,658	49,076	42,700
1904	6,900	56,526	63,426	5,369	58,057	45,300
1905	6,200	56,500	62,700	6,600	56,100	50,200
1906	7,100	64,700	71,800	6,100	65,700	58,100
1907	7,500	62,800	70,300	4,900	65,400	65,000
1908	8,000	74,400	82,400	5,200	77,200	73,900
1909	7,500	71,300	78,800	4,600	74,200	73,100
1910	12,900	77,112	90,012	4,501	85,511	85,700
1911	13,200	84,541	97,741	2,835	94,906	95,700
1912	11,900	88,833	100,700	3,092	98,500	94,700
1913	11,900	94,863	106,800	4,402	103,600	95,900

Note: 1912 and 1913 figures are from Metallgesellschaft.

BRITISH AND FRENCH VISIBLE SUPPLY OF COPPER

This table, based on the compilations of Messrs. Jas. Lewis & Sons of London gives estimates of the visible supply, consisting of the stocks of refined copper on hand in Great Britain and France on the day named, plus shipments afloat from Chile and Australia to European ports. In long tons.

	1916	1915	1914	1913	1912	1911
Jan. 1	20,064	30,309	21,034	40,380	57,283	83,707
Feb. 1	17,646	30,002	16,865	38,228	55,570	83,196
Mar. 1	16,734	29,252	18,559	36,176	51,507	82,387
April 1	12,201	23,883	17,923	32,291	50,175	82,267
May 1	16,046	26,314	20,360	30,467	49,771	78,069
June 1	15,310	28,917	24,352	29,634	44,618	72,613
July 1	15,376	32,868	25,698	28,172	41,623	70,172
Aug. 1	13,188	35,063	26,739	28,374	45,026	68,025
Sept. 1		34,064	27,933	26,536	45,666	66,914
Oct. 1		28,933	29,671	22,583	44,238	67,340
Nov. 1		24,835	31,443	21,380	43,330	61,836
Dec. 1		20,895	30,626	21,514	40,746	58,682

GERMAN COPPER TRADE

From Metallgesellschaft und Metallurgische Gesellschaft A.-G. (in metric tons).

	Production	Imports	Gross Supply	Exports	Net Supply	Con- sumption
1884	18,113	13,819	31,932	6,906	25,026	25,000
1885	19,928	13,168	33,096	5,706	27,390	27,250
1886	19,314	11,913	31,227	6,510	24,717	25,000
1887	20,192	12,427	32,619	5,154	27,465	27,250
1888	21,017	8,082	29,099	4,530	24,569	24,500
1889	24,160	29,643	53,803	7,135	46,668	46,500
1890	24,427	31,408	55,835	8,428	47,407	47,000
1891	24,092	34,182	58,274	6,247	52,027	52,000
1892	24,781	32,498	57,279	6,598	50,681	50,000
1893	24,011	38,455	62,466	7,517	54,949	55,000
1894	25,722	37,032	62,754	6,609	56,145	56,000
1895	25,777	44,365	70,142	6,329	63,813	64,000
1896	29,319	56,814	86,133	5,996	80,137	80,000
1897	29,408	67,573	96,981	7,183	89,798	90,000
1898	30,695	73,291	103,986	6,972	97,014	97,000
1899	34,634	70,091	104,725	7,061	97,664	98,000
1900	30,929	83,503	114,432	5,505	108,927	109,000
1901	31,317	58,620	89,937	5,097	84,840	85,000
1902	30,578	76,050	106,628	4,678	101,950	102,000
1903	31,214	83,261	114,475	4,333	110,142	110,000
1904	30,264	110,231	140,495	4,223	136,272	135,000
1905	31,713	102,218	133,935	5,958	127,977	128,000
1906	32,275	126,066	158,341	7,243	151,098	151,000
1907	31,946	124,116	155,926	6,112	149,814	150,000
1908	36,026	157,669	187,435	6,778	180,657	180,000
1909	34,412	154,673	185,799	6,745	179,054	179,000
1910	38,004	181,551	216,477	7,063	209,414	209,000
1911	37,808	191,590	229,042	6,914	222,128	222,544
1912	38,900	200,608	240,408	7,854	232,735	231,700
1913	41,100	225,392	239,508	7,208	.....	259,300

AUSTRO-HUNGARIAN COPPER TRADE

The following table is based on the figures of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.:

(Metric Tons.)

Year	Production	Imports	Gross Supply	Exports	Net Supply	Con- sumption
1892	1,295	8,644	9,939	342	9,597	.....
1893	1,396	11,822	13,218	434	12,784	.....
1894	1,726	13,383	15,100	255	14,854	.....
1895	1,276	11,747	13,023	151	12,872	.....
1896	1,366	13,666	15,032	228	14,804	.....
1897	1,426	15,926	17,352	159	17,193	17,000
1898	1,343	17,442	18,785	173	18,612	18,300
1899	1,479	16,185	17,664	534	17,130	16,500
1900	1,200	18,970	20,170	471	19,699	18,700
1901	1,150	17,504	18,654	435	18,219	18,200
1902	1,350	18,256	19,606	436	19,179	19,200
1903	1,400	18,704	20,104	1,226	18,878	18,700
1904	1,463	22,532	23,995	747	23,248	23,100

AUSTRO-HUNGARIAN COPPER TRADE—Continued

Year	Production	Imports	Gross Supply	Exports	Net Supply	Con- sumption
1905	1,439	22,535	23,974	1,253	22,721	21,000
1906	1,457	24,488	25,945	1,271	24,674	24,200
1907	1,066	26,181	27,247	619	26,628	26,500
1908	1,338	33,259	34,597	1,125	33,472	33,000
1909	1,765	30,606	32,371	1,250	31,121	31,000
1910	2,279	32,217	34,496	977	33,519	33,500
1911	2,563	37,251	39,814	1,310	38,504	37,400
1912	4,026	45,460	49,475	1,332	48,154	47,400
1913	4,132	36,451	40,583	1,379	39,200	36,600

RUSSIAN COPPER TRADE

This table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.: (Metric tons).

Year	Production	Imports	Gross Supply	Exports	Net Supply	Con- sumption
1892	4,978	6,568	11,546	....	11,546	11,500
1893	5,100	8,756	13,856	....	13,856	13,750
1894	5,409	6,666	12,075	....	12,075	12,250
1895	5,854	8,100	13,954	....	13,954	14,000
1896	5,832	12,433	18,265	....	18,265	18,000
1897	6,941	12,507	19,448	....	19,448	19,500
1898	7,291	14,450	21,741	....	21,741	22,000
1899	7,533	11,100	18,633	....	18,633	18,500
1900	8,100	12,300	20,400	....	20,400	20,500
1901	8,100	10,900	19,000	....	19,000	19,000
1902	8,800	17,500	26,300	....	26,300	26,250
1903	10,500	14,450	24,950	....	24,950	25,000
1904	10,900	20,300	31,200	....	31,200	31,250
1905	8,900	18,700	27,600	....	27,600	27,500
1906	10,600	16,000	26,600	400	26,200	26,000
1907	15,000	4,500	19,500	1,500	18,000	18,000
1908	16,800	4,800	21,600	20	21,580	21,000
1909	18,500	3,500	22,000	400	21,600	22,000
1910	22,600	6,500	29,100	500	28,600	28,600
1911	25,600	7,800	33,400	600	32,800	32,800
1912	33,535	7,000	40,535	500	40,035	40,000
1913	35,295	6,100	40,400	200	40,200	40,200

ITALIAN COPPER TRADE

This table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G.:

Year	Production	Imports	(Metric Tons.)		Net Supply	Con- sumption
			Gross Supply	Exports		
1892	2,564	2,139	4,703	168	4,535	4,500
1893	2,371	3,043	5,414	157	5,257	5,250
1894	2,670	3,706	6,376	32	6,344	6,250
1895	2,375	4,350	6,725	84	6,641	6,750
1896	2,842	4,509	7,351	383	6,968	7,000
1897	2,980	5,032	8,012	222	7,790	7,750
1898	3,230	5,028	8,258	462	7,796	8,000
1899	3,032	5,006	8,038	1,355	6,683	6,500
1900	2,797	6,224	9,021	676	8,345	6,250
1901	3,483	5,982	9,465	100	9,365	9,500
1902	3,863	7,050	10,913	165	10,748	10,500

ITALIAN COPPER TRADE—Continued

Year	Production	Imports	Gross Supply	Exports	Net Supply	Con- sumption
1903	3,620	6,096	9,716	162	9,554	9,750
1904	3,593	11,492	15,085	180	14,905	15,000
1905	3,578	13,795	17,373	170	17,203	17,250
1906	3,600	15,350	18,950	450	18,500	18,250
1907	4,000	21,000	25,000	300	24,700	25,000
1908	4,000	19,623	23,623	172	23,451	23,000
1909	3,000	14,729	17,729	302	17,427	17,500
1910	1,766	21,567	23,333	837	22,496	22,500
1911	1,666	28,510	30,176	743	29,433	29,400
1912	2,319	33,631	35,331	1,717	34,200	33,600
1913	2,400	30,280	32,680	1,465	31,200	39,100

MISCELLANEOUS EUROPEAN COPPER TRADE

This table is based upon the compilations of the Metallgesellschaft und Metallurgische Gesellschaft A.-G. It includes Sweden, Norway, Denmark, Holland, Belgium, the Balkan States and Spain and Portugal; but does not include copper production of the two latter named countries:

(Metric Tons.)

Year	Production	Imports	Gross Supply	Exports	Net Supply	Con- sumption
1892	1,400	1,100	2,500	....	2,500	2,500
1893	1,600	1,400	3,000	....	3,000	3,000
1894	1,600	1,400	3,000	....	3,000	3,000
1895	1,500	1,400	2,900	....	2,900	2,900
1896	1,700	1,400	3,100	....	3,100	3,100
1897	1,700	2,500	4,200	....	4,200	4,200
1898	1,500	2,700	4,200	....	4,200	4,200
1899	2,300	2,800	5,100	....	5,100	5,000
1900	2,500	3,600	6,100	....	6,100	6,000
1901	3,100	5,200	8,300	....	8,300	8,500
1902	6,200	5,300	11,500	....	11,500	11,250
1903	8,000	4,500	12,500	....	11,900	12,000
1904	7,000	7,000	14,000	....	14,200	14,000
1905	7,700	8,000	15,700	....	15,000	15,000
1906	7,100	8,000	15,100	....	15,400	15,500
1907	7,500	7,500	15,000	....	15,000	15,000
1908	13,200	2,200	15,400	....	15,400	15,000
1909	28,000	....	28,000	7,000	21,000	21,800
1910	30,200	....	30,200	6,000	24,200	24,000
1911	32,200	....	32,200	8,000	24,200	24,500
1912	41,600	....	41,600	15,000	26,600	26,000

CHAPTER VII

DIVIDENDS OF MINING COMPANIES IN UNITED STATES.

Table from Mng. and Eng. World—Corrected to July 1, 1916.

Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies.

NAME OF COMPANY	Number Shares Issued	Par Val.	Paid in 1915	Dividends on		Issued Capitalization		Date Latest	Amt.
				Paid in 1916	Total to Date	Total to Date	Date Latest		
Acacia, g.	1,438,989	\$ 1	\$	\$	\$136,194	Dec. 25 '12	\$0.01		
Adams, s l c.	80,000	10	.....	.....	778,000	Dec. 18 '09	.04	
Almeck c.	200,000	25	1,150,000	600,000	4,650,000	Apr. 10 '16	3.00		
Alaska Goldfields. . .	250,000	5	38,375	.....	403,250	Jan. 10 '15	.15	
Alaska Mexican, g. . .	180,000	5	90,000	.....	3,507,381	Nov. 28 '15	.10	
Alaska Mines Soc. . .	500,000	5	.....	.....	90,000	Nov. 1 '06	.....	
Alaska Treadwell, g. .	200,000	25	650,000	250,000	15,780,000	May 29 '16	.50		
Alaska United, g. . .	180,200	5	180,200	54,060	2,045,270	Feb. 28 '16	.30		
Aloues. . .	100,000	25	100,000	250,000	350,000	Apr. 10 '16	1.50		
Amalgamated, c.	1,538,829	100	13,318,995	.....	103,444,983	Aug. 30 '15	3.77	
Am. Sm. & R., com. . .	500,000	100	2,000,000	1,500,000	30,833,333	June 1 '16	1.50		
Am. Sm. & R. pf. . .	500,000	100	3,500,000	1,750,000	56,546,386	June 1 '16	1.75		
Am. Sm. Sec. A pf. . .	170,000	100	1,700,000	510,000	11,010,000	Apr. 1 '16	1.50		
Am. Sm. Sec. B pf. . .	300,000	100	1,500,000	750,000	16,260,000	Apr. 3 '16	1.25		
Am. Zinc, L. & Sm. . .	193,120	25	.....	2,414,000	3,522,825	June 10 '16	12.50	
Anaconda, c.	2,331,250	50	6,693,750	6,993,750	171,251,771	May 20 '16	1.50		
Anchor, s.	500,000	1	30,000	.....	30,000	July 15	.03	
Annie Laurie, g.	25,000	100	.....	.....	439,561	Apr. 22 '05	.50	
Argonaut, g.	200,000	5	120,000	20,000	1,640,000	Mar. 27 '15	.10		
Arizona, c. ....	.....	.....	765,557	629,550	20,220,434	Apr. 1 '16	.30	
Atlantic, c.	100,000	25	.....	.....	990,000	Feb. 21 '05	.50	
Bagdad-Chase, g. pf. .	84,819	5	.....	.....	202,394	Jan. 1 '09	.10	
Bald Butte, g. s. . .	250,000	1	.....	.....	1,354,648	Nov. 1 '07	.04	
Baltic, c.	100,000	25	.....	.....	7,950,000	Dec. 31 '13	2.00	
Barnes-King, g.	40,000	5	.....	60,000	60,000	June 1 '16	.07	
Beck Tunnel Con. . .	1,000,000	0.10	.....	.....	940,000	Nov. 15 '07	.02	
Benton, s. l. . .	196,607	1	.....	.....	10,949	Oct. 1 '08	.01	
Big Four Exp. . .	400,000	1	285,861	40,000	50,000	June 15 '06	.05		
Bingham-N. Haven. . .	228,689	5	.....	.....	960,493	Dec. 20 '15	.20	
Board of Trade, s. . .	120,000	1	.....	.....	78,000	Jan. 15 '11	.05	
Bonanza Dev. . .	300,000	1	.....	.....	1,425,000	Oct. 28 '11	.20	
Booth (Reorganized). .	998,995	5	.....	349,949	349,949	June 26 '16	.05	
Boss, g.	408,500	1	.....	.....	40,850	Dec. 10 '14	.10	
Boston & Colo. Sm. . .	15,000	10	.....	.....	402,350	Oct. '02	.75	
Boz. & Mont. Con. . .	100,000	25	94,868	.....	63,225,000	May 15 '11	4.00	
Breece, l. s. . .	200,000	25	.....	.....	220,000	Dec. 15 '13	.10	
Brunswick Con. g. . .	300,000	1	.....	.....	203,315	Sept. 15 '15	.06	
Bullion-B & Champ. . .	100,000	10	60,000	.....	2,768,400	July 11 '08	.10	
Bullwhacker, c. . .	450,000	1	1,062,780	.....	10,000	July 1 '07	.01	
Bunker Hill Con. . .	200,000	1	23,972	30,000	851,000	June 4 '16	.02		
Bunker Hill & Sulf. .	327,000	10	.....	827,500	17,590,500	June 4 '16	.40	
Butte Alex Scott. . .	75,000	10	.....	844,662	1,054,119	Apr. 10 '16	10.50	
Butte, Ballaklava, c. .	250,000	10	4,907,937	.....	125,000	Aug. 1 '10	.50	
Butte Coalition, c. . .	1,000,000	15	547,050	.....	4,700,000	Dec. 1 '11	.25	
Butte & Superior, s. .	272,697	10	2,006,557	5,862,993	11,383,017	June 30 '16	10.75		
Caledonia, l. s. c. . .	2,605,000	1	5,000,000	468,900	1,351,631	June 5 '16	.03		
Calumet & Ariz., c. . .	641,923	10	.....	2,565,676	25,714,001	June 20 '16	2.00	
Calumet & Hecla, c. .	100,000	25	488,104	3,000,000	132,250,000	June 23 '16	15.00		
Camp Bird, g.	1,750,000	25	125,000	113,584	10,243,964	Jan. 1 '16	.17		
Cardiff, s. l. . .	500,000	1	.....	125,000	250,000	June 1 '16	.25	
Carisa, g. s. c. . .	600,000	1	.....	.....	60,000	Dec. '06	.01	
Cashier, g.	900,000	1	.....	.....	26,160	Apr. '04	.00	
Centennial Eureka. . .	100,000	25	40,000	100,000	4,000,000	Apr. 25 '16	1.00		
Center Creek, l. s. . .	100,000	10	.....	30,000	580,000	Apr. 1 '16	.25	
Central Eureka, g. . .	100,000	1	87,888	.....	799,159	Mar. 5 '06	.05	
Champion, c.	100,000	25	87,888	3,720,000	13,720,000	June 7 '16	6.40		
Chief Con.	882,960	1	2,609,860	88,175	439,212	May 15 '16	.05		

DIVIDENDS OF MINING COMPANIES IN UNITED STATES—Continued.

NAME OF COMPANY	Number Shares Issued	Par Val.	Dividends on Issued Capitalization			Date Latest	Amt.
			Paid in 1915	Paid in 1916	Total to Date		
Chino Copper c.	N. M. 869,980	\$ 5	\$.	\$3,044,930	\$9,742,925	June 30, '16	\$2.25
C. K. & N. g.	Calo. 1,431,900	1			172,828	Nov. '04	.01
Cliff, g.	Alaska 100,000	1			115,000	Feb. 5, '14	.05
Cliff, g. s. l.	Utah 300,000	10			90,000	Jan. 1, '13	.10
Clinton, g. s.	Colo. 1,000	100			60,000	Dec. '03	.30
Colo. G. Dredging.	Colo. 200,000	10		100,000	425,000	Feb. 23, '16	1.00
Colorado, s. l.	Utah 1,000,000	0.20			2,600,000	Mar. 15, '13	.03
Columbus Con. l.s.c.	Utah 283,540	5			212,423	Oct. 14, '07	.20
Combination, g.	Nev. 320,000	1			873,000	Dec. '06	.15
Constock-Phoenix.	Nev. 783,000	1			90,000	Nov. 15, '11	.05
Cons. Interstate-Call.	Idaho 464,990	10	2,530,000	1,394,970	3,952,415	June 30, '16	1.50
Con. Mercur, g.	Utah 1,000,000	1			1,265,000	June 25, '13	.03
Consolidated, g.	Colo. 2,500,000	1			380,000	Mar. '02	.01
Con. St. Gothard, g.	Cal. 100,000	10	242,000		11,430	Oct. 14, '08	.05
Continental, s.	Mo. 22,000	25	1,182,003		561,000	Dec. 30, '15	30.00
Copper Range Co., c	Mich. 394,001	100		1,486,203	16,655,052	June 15, '16	2.50
Creede United, g.	Colo. 500,000	1			187,500	July '06	.004
Cripple Creek, g. pf.	Colo. 125,000	1			45,000	Jan. '02	.04
Crippel Ck. Con. g.	Colo. 2,000,000	1			180,000	Mar. '04	.004
Croesus, g.	Cal. 200,000	5			247,300	May 2, '08	.05
Crown King.	Ariz. 400,000	10			242,760	May '01	.02
Cumberland-Ely, c.	Nev. 1,300,000	5			390,000	Sept. 29, '10	.10
Dall, z. l.	Wis. 60,000	1			33,000	Nov. 25, '09	.05
Dalton & Lark, l.s.c.	Utah 2,500,000	1			350,000	July '01	.104
Daly-Judge.	Utah 300,000	1	300,000	75,000	1,230,000	Apr. 1, '16	.25
Daly, g. s. l.	Utah 150,000	20			2,925,000	Mar. '97	.25
Daly-West, g. s. l.	Utah 180,200	20			6,606,000	Jan. 15, '13	.15
De Lamar, g. s. l.	Idaho 80,000	5			2,777,520	Aug. 23, '11	.25
Diamondfield, g.	Nev. 732,000	1			14,650	Sept. '95	.02
Dillon, g.	Colo. 1,250,000	1			156,250	Nov. '05	.01
Dr. Jack Pot Con.	Colo. 3,000,000	0.02½			90,000	Mar. 20, '11	.004
Doe Run, l.	Mo. 65,785	100			3,156,309	Dec. 6, '13	.76
Ducktown, c.	Tenn. 973,300	5			1,600,000	(to 1916)	
Duluth & Utah.	Utah 50,000	20	4,000		10,000	Mar. 10, '15	.04
Eagle & Blue Bell.	Utah 893,146	1	135,000		447,600	Dec. 20, '15	.05
Elkton Can., g.	Colo. 2,500,000	1	100,000		3,547,460	Nov. 24, '15	.02
El Paso, g.	Colo. 490,000	5			1,707,545	Feb. 25, '14	.10
Ernestine, g. s.	N. M. 300,000	5	45,000		565,000	July 5, '15	.15
Federal Sm. com.	Idaho 60,000	100			2,708,750	Jan. 14, '09	1.50
Federal Sm., pf.	Idaho 120,000	100	480,000	240,000	12,095,552	May 22, '16	1.00
Findley, g.	Colo. 1,250,000	1			350,000	Sept. '06	.01
Florence Annex.	Nev. 1,000,000	1			50,000	Jan. 20, '08	.05
Florence (Goldfield).	Nev. 1,050,000	1			840,000	Apr. 2, '11	.10
Frances Mohawk, g.	Nev. 910,000	1			541,000	Jan. 1, '08	.05
Franklin.	Mich. 166,318	25	998,148		2,238,148	Aug. 2, '15	6.00
Freemont Con., g.	Cal. 200,000	2.50	10,000		264,000	Dec. 1, '15	.05
Free Coinage, g.	Colo. 10,000	100			180,000	Dec. 25, '09	1.00
Frontier, s.	Wis. 1,239	100			178,416	Dec. 9, '13	2.00
Gemini-Keystone, l.	Utah 5,000	100		50,000	2,405,000*	June 6, '16	5.00
General Dev. Co.	N. Y. 120,000	25	179,946	330,000	3,324,000	June 1, '16	1.50
Glanville, s.	Wis. 2,800	25			15,400	June 4, '09	1.00
Goconda.	Ariz. 850,000	1	170,000		170,000	Dec. 15, '15	.03
Gold Chain g.	Utah 100,000	25			160,000	May 25, '13	.03
Gold Coin of Victor.	Colo. 1,000,000	1			1,350,000	Feb. 14, '09	.02
Gold Dollar Con., g.	Colo. 2,500,000	1			100,000	Dec. 1, '12	.01
Gold King Con., g.	Colo. 5,750,370	1	10,000		1,351,808	Nov. 1, '15	.25
Gold Sovereign.	Ariz. 300,000	10			150,000	Nov. '06	.04
Gold Sovereign.	Colo. 1,800,000	1			31,571	Nov. 14, '12	.04
Golden Centre, g.	Cal. 285,000	1	11,000		22,000	Jan. 1, '16	.02
Golden Cycle, g.	Colo. 1,500,000	1	3,315,000	180,000	7,483,300	June 10, '16	.02
Golden Eagle, g.	Colo. 400,915	1			98,916	Sept. '01	.05
Golden Star, g.	Ariz. 400,000	5			120,000	Mar. 15, '10	.10
Gold' Com. Fra., g.	Nev. 922,000	1			92,111	Oct. 15, '09	.05
Goldfield Con.	Nev. 3,559,148	10			28,999,831	Oct. 31, '15	.15
Good Hope, g. s.	Colo. 500	100	1,600,616		941,250	Jan. '03	.01
Good Sp. Anchor, s. s.	Nev. 550,000	1		33,000	119,755	June 15, '16	.02
Grand Central, g.	Utah 500,000	1	12,500		1,545,200	Dec. 23, '13	.03
Grand Gulch, c. s.	Nev. 239,845	2.50	2,398	9,594	11,992	June 1, '16	.03
Granite, g.	Alaska 430,000	1		17,200	17,200	May 10, '16	.03
Gwin, g.	Cal. 106,000	10			481,500	Feb. '06	.25

DIVIDENDS OF MINING COMPANIES IN UNITED STATES—Continued.

NAME OF COMPANY	Number Shares	Par Val.	Dividends on Issued Capitalization				Latest Amt.
			Paid in 1915	Paid in 1916	Total to Date	Date	
Hazel, g.	Cal. 900,000	\$ 1	\$9,000	\$	\$1,114,000	Jan. 5, '15	\$0.01
Hecia, s. l.	Idaho 1,000,000	0.25	565,000	650,000	4,405,000	June 20, '16	.15
Hercules	Idaho 1,000,000	1	2,250,000	1,450,000	12,200,000	June 15, '16	.20
Hidden Treasure, g.	Cal. 30,000	10			457,452	Sept. '00	.10
Holy Terror, g.	S. D. 500,000	1			172,000	Jan. '00	.01
Homestake, g.	S. D. 251,160	100	22,200,008	979,524	36,685,232	June 25, '16	.65
Hope Dev.	Cal. 500,000	1	5,000		5,000	Dec. 31, '15	.01
Horn Silver, l.s.z.	Utah 400,000	1		40,000	5,182,000	June 30, '16	.05
Imperial, c.	Ariz. 500,000	10			300,000	June 24, '07	.20
Independence Con., g	Ariz. 2,500,000	10			281,375	Apr. '01	.04
Inspiration Con.	Colo. 920,687	20		1,149,859	1,149,859	May 1, '16	1.25
Inter'l Nickel, com.	U. S. 1,673,384	25	6,845,667	5,438,498	30,941,338	June 1, '16	2.00
Inter'l Nickel, pf.	U. S. 89,126	100	554,756	267,378	5,614,824	May 1, '16	1.50
Intern'l Sm. & Ref.	U. S. 100,000	100			4,100,000	May 2, '14	2.00
Iowa, g. s. l.	Colo. 1,666,667	1	16,667		270,167	Dec. 31, '15	.004
Iowa Tiger, g. s. l.	Colo. 3,000	1	6,000		25,179	Jan. 15, '15	.50
Iron Blossom, l. s. g.	Utah 1,000,000	1	330,000	150,000	2,650,000	Apr. 15, '16	.10
Iron Cap pd. c.	Ariz. 33,481	10	23,381		23,381	Dec. 31, '15	.14
Iron Clad, g.	Colo. 1,000,000	1			50,000	Nov. '06	.05
Iron Silver	Colo. 500,000	20	100,000		5,050,000	Dec. 31, '15	.10
Isabella, g.	Colo. 2,250,000	1			742,500	Mar. '01	.01
Isla Royale, c.	Mich. 150,000	25			150,000	Mar. 31, '13	1.00
Jamison, g.	Cal. 390,000	10			378,300	Jan. '11	.02
Jerry Johnson, g.	Colo. 2,500,000	10			187,500	Nov. 5, '14	.004
Jim Butler	Nev. 1,718,020	1	171,852	171,802	343,604	Feb. 2, '16	.10
Joplin Ore & Spelter	Mo. 400,000	5	333,750	44,008	44,008	June 22, '16	.054
Jumbo Ext., g.	Nev. 1,550,000	1		194,000	684,998	June 30, '16	.05
Kendall, g.	Mont. 500,000	5		50,000	1,555,000	Apr. 3, '16	.10
Kenefick Zinc	Me. 200,000			60,000	60,000	June 30, '16	.10
Kennecott	Alas. 250,000	10		7,000,000	12,000,000	June 30, '16	1.50
Kennedy, g.	Cal. 100,000	100			1,801,001	June '00	.05
King of Arizona, g.	Ariz. 200,000	1			396,000	Aug. 2, '09	.12
Klar Piquett, z.	Wis. 20,000	1			157,500	Dec. 16, '12	.25
Knob Hill, g.	Wash. 1,000,000	1	46,500		70,000	Aug. 1, '13	.004
La Fortuna, g.	Ariz. 250,000	1			1,200,500	Oct. '02	.014
Lake View	Utah 500,000	.05		56,250	102,500	May 10, '16	.024
Last Dollar, g.	Colo. 1,500,000	1	106,841		180,000	Feb. 23, '03	.02
Liberty Bell, g.	Colo. 133,551	5			1,752,795	Jan. 31, '16	.05
Lightner, g.	Cal. 102,255	1	11,200		331,179	June '06	.05
Linden, z.	Wis. 1,020	10			11,200	Dec. 31, '15	3.00
Little Bell, s. l.	Utah 300,000	1		15,000	75,000	Apr. 22, '16	.05
Little Florence	Nev. 1,000,000	1			430,000	Jan. '08	.03
Lost Packer	Idaho 150,000	1	10,000		37,500	Oct. 23, '13	.25
Lower Mammoth	Utah 1,000,000	1			67,000	Dec. 15, '15	.01
MacNamara, g. s.	Nev. 734,576	1			46,800	Apr. 23, '05	12.00
Magma, c.	Ariz. 240,000	5.00	240,000	240,000	480,000	June 30, '16	.50
Mammoth, g. s. c.	Utah 400,000	.10	20,000	40,000	2,360,000	Apr. 20, '16	.05
Manhattan-Big 4, g.	Nev. 762,400	1			30,248	Aug. 15, '11	.02
Mary McKinney, g.	Colo. 1,309,252	1			1,169,306	July 28, '14	.02
May Day	Utah 800,800	0.25	88,000	40,000	284,000	May 26, '16	.02
Mary Murphy, g. s. l.	Colo. 370,000	5	50,134	25,067	93,106	May 1, '16	.07
Mexican, g. s.	Nev. 201,600	3			171,360	June 4, '14	.75
Miami, c.	Ariz. 747,114	5	1,681,004	2,054,563	7,454,442	May 15, '16	1.50
Mine La Motte, l.	Mo. 300,000	10			300,000	Jan. 23, '04	.20
Modoc, g. s.	Colo. 500,000	1			275,000	Oct. 20, '11	.01
Mogollon, g. s.	N. M. 355,682	1	80,000		130,000	Oct. 1, '15	.10
Mohawk, c.	Mich. 100,000	25	600,000	700,000	4,575,000	Feb. 1, '16	7.00
Moh'k Com. Lease.	Nev. 500,000	1			115,000	July 22, '08	.08
Moh'k (Goldfield)	Nev. 710,000	1			568,000	Nov. 25, '07	.30
Moh'k Jumbo Lease.	Nev. 600,000	1			198,000	Nov. 20, '08	.03
Mon'ch-Madonna, g	Colo. 1,000,000	1			40,000	May 15, '11	.01
Mont. Ore Purch.	Mont. 80,833	25			9,448,119	Jan. 29, '07	15.00
Mont-Tonopah, g.	Nev. 1,000,000	1			530,000	Dec. 20, '12	.10
Monument, g.	Colo. 300,000	1			27,124	Apr. 28, '05	.01
Morning Star Drift	Cal. 2,400	100			854,400	Sept. 26, '00	3.00
Moscow, s. l. c. z.	Utah 797,601	1			67,480	Dec. 20, '14	.03
Mountain, c.	Cal. 250,000	25			4,216,250	May 14, '08	.44
Mountain View	Utah 139,720	1			12,554	Aug. 6, '06	.06
Mt. Diablo, s.	Nev. 50,000	100			260,271	Jan. 28, '00	.10
Mt. Rosa, g.	Colo. 994,850	1			19,897	Nov. 8, '05	.01

DIVIDENDS OF MINING COMPANIES IN UNITED STATES—Continued.

NAME OF COMPANY	Number Shares Issued	Par Val.	Dividends on Issued Capitalization				Date Latest	Amt.
			Paid in 1915	Paid in 1916	Total to Date	Date		
Napa Con., q.....	Cal. 100,000	\$ 7	\$.....	\$.....	\$1,840,000	July 20,'11	\$0.40	
National, g.....	Nev. 750,000	1	.....	.....	570,000	May 1,'11	.10
National Lead, com.	U. S. 206,554	100	619,660	413,108	9,442,547	June 30,'16	1.00	
National Lead, pf.....	U. S. 243,676	100	1,706,004	852,002	32,905,562	June 15,'16	1.75	
National, z. l.....	Mo. 500,000	1	6,000	70,000	85,000	June 30,'16	.05	
Nevada Con., c.....	Nev. 2,000,000	5	2,999,185	2,500,000	22,475,893	June 30,'16	.75	
Nevada Douglas.....	Nev. 922,860	5	.....	.....	125,000	Jan. 1,'13	.123
Nevada Hills, g.....	Nev. 746,000	5	.....	.....	373,716	Dec. 20,'07	.10
Nev. Keystone, g.....	Nev. 638,887	1	.....	.....	61,700	Feb. 18,'04	.03
Nevada Wonder.....	Nev. 1,500,000	1	140,823	150,000	783,528	May 20,'16	.10	
New Baltic.....	Mich. 70,000	25	35,000	.....	35,000	July 15,'15	.50
New Century, z.....	Mo. 300,000	1	.....	.....	1,170,000	Oct. 26,'09	.01
Newhouse, l. c.....	Utah 600,000	10	.....	.....	600,000	Nov. 20,'07	.10
New Idria, q.....	Cal. 100,000	5	150,000	200,000	2,030,000	June 30,'16	1.00	
New Jersey, z.....	U. S. 350,000	100	.....	13,308,000	.....	June 10,'16	5.00
New Zealand Con.....	Colo. 675,000	1	.....	.....	129,600	Mar. 7,'02	.50
North Butte, c. g. s.	Mont. 430,000	15	.....	430,000	12,507,000	Apr. 17,'16	.50
North Star, g.....	Cal. 258,000	10	387,000	50,000	4,837,040	Mar. 30,'16	.20	
O. P. David, z.....	Wis. 120,000	1	250,000	.....	144,000	May 15,'11	.04
Old Colony, z.....	Mo. 69,909	10	.....	.....	138,184	Nov. 7,'01	.25
Old Dominion Co., h	Ariz. 293,353	25	.....	1,320,088	8,640,566	June 30,'16	2.00
Old Dominion, M&S	Ariz. 162,000	25	1,466,765	891,000	5,508,000	June 29,'16	3.00	
Old Town Con., g.....	Colo. 2,809,286	1	810,000	.....	162,577	Aug. 7,'05	.00
Ontario, s. l.....	Utah 150,000	100	.....	.....	13,917,500	Dec. 7,'02	.30
Ophir, g. s.....	Nev. 201,600	3	.....	.....	2,088,520	Jan. 25,'12	.10
Ophongco, c. g. s.....	Utah 898,978	0.25	.....	.....	71,818	Jan. 30,'13	.01
Optimo, z.....	Wis. 490	100	.....	.....	44,800	Sept. 1,'15	10.00
Oroville Dredging.....	Cal. 700,000	5	17,500	168,000	2,500,008	June 24,'16	.12	
Oroville Union, g.....	Cal. 52,154	1	348,968	14,759	45,994	May 12,'16	.10	
Oscoda, c.....	Mich. 96,150	25	769,200	673,050	13,621,925	Apr. 29,'16	4.00	
Oscola, l. z.....	Mo. 98,000	5	.....	9,800	269,609	May 1,'16	.05
Parrot, c.....	Mont. 229,850	10	34,478	.....	7,577,264	May 15,'15	.15
Pearcock.....	Wis. 5,000	100	42,500	10,000	66,000	May 31,'16	.05	
Pearl Con., g. s.....	Wash. 1,970,710	5	.....	.....	187,216	Sept. 6,'10	.02
Petro, g. s.....	Utah 500,000	1	.....	.....	65,000	Aug. 9,'06	.04
Pharmacist, g.....	Colo. 1,500,000	1	.....	.....	91,500	Feb. 1,'10	.004
Phelps, Dodge & Co.	U. S. 450,000	100	9,000,000	5,400,000	53,771,527	June 30,'16	6.00	
Pioneer, g.....	Alas. 5,000,000	1	.....	.....	2,041,526	Oct. 7,'11	.03
Pittsburg, l. z.....	Mo. 1,000,000	1	.....	.....	20,000	July 15,'07	.02
Pittsburgh-Idaho, l.	Idaho 1,000,000	1	.....	.....	249,104	July 15,'13	.04
Pitts Silver Peak.....	Nev. 2,790,000	1	.....	.....	840,600	Dec. 1,'14	.02
Platteville, l. s.....	Wis. 500	60	.....	.....	179,500	June 15,'07	10.00
Plumas Eureka, g.....	Cal. 150,625	10	.....	.....	2,831,294	Apr. 8,'01	.06
Plymouth Con.....	Cal. 240,000	5	172,800	58,250	231,050	Apr. 10,'16	.24	
Portland, g.....	Colo. 3,000,000	1	360,000	270,000	10,447,080	July 20,'16	.03	
Prince Con., s. l.....	Nev. 1,000,000	1	124,925	125,000	250,000	July 1,'16	.05	
Quartette, g. s.....	Nev. 100,000	10	.....	.....	375,000	July 31,'07	.20
Quicksilver, pf.....	Cal. 43,000	100	.....	.....	1,931,411	Apr. 8,'03	.50
Quip, g.....	Wash. 1,500,000	1	.....	.....	67,000	Feb. 1,'12	.01
Quincy, c.....	Mich. 110,000	25	880,000	770,000	22,547,500	June 30,'16	4.00	
Ray Con., c.....	Ariz. 1,460,804	10	1,194,836	1,571,279	6,144,406	June 30,'16	.50	
Red Bird, g. s. c. l.	Mont. 300,000	5	.....	.....	72,000	Oct. 9,'04	.01
Red Metal, c.....	Mont. 100,000	10	.....	.....	1,200,000	Apr. 1,'07	4.00
Red Top, g.....	Nev. 1,000,000	1	.....	.....	128,175	Nov. 25,'07	.10
Republic, g.....	Wash. 1,000,000	1	.....	.....	85,000	Dec. 28,'10	.013
Richmond, g. s. l.....	Nev. 54,000	1	.....	.....	4,453,797	Dec. 23,'00	.01
Rocco-Home, l. s.....	Nev. 300,000	1	.....	.....	152,500	Dec. 22,'05	.02
Rochester Ld. & L.....	Mo. 4,900	100	.....	.....	190,846	July 1,'12	.50
Round Mountain, g.	Nev. 889,018	1	.....	.....	363,964	Aug. 25,'13	.04
Sacramento, g.....	Utah 1,000,000	5	.....	.....	308,000	Oct. 22,'06	.004
St. Joseph, l.....	Mo. 1,464,798	10	845,658	704,733	10,972,631	June 20,'16	.25	
St. Mary's M. L.....	Mich. 160,000	25	1,280,000	2,080,000	6,880,000	Aug. 28,'16	2.00	
Schoenh'r-Wal'n, z. l.	Mo. 10,000	10	.....	.....	90,000	Sept. 20,'11	.20
Scratch Gravel.....	Mont. 1,000,000	1	.....	20,000	20,000	Feb. 1,'16	.02
Seven Tro. Co., g. s.	Nev. 1,443,077	1	180,378	36,076	252,532	Apr. 1,'15	.024	
Shannon, c.....	Ariz. 300,000	10	.....	.....	750,000	Jan. 30,'13	.50
Shattuck-Ariz., c.....	Ariz. 350,000	10	875,000	1,225,500	4,200,000	July 20,'16	1.25	
Silver Hill, g.....	Nev. 108,000	1	.....	.....	88,200	June 24,'07	.05
*Silver King Coal'n.	Utah 1,250,000	5	562,500	562,500	14,147,485	July 1,'16	.15	
Silver King Con.....	Utah 637,582	1	255,033	127,516	942,373	July 22,'15	.10	
Silver Mines Expl..	N. Y. 10,000	100	.....	.....	250,000	June 16,'10	2.00

DIVIDENDS OF MINING COMPANIES IN UNITED STATES—Continued.

NAME OF COMPANY	Number Shares Issued	Par Val.	Paid in		Dividends on Issued Capitalization		Total to Date	Date	Latest	Amt.
			1915	1916	Paid in 1916	Date				
Sioux Cons., l. s. c.	Utah	745,389	\$ 1	\$	\$	\$872,105	July 20	'11	\$0.04	
Skidoo, g.	Cal.	1,000,000	5			365,000	Oct. 2	'14	.01	
Smuggler, s. l. z.	Colo.		1			2,235,000	Nov. 22	'06	.03	
Snowstorm, c.	Idaho	1,500,000	1			1,169,610	Oct. 10	'13	.01	
Socorro	N. M.	377,342	5	37,730	56,599	196,070	Aug. 1	'16	.05	
South Eureka, g.	Cal.	299,981	1	251,988	167,920	1,409,754	Aug. 15	'16	.07	
South Hecla	Ida.	500,000	1		39,450	39,450	Aug. 10	'16	.15	
So. Swansea, g. s. l.	Utah	300,000	1			287,500	Apr. 3	'04	.01	
Spearfish, g.	S. D.	1,500,000	1			165,500	Jan. 7	'05	.01	
Standard Con., g. s.	Cal.	178,394	10			5,274,408	Nov. 17	'13	.25	
Standard, c.	Ariz.	425,000	1	867,852		69,500	Sept. 8	'05	.50	
Stewart, l-s.	Idaho	1,238,362	1			2,043,297	Dec. 31	'15	.05	
Stratton's Crisp. Ck.	Colo.	2,000,000	1			300,000	Sept. 6	'08	.02	
Stratton's Ind.	Colo.	1,000,000	5			5,028,568	Dec. 23	'06	.12	
Str'n's Ind. (new) g.	Colo.	1,000,000	.30		160,000	691,250	Jan. 31	'16	.16	
Strong, g.	Colo.	1,000,000	1			2,275,000	July 9	'05	.02	
*Includes dividends paid by Silver King Mfg. Co. to 1907—\$10,675,000.										
Success	Idaho	1,500,000	1	555,000	345,000	1,125,000	July 23	'16	.03	
Superior & Pitts., c.	Ariz.	1,499,792	10	1,739,759		10,318,568	Dec. 21	'15	.38	
Swansea, s. l.	Utah	100,000	5			334,500	Apr. 29	'07	.05	
Tamarack, c.	Mich.	60,000	25			9,420,000	July 23	'07	4.00	
Tennessee, c.	Tenn.	200,000	25	600,000	80,000	80,000	June 1	'16	.02	
Tightner	Cal.	100	100		300,000	5,206,250	Apr. 15	'16	.75	
Tomboy, g. s.	Colo.	310,000	5	155,000		160,000	Jan. 3	'14		
Tom Reed, g.	Ariz.	909,555	1	300,151	74,400	3,861,555	June 30	'16	.24	
Tonopah-Alpine, g.	Nev.	700,000	1			2,555,934	Sept. 5	'15	.01	
Ton.-Belmont, g.	Nev.	1,500,000	1	750,016	562,500	8,205,527	July 1	'16	.12	
Ton. Extension, g. s.	Nev.	1,272,801	1	331,299	413,660	1,400,856	July 1	'16	.15	
Tonopah, g. s.	Nev.	1,000,000	1	900,000	450,000	13,450,000	July 21	'16	.15	
Tonopah Midway, g.	Nev.	1,000,000	1			250,000	Jan. 1	'07	.05	
Town Topics, g. s.	Colo.	1,000,000	1			234,000	Apr. 28	'15	.02	
Tremnis	Cal.	200,000	2.50	16,000		1,100,000	Oct. 30	'12	3.00	
Tri-Mountain, c.	Mich.	100,000	25			495,525	Apr. 15	'13	1.00	
Tuolumne, c.	Mont.	800,000	1			470,000	Sept. 20	'11	.05	
Uncle Sam Con., s.	Utah	500,000	1			444,244	Jan. 27	'03	.02	
Union, g.	Colo.	1,250,000	1			167,070	Nov. 16	'15	.10	
Union Basin, s.	Ariz.	835,350	1	167,070		1,500,000	Apr. 15	'07	3.00	
United, c., pf.	Mont.	50,000	100			6,125,000	Aug. 6	'07	1.75	
United, c., com.	Mont.	450,000	100			211,527	Oct. 15	'07	.50	
United, s. l., pf.	Mo.	19,556	25			40,000	Dec. 21	'12	.01	
United Copper, c. s.	Wash.	1,000,000	1			440,435	Jan. 1	'10	.04	
United Crisp. Ck.)	Colo.	4,009,100	1		759,000	3,335,000	June 30	'16	18.00	
United Globe, c.	Ariz.	23,000	100	701,500		11,000,000	Sept. 23	'10	5.00	
United Metals Sell.	U. S.	50,000	100		1,620,000	38,047,000	July 9	'16	.75	
United Verde, c.	Ariz.	300,000	10	2,000,000		414,078	Oct. 9	'03	1.00	
U. S. Red. & R., com.	Colo.	59,188	100			1,775,936	Oct. 1	'07	1.50	
U. S. Red. & R., pf.	Colo.	39,458	100			7,590,745	July 15	'16	1.00	
U. S. S. R. & M. com.	USMx	351,105	50	263,336	1,288,668	18,084,366	July 15	'16	.87	
U. S. S. R. & M., pf.	USMx	486,350	50	1,702,225	8,934,695	41,656,592	June 30	'16	3.00	
Utah, c.	Utah	1,624,489	10	6,904,082		283,720	Oct. 21	'10	.02	
Utah, s. l. (Fish Sp.)	Utah	93,000	10		264,100	330,125	July 1	'16	.25	
Utah-Apex, s. l.	Utah	528,200	5	66,025	450,000	9,600,000	June 26	'16	.75	
Utah Con., c.	Utah	300,000	5	600,000	10,000	10,000	May 29	'16	1.00	
Victoria, g. s. l.	Utah	250,000	1			207,500	Apr. 23	'10	.04	
Vindicator Con., g.	Colo.	1,500,000	1	225,000	135,000	3,397,500	July 25	'16	.03	
Wasp No. 2, g.	S. D.	500,000	1	82,500	100,000	649,466	May 15	'16	.02	
Wellington, l. s.	Colo.	10,000,000	1	300,000	400,000	1,050,000	July 1	'16	.02	
West End Con.	Nev.	1,788,486	1	178,848		536,545	Jan. 15	'16	.05	
West Hill	Wis.	20,000	1	28,000	8,000	40,000	June 29	'16	.20	
White Knob, g. pf.	Cal.	200,000	10	80,000	40,000	170,000	May 29	'16	.10	
Wilbert	Idaho	1,000,000	1	10,000	20,000	30,000	May 1	'16	.01	
Wolverine, c.	Mich.	60,000	25	540,000	360,000	8,760,000	Apr. 1	'16	6.00	
Wolverine & Ariz., c	Ariz.	118,674	15	29,668		53,403		'15	.25	
Work, g.	Colo.	1,500,000	1			1,597,685	Apr. 31	'12	.02	
Yak	Colo.	1,000,000	1	160,000	120,000	2,127,685	June 30	'16	.07	
Yankee Con., g. s. l.	Utah	1,000,000	1			167,500	Feb. 1	'13	.01	
Yellow Aster, g.	Cal.	100,000	10	18,000	15,000	1,187,789	July 6	'16	.02	
Yellow Pine	Cal.	1,000,000	1	450,000	650,000	1,543,008	July 25	'16	.15	
Yosemite Dredg.	Cal.	24,000	10			102,583	July 15	'14	.10	

DIVIDENDS OF FOREIGN MINING COMPANIES
(Table from Mng. and Eng. World—Corrected to July 1, 1916.)

Company	First	High	Date	Low	Date	Last	Sales	Total
Ajuchitlan	Mex.	50,000	\$ 5	\$	\$237,500	July 1, '13		\$0.25
Amistady C'n'd'a, g.s.	Mex.	9,600	50		429,358	July 15, '08		1.28
Amparo, s. g.	Mex.	2,000,000	1	280,000	200,000	2,132,176	May 10, '16	.05
Bart. de Medina Mill	Mex.	2,000	25			103,591	Aug. 1, '07	.50
Batopilas, s.	Mex.	446,268	20			55,870	Dec. 31, '07	.12
Beaver Con., s.	Ont.	2,000,000	1	120,000	60,000	710,000	Apr. 29, '16	.03
Boleo, g.	Mex.	120,000	20			721,871	May 8, '11	5.00
British Columbia, c.	B. C.	591,709	5			615,399	Jan. 5, '13	15
Buena Tierra	Mex.	330,000	5	80,190		160,380	Jan. 30, '15	.24
Buffalo, Ont.	Ont.	1,000,000	1			2,787,000	July 1, '14	.05
Canadian Goldfields.	Can.	600,000	0.10			237,099	July 15, '14	.01
Cananea Central. c.	Mex.	600,000	10			360,000	Mar. 1, '12	.60
Cariboo-Cobalt	Ont.	1,000,000	1	205,000		295,000	Sept. 1, '15	.09
Cariboo-McKinney, g	B. C.	1,250,000	1			56,250	Dec. 1, '09	.00
City of Cobalt	Ont.	500,000	1			138,375	May 15, '09	.01
Cobalt Central, s.	Ont.	4,761,500	1			192,845	Aug. 24, '09	.01
Cobalt Lake, s.	Ont.	3,000,000	1			465,000	May 29, '14	.02
Cobalt Silver Queen	Ont.	1,500,000	1			315,000	Dec. 1, '08	.03
Cobalt Townsite, s.	Ont.	199,282	5			1,042,259	Aug. 20, '14	.24
Coniagas, s.	Ont.	800,000	5	600,000	200,000	8,040,000	Feb. 5, '16	.25
Con. Mg. & Sm., g.s.c.	B. C.	58,502	100	348,264	420,517	2,740,654	July 1, '16	2.50
Crown Reserve, s.	Ont.	1,999,957	1	141,505		6,102,408	July 15, '15	.03
Dolores	Mex.	400,000	5			1,374,865	July 24, '11	.22
Dome Mines, s.	Ont.	1,000,000	5	400,000	400,000	800,000	June 1, '16	.50
DoaEstrellas, (ElOro)	Mex.	300,000	0.50			15,405,000	Sept. 30, '13	1.50
El Favor	Mex.	3,500,000	1			210,000	Apr. 30, '14	.01
El Oro, g. s.	Mex.	1,147,500	5			9,136,842	July 11, '13	.24
El Rayo, g. s.	Mex.	260,020	2			140,410	Apr. 24, '11	.15
El Truinlo, c.	Mex.	2,000,000	1			20,000	Aug. 28, '11	.01
Esperanza, s. g.	Mex.	450,000	5	270,000		12,521,250	Dec. 31, '15	.10
Granby Con., c. g. s.	B. C.	149,985	100	444,955	449,956	6,050,341	May 1, '16	1.50
Greene-Cananea, c.	Mex.	418,288	100		1,458,627	5,694,432	May 29, '16	2.00
Greene Con., c.	Mex.	1,000,000	10	500,000	2,500,000	12,544,000	July 25, '16	1.00
GreeneGold-Silver, pf.	Mex.	300,000	10			194,871	Mar. 28, '07	.40
Guanajuato Con.	Mex.	540,000	5			600,000	Oct. 8, '06	.07
Guanajuato Dev., pf.	Mex.	10,000	100			274,356	Jan. 1, '11	3.00
GuggenheimExplorat	Mex.	833,732	25	3,118,995	10,713,456	34,032,760	Apr. 3, '16	11.85
Halleybury, s.	Ont.	80,000	1			50,000	Apr. 5, '11	.50
Hedley	B. C.	120,000	10	300,000	120,000	1,943,520	June 30, '16	.02
Hinds Con., g. s. l.	Mex.	5,000,000	1			88,000	Feb. 27, '08	.02
Hollinger	Ont.	600,000	5	1,560,000	920,000	5,130,000	July 14, '16	.20
Jimulco, c.	Mex.	10,000	100			975,000	Feb. 27, '11	1.00
Kerr Lake, s.	Ont.	600,000	5	600,000	300,000	6,420,000	June 1, '16	.25
La Blanca	Mex.	140,000	20			2,775,700	Mar. 31, '13	.90
La Republica, s.	Mex.	400,000	5			110,000	Aug. 15, '11	.05
La Rose Con., s.	Ont.	1,498,627	5	412,121	224,793	5,611,913	July 20, '16	.05
Las Cabrillas	Mex.	1,040	10			591,400	June 3, '12	10.00
Le Roi No. 2, g.	B. C.	120,000	25	57,600		1,527,320	Dec. 15, '15	.24
Lucky Tiger	Mex.	715,337	10	493,583	264,675	3,528,066	July 20, '16	.08
McK'y-Dar'gh-Sav.	Ont.	2,247,692	1	269,724	202,293	4,810,061	July 1, '16	.03
Mexican, l. pf.	Mex.	12,500	100			1,018,750	May 1, '12	3.50
Mexico Con.	Mex.	240,000	10			660,000	Mar. 10, '08	.25
Mex. Mill. & Tr., pf.	Mex.	10,500	100			4,478,500	June 26, '14	.96
Mex. Mines of El Oro	Mex.	180,000	5			497,500	Jan. 23, '11	.06
Minas Pedrazzini	Mex.	1,000,000	1			4,958,600	July 25, '13	.12
Mines Co. of Am.	Mex.	900,000	10		259,375	1,037,500	Mar. 30, '16	.12
Mining Corp. of Can.	Can.	2,075,000	1	518,750		402,509	Nov. 15, '12	3.50
Montezuma, l. pf.	Mex.	5,000	100			100,000	July 20, '09	.04
Mont'ma M. & Sm.	Mex.	500,000	1		137,500	137,500	Jan. 3, '16	.11
Naica, s. l.	Mex.	100	300			3,190,000	Oct. 11, '09	283
N. Y. & Hond. Ros.	C. A.	200,000	10	240,000	220,000	3,970,000	July 28, '16	.50
Niapiising, s.	Ont.	1,200,000	5	1,200,000	900,000	14,340,000	July 20, '16	.25
North Star, s. l.	B. C.	1,300,000				533,000	Feb. 1, '10	.20

DIVIDENDS OF FOREIGN MINING COMPANIES—Continued.

Company	First	High	Date	Low	Date	Last	Sales Total
Paloma, g. Mex.	3,000	\$	\$	\$	\$89,600	Dec. 1 '12	\$5.00
Panuco, Mex.	10,000				7,465,000	Nov. 4 '09	5.00
Penoles, s. g. Mex.	120,000	20			6,451,687	Sept. 30 '13	1.25
Peregrina, pf. Mex.	10,000	100			328,656	Sept. 1 '10	3.50
Peterson Lake, Ont.	2,401,820	1	126,096	84,064	340,287	July 1 '16	.01
Pinguico, pf. Mex.	20,000	100			780,000	Apr. 15 '13	3.00
Porcupine Crown, Ont.	2,000,000	1	240,000	180,000	600,000	July 2 '16	.03
Providencia, (S. J.) Mex.	6,000	15			963,360	Apr. 1 '08	1.00
Rambler-Cariboo, Ont.	17,500	100	35,000	52,500	472,500	June 15 '16	.02
Rea Mines, Leasing, Ont.	200,000	1	12,750		12,750	Feb. 20 '15	.06
Right of Way, Ont.	1,685,500	1		16,855	560,614	June 15 '16	.004
Rio Plata, Mex.	374,518	5			354,744	Feb. 1 '13	.05
San Francisco Mill., Mex.	6,000	25			445,086	Oct. 15 '08	1.00
San Rafael, Mex.	2,400	25			6,798,260	Jan. 1 '12	2.00
San Toy, s. l. Mex.	6,000,000	1.00			540,000	July 24 '13	.01
Santa Gertrudis, Hd. Mex.	1,369,000	5	328,560	364,500	2,819,772	June 16 '16	.24
Sta. Ger. Guad., g. s. Mex.	60,000				3,960,800	Mar. 27 '09	1.00
Sta. Maria del Paz, Mex.	9,600	12 1/2			3,606,000	Jan. 2 '13	2.50
Seneca-Superior, Ont.	478,884	1	335,219	478,884	1,400,096	July 15 '16	.30
Soledad, s. l. Mex.	960	20			4,439,840	Oct. 17 '11	8.00
Sorpresa, g. s. Mex.	19,200	20			3,979,240	Jan. 5 '11	34.00
Standard, s. l. B. C.	2,000,000	1	250,000	350,000	2,150,000	July 10 '16	.02 1/2
Temiscamg' & H. B. Ont.	7,761	1			1,940,250	Nov. 10 '14	3.00
Temiskaming, s. Ont.	2,500,000	1	75,000	75,000	1,534,156	July 22 '16	.03
Tezuitlan, c. Mex.	8,000	100			1,955,000	Jan. 1 '09	1.50
Tough Oaks, Ont.	531,500	5	66,437	199,311	265,750	July 3 '16	.12 1/2
Tretheway, s. Ont.	1,000,000	1			1,061,988	July 15 '14	.05
Wetlaufer-Lorrains, Ont.	1,416,590	1			656,386	Oct. 20 '13	.05
Yukon, g. Y. T.	3,500,000	5	1,050,000	525,000	8,108,110	June 30 '16	.07 1/2

MINING STOCKS LISTED ON THE NEW-YORK STOCK EXCHANGE (1915).

Company	First	High	Date	Low	Date	Last	Total Sales
Alaska Gold Mines††	26 3/4	40 3/4	Apr. 22	21 3/4	Dec. 9	25	1,543,120
Alaska Juneau Gold Mining††	13	13 3/4	Nov. 4	9 3/4	Dec. 9	10	387,950
Amalgamated Copper	51 3/4	79 3/4	Apr. 24	50 3/4	Feb. 24	72	9,033,746
American Smelting and Refining Co.	56	108 3/4	Dec. 31	56	Jan. 2	108 3/4	2,512,805
Amer. Smelting and Refining Co. pf.	100	113	Nov. 18	100	Jan. 4	112 3/4	45,655
American Smelters pf. A.	86	92	Dec. 31	86	Sept. 30	91 3/4	23,121
American Smelters pf. B.	78	85 3/4	Dec. 6	78	Jan. 19	85 3/4	14,169
American Zinc, Lead and Smelt.†	69 3/4	71 3/4	Dec. 24	67 3/4	Dec. 29	69	25,850
Anaconda Copper Mining Co.†	50 3/4	91 3/4	Nov. 17	49 3/4	Feb. 24	91 3/4	3,747,121
Butte & Superior††	68 3/4	79 3/4	June 4	53	May 10	72 3/4	544,134
Batopilas Mining††	7 3/4	4 3/4	Dec. 9	3 3/4	Feb. 5	3 3/4	243,457
Chile Copper†	26	26 3/4	Nov. 24	23 3/4	Dec. 13	24 3/4	90,352
Chino Copper†††	33 3/4	57 3/4	Nov. 17	32 3/4	Jan. 6	55 3/4	1,372,153
Comstock Tunnel	9c	21c	June 3	7c	May 29	11c	356,850
Dome Mines	17 3/4	30 3/4	Dec. 6	16	June 25	28 3/4	377,584
Federal Mining and Smelting	10	60	June 12	8	Mar. 24	32 3/4	45,046
Federal Mining and Smelting pf.	29 3/4	65	June 12	20	Mar. 13	53 3/4	186,813
Granby Consol.	79 3/4	91	June 14	79 3/4	Apr. 19	80	1,170
Greene Cananea††	42 3/4	52 3/4	Dec. 27	37	Oct. 22	50 3/4	69,700
Guggenheim Exploration†	45 3/4	83 3/4	Dec. 31	45 3/4	Jan. 7	83 3/4	1,159,845
Guggenheim Ex. div.	23 3/4	23 3/4	Dec. 31	22	Dec. 31	23	13,800
Homestake Mining	116	124	Dec. 9	116	Feb. 24	124	5,718
International Nickel v. tr. cfs.	215	223 3/4	Oct. 5	179 3/4	Dec. 3	198	91,661
Internat. Nickel pf., v. tr. cfs.	107	110	Oct. 5	105 3/4	Oct. 19	108	1,025
Miami Copper†††	17 3/4	36 3/4	Dec. 31	17 3/4	Jan. 6	36	1,036,347
National Lead Co.	44	70 3/4	May 1	44	Jan. 4	66 3/4	573,618
National Lead Co. pf.	104 3/4	115	Nov. 15	104 3/4	Jan. 4	110	13,621
Nevada Con. Copper Co.†††	11 3/4	17	Nov. 17	11 3/4	Feb. 24	16 3/4	391,395

MINING STOCKS LISTED ON THE NEW YORK STOCK EXCHANGE —Continued.

Compan	First	High	Date	Low	Date	Last	Total Sales
Ontario Silver Min.....	2	12¾	Dec. 9	2	Feb. 23	9¾	262,932
Quicksilver.....	1¾	5¾	Nov. 1	¾	Mar. 15	4¾	96,820
Quicksilver pf.....	1¾	6¾	Nov. 1	¾	Mar. 29	4¾	45,705
Ray Consolidated Copper††.....	15¾	27¾	Nov. 17	15¾	Jan. 2	25¾	1,541,206
Tennessee Copper†.....	32¾	70	Sept. 30	25¾	Feb. 24	63¾	1,378,229
Utah Copper††.....	49¾	81¾	Dec. 28	48¾	Jan. 5	81¾	2,762,984

Highest and lowest prices of the year are based usually on sales of 100 shares. Where prices are used for less than that amount they are marked with an asterisk (*). †Par \$50. ‡Par \$25. †† Par \$20. ††† Par \$10.

BONDS ON THE NEW YORK STOCK EXCHANGE

Bond	High	Low	Last	Total Sales
Alaska Gold M. 10-yr. conv. deb.' 25.....	150	112¾	117	868,000
Am. Smelt. Sec. 15-yr. s. f. 6s, 1926.....	115¾	103¾	114¾	3,877,000
Chile Copper conv. 7s, 1923.....	141	111	135	2,928,000
Granby Consol. conv. 6s, Series A.....	111	98	104	1,172,000
Granby stamped.....	105	102¾	104	295,000
Inspiration Cons. Cop. conv. 6s, 1922.....	190	97	185	15,768,500
Ray Con. Cop. 1st mtg. cv. 6s, 1921.....	140	103	129	2,866,500
Tenn. Cop. sub. rects. for 1st 10-yr. cv. 6s, f.p.	136	117	124¾	276,000

MINING STOCKS ON THE NEW YORK CURB—1915

Company	Open	High	Low	Last	Total Sales
Atlanta.....	*44	50	15	22	2,787,160
Alta Con. Min.....	*22	23	8	15	751,100
Alaska Juneau.....	14	16¾	11	12¾	343,675
Albion Mining.....	*47	48	41	41	31,500
Am. Commander.....	* 9	17	7	8	917,575
Ariz. Cons.....	6¾	6¾	6¾	6¾	100
Ariz. Duquesne.....	*25	40	25	37	345,750
Beaver Consolidated.....	*39	39	39	39	200
Blue Bell.....	* 6	6¾	3	6	88,900
Blue Bull.....	*11	11	4¾	6	196,800
Big Cottonwood.....	*12	13	3	5	424,600
Big Ledge Dev. Co.....	1¾	4¾	1¾	1¾	140,922
Braden Copper.....	6¾	18	6¾	17¾	1,052,127
Bingham Mining.....	8½	8¾	8½	8¾	200
Booth.....	*41	58	34	39	461,300
Butte Cop. and Zinc.....	2¾	10¾	2¾	6¾	168,800
Buffalo Mines.....	1½	1¾	¾	1¾	11,400
Butte-New York.....	¾	4	½	3½	159,935
Butte & Superior.....	40	69	40	64	5,510
Cactus Mining.....	*42	45	42	45	300
Calaveras Cop.....	2¾	4¾	2¾	4¾	9,350
Caledonia Copper.....	*74	1¾	*74	87	312,645
Can. Copper.....	1¾	2½	¾	2¾	373,700
Caribou Cobalt.....	*63	63	30	35	42,955
Cashboy.....	* 7	10	3	5½	739,100

MINING STOCKS ON THE NEW YORK CURB—1915—Continued.

Company	Open	High	Low	Last	Total Sales
Chile Copper, w. i.	22½	26¾	17¾	25¾	403,985
Cerro de Pasco Cop.	55	55	35½	39	68,445
C. O. D.	* 7	9	4	4½	174,200
Combination Fraction.	*10	11	6	8	37,500
Constock Tunnel.	*13	17	8	10	99,200
Cons. Ariz. Smelt.	¾	1½	¼	1¾	1,161,690
Cons. Copper Mines.	2¾	2¾	1½	2	18,775
Consolidated Nev.-Utah.	¾	¾	*17	1½	399,550
Crown Reserve.	¾	1½	¾	¾	14,616
Daly-West.	3¾	3¾	3½	3½	1,000
Davis-Daly Copper.	1	2¾	1	2¾	2,800
Dia. Black Butte.	* 6½	9	2	4	242,780
Dome Ex.	7	36	7	26	190,035
Dome Lake.	23¾	24	23½	24	2,000
East Caledonia.	*24	24	24	24	1,000
Ely Con.	* 7	12	7	9½	149,400
El Paso Con.	1½	1½	1	1	100
Emma Copper.	*34	92	16	21	1,092,900
Federal Reserve Min.	18	20	16	17	130,600
First Nat'l Copper.	1½	10	1¾	8¾	2,834,810
Florence.	*58	83	35	47	150,959
Foley O'Brien.	*25	37	25	28	2,700
Genesee.	*33	44	33	33	64,520
Gold Hill.	¾	¾	¾	¾	30,100
Goldfield Cons.	1½	1½	1½	1½	273,466
Goldfield Merger.	*34	43	14½	18	1,501,700
Greene-Can., new.	24	44½	23½	42	62,057
Greenw. Cop. M. & S.	* 4½	4½	4½	4½	200
Guanajuato Con.	¾	¾	¾	¾	400
Halifax Tonopah.	*30	42	25	30	7,750
Hecla Mining.	3¾	4	2½	3¾	29,310
Howe Sound, w. i.	2¾	7¾	2½	7¾	185,940
Inter. Mines Dev. Co.	*30	30	15	23	1,563,000
Iron Blossom.	*70	1½	*61	1½	107,820
Jim Butler.	*96	1½	*96	1½	56,950
Jumbo Extension.	2¾	2¾	*50	1½	2,608,201
Kerr Lake.	4¾	5½	3	5	67,070
Kewanas.	*29	47	9½	20	1,416,730
Kennecott Copper.	25	59½	25	56½	2,132,000
Keystone Mining.	3¾	3¾	3¾	3¾	200
Lake Superior.	10	13¾	10	12	3,920
La Rose Consol.	¾	1	¾	¾	93,115
Lone Star.	*12	13	3½	4	210,205
Magma Copper.	12½	16¾	12½	15½	150,960
Majestic Mines.	*60	2	*40	1¾	296,968
Marsh Mining.	*38	38	29	33	73,555
Mason Valley.	1½	4¾	1½	4¾	6,250
McIntyre.	*43	1.10	39	93	164,900
McKinley-Darragh.	*58	73	19	43	511,773
Mines Co. of Am.	2¾	4¾	2	3¾	46,410

MINING STOCKS ON THE NEW YORK CURB—1915—Continued

Company	Open	High	Low	Last	Total Sales
Montana Con.....	1¾	1¾	5/8	¾	38,500
Mother Lode.....	*17½	52	17½	26	3,771,550
Nat. Zinc and Lead.....	*35	3¾	*33	2½	133,470
Nevada Hills.....	32	37	16	20	60,390
New Utah Bingham.....	*58	5¾	*58	4¾	159,193
Nipissing Mines.....	5¾	8¾	5¾	8¾	298,430
No. Butte Develop.....	¾	¾	¾	¾	66,600
Ohio Copper.....	¾	¾	¾	¾	2,000
Oro.....	*12½	16	5	6	204,900
Pacific Smelters.....	¾	¾	¾	¾	7,500
Peterson Lake.....	38	40	32	38	221,500
Ray Hercules.....	7	7	3¾	3¾	516,400
Rex Con. Min.....	*37	57	23	30	987,185
Rochester Mines.....	*67	1½	*54	54	164,900
Sandstorm Kendall.....	* 7	14	4	8½	316,750
San Toy.....	18½	27	15	25	179,060
Santa Fe.....	5¾	5¾	3	3¾	76,825
Sells.....	*36	38	20	32	122,250
Seven Troughs Coalition.....	45	48	44	44	37,700
Silver Pick.....	* 6	12½	6	7	204,010
South Utah Mines.....	¾	¾	*10	¾	13,720
Stand. Silver-Lead.....	1¾	2¾	1¾	1½	375,995
Stewart.....	1½	2¾	¾	¾	871,165
Success Mining.....	*64	1¾	*56	65	2,113,265
Superstition M. C.....	*18	36	18	32	1,068,905
Temiskaming.....	*48	75	48	65	62,400
Tonopah Belmont.....	4½	5¾	4¾	4¾	21,570
Tintic Mining.....	½	1½	½	1¾	4,500
Tonopah Merger.....	*35	63	30	55	454,065
Tonopah Extension.....	2½	4¾	2½	4½	330,032
Tonopah of Nev.....	7¾	7¾	5	6¾	56,559
Tularosa.....	¾	½	¾	¾	109,200
Tuolumne.....	*25	½	*23	¾	251,970
Trinity Copper.....	13	13	12½	12	550
Tri-Bullion.....	¾	¾	¾	½	361,619
United Copper.....	¾	¾	¾	¾	200
U. S. Continental Min.....	17	17	13	14	26,600
United Verde Ex.....	6¾	6¾	6¾	6¾	300
Utah Con.....	14¾	14¾	14¾	14¾	175
Wasatch.....	1¾	1¾	¾	¾	135,611
West End Cons.....	*58	*100	50	80	460,625
West End Ex.....	* 3	8	2	3	619,780
Wettlaufer Silv. Mines.....	* 3	12	3	10	41,200
Wh. Knob. Cop. pfd.....	1¾	3¾	1	2	49,350
Yukon Gold Mine.....	2¾	3¾	2¾	2¾	49,295

Total Sales

1915..41,158,026
1912..12,689,773

1914..11,004,172
1911..11,772,314

1913..10,576,792
1910..34,172,548

BONDS

Company	Open	High	Low	Last	Sales
Alaska G. M. 6s w. i.....	112½	120	112½	118½	32,200
Braden Copper 6s.....	137½	340	137½	335	1,808,000
Braden Copper 7s.....	138	340	138	322½	203,000
Cerro de Pas. Cop. 6s.....	118	122	117	121	1,574,000
Cons. Ariz. 5s.....	15	34	15	33	202,950
Chile Copper 7s.....	106	120½	105	116¾	1,337,000
Ely Cent. 6s.....	½	½	⅞	½	27,900
Kennecott Cop. 6s.....	112	228	108	226	6,791,000
United Lead deb. 5s.....	71	74	71	71	5,000

*Cents per share.

CHAPTER VIII
DATA OF THE WORLD'S PRINCIPAL MINES

Compiled from Annual Reports of the Respective Companies

By S. F. SHAW†

Table taken from Eng. and Mng. Journal

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Develop-ment, Feet	Yield per Ton	Cost per Ton
Ahmceek	U.S.	1914	590,519	\$462,643	\$200,356		4,587	...	\$1.15
Alaska Mexican	Alas.-U.S.	1914	233,457	170,020	144,020	688,736	4,555	\$2.18	1.47*
Alaska Treadwell	Alas.	1914	910,285	1,351,403	1,100,000	7,159,253	6,604	2.62	1.49*
Alaska United	Alas.	1914	458,314	257,939	162,180	4,686,539	14,517	2.11	1.54*
Allouez	U.S.	1914	354,457	114,534	...	...	3,526	2.23	1.91
Amalgamated Zinc	Aus.	1-1914	247,386	290,000	...	...	...	...	...
		1-1914	165,438	\$34,356	...	...	...	...	...
American Smg. and Ref.	U.S.-Mex.	1914	1,266,702	9,031,565	8,017,450	...	...	...	...
Anaconda	U.S.	1914	6,468,439	6,468,439	...	...	...	8.94	...
Arizona Copper	U.S.	'13-'14	1,079,950	\$288,255	\$157,521	...	...	4.86	3.56
Ashanti Goldfields	W.Af.	'13-'14	97,293	\$145,731	\$147,327	432,500	18,278	20.00	14.78
Associated Gold Mines	Aus.	'13-'14	127,856	\$11,467	\$12,384	33,306	...	5.77	5.35
Baltic	U.S.	1914	324,433	154,233	...	...	...	2.89	2.41
Blackwater	N.Z.	1914	50,426	\$19,854	\$12,499	104,564	...	9.00	...
Brakpan	Tran.	1914	622,573	\$245,900	\$225,000	2,490,000	24,389	6.70	4.79
British Broken Hill	Aus.	1-1914	28,512	—£17,610	...	1,053,250	...	...	...
British Columbia Copper	B.C.	1914	193,289	—39,765	...	...	2,576	...	...
Broken Hill North	Aus.	1-1914	156,020	\$157,658	\$150,000	3,000,000	...	...	4.33*
		1-1914	102,735	\$106,121	...	...	...	...	...
Broken Hill Block 10	Aus.	1-1914	37,853	—£4,691	\$12,500	...	...	7.35	...
		1-1914	23,810	\$4,245	\$10,000	...	...	8.49	7.64
Broken Hill Block 14	Aus.	1-1914	19,821	—£608	\$10,000	...	...	9.10	9.25
Broken Hill Proprietary	Aus.	1-1914	139,991	\$150,714	\$107,050	...	...	...	...
		1-1914	121,316	\$125,611	\$59,050	...	...	...	...

DATA OF THE WORLD'S PRINCIPAL MINES—Continued

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Develop-ment, Feet	Yield per Ton	Cost per Ton
Broken Hill South.....	Aus.	'1914	172,178	£141,100	£140,000	.....	9,500	\$9.84	\$5.86
		'1914	112,750	£69,252	.....	.....	.....	6.34	4.90
Brunswick.....	U.S.	1914	16,237	123,964	94,869	21,000	.....	17.76	10.22
Buena Tierra.....	Mex.	1914	16,307	£5,908	£16,500	300,000	.....	6.90	5.14
Buffalo.....	Ont.	'13-'14	77,616	388,187	660,000	54,116	.....	13.26	8.56
Bullfinch Proprietary.....	Aus.	1913	52,679	£50,572	£47,615	145,582	.....	9.90	5.86
Butte & Superior.....	U.S.	1914	327,210	1,417,128	611,919	1,030,000	16,796	.....	.....
Calumet & Arizona.....	U.S.	1914	64,702	.....	.....	.....	6,328	.....	.....
Camp Bird.....	U.S.	'13-'14	30,595	£70,292	£45,500	25,709	.....	26.19	5.60
Carn Brea & Tincroft.....	Eng.	'1914	29,795	—£3,681	.....	.....	.....	5.12	5.17
		'1914	29,373	—£283	.....	.....	.....	2.01	2.08
Centennial.....	U.S.	1914	138,136	—3,213	.....	.....	.....	.....	.....
Centennial Eureka.....	U.S.	1914	58,365	658,175	.....	.....	.....	3.44	2.31
Champion.....	U.S.	1914	614,854	.....	.....	.....	.....	11.45	2.11
Champion Reef.....	Ind.	'13-'14	216,934	3,222,579	£138,667	477,384	17,334	8.79	5.06*
City & Suburban.....	Tran.	1914	1,926,705	£248,550*	£204,000	90,270,155	10,965	9.27	5.83
City Deep.....	Tran.	1914	324,211	£359,033	£296,875	2,510,800	.....	.....	.....
Coniagas.....	Ont.	'13-'14	54,522	989,618	.....	260,086	2,295	.....	.....
Cons. Langlaagte.....	Tran.	1914	578,100	£236,224	£190,000	2,220,707	.....	6.12	4.15
Cons. Main Reef.....	Tran.	'13-'14	241,257	£116,609	464,376	693,460	33,146	7.67	5.30
Cons. Mining & Smelting	B.C.	1914	374,771	474,012	.....	.....	.....	.....	.....
Copper Queen.....	U.S.	1914	732,829	£990,573	£799,090	9,369,000	.....	6.32	4.22
Crown Mines.....	Tran.	1914	2,287,600	239,447	425,515	.....	4,056	23.40	15.90
Crown Reserve.....	Ont.	1914	31,635	.....	.....	.....	.....	.....	.....
Daly Judge.....	U.S.	1914	54,701	127,803	180,000	.....	11,559	.....	2.39
Davis-Daly Estate.....	U.S.	'13-'14	52,195	—108,020	.....	.....	.....	.....	.....
Detroit Copper.....	U.S.	1914	477,582	.....	\$ 280,000	.....	26,375	.....	.....
Dolcoath.....	Eng.	'1914	57,254	£510	.....	.....	.....	5.73	5.73
		'1914	48,058	£898	.....	.....	.....	6.03	5.93
Dome.....	Ont.	'14-'15	248,550	315,179	.....	2,782,811	12,098	4.25	2.97*
Ducktown Sulp. & Cop.....	U.S.	1914	169,000	.....	£199,820	3,240,000	.....	.....	.....
Durban-Roodepoort.....	Tran.	1914	170,238	£36,341	£31,500	475,093	.....	5.12	3.99*
Durban-Roode rt Deep..	Tran.	1914	299,090	£57,237	£33,000	1,303,400	.....	6.62	5.69*

DATA OF THE WORLD'S PRINCIPAL MINES—Continued

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Develop- ment, Feet	Yield per Ton	Cost per Ton
East Butte.....	U.S.	1914	110,992	222,252	£428,032	5,400,000	.....	\$11.63	\$9.45
East Rand Proprietary..	Tran.	1914	1,831,950	£736,157*	157,500	200,000 tails	.....	6.64	4.70*
Esperanza.....	Mex.	1914	120,975	319,967	.....	148,365	13,277	8.59	5.95
Federal Min. & Smlt.....	U.S.	1914	414,741	.....	599,305	1,037,090	7,256	.....	.....
Gaika Gold.....	Rhod.	'13-'14	36,927	£29,126	£27,349	100,770	.....	10.85	6.30
Geduld.....	Tran.	1914	244,385	£96,968	£46,125	1,900,000	.....	7.86	5.93*
Geldenhuis Deep.....	Tran.	1914	570,600	£129,096	£109,878	1,613,000	.....	6.66	5.55*
Libbe & Phoenix.....	Rhod.	1914	.....	.....	£240,000	194,400	.....	.....	.....
Goldfield Consol.....	U.S.	1914	338,192	1,835,224	1,067,744	142,000	30,028	11.61	6.19
Gold Roads.....	U.S.	1914	107,846	.....	.....	.....	.....	.....	.....
Great Boulder Persev... Aus.	Aus.	1914	245,555	£27,996	.....	595,007	.....	5.16	4.61
Great Boulder Prop... Aus.	Aus.	1914	190,117	£300,632	£262,000	560,647	.....	13.40	6.77
Great Fingall..... Aus.	Aus.	1914	44,006	—£25,821	.....	63,360	.....	8.10	10.95
Greene Cananea..... Mex.	Mex.	1914	384,690	615,792	1,000,000	.....	31,859	10.00	8.41
Grenville..... Eng.	Eng.	1-1914	21,483	£1,869	.....	.....	.....	6.08	6.50
Hedley Gold..... B.C.	B.C.	1914	78,484	388,228	300,000	413,000	.....	10.16	5.21
Hollinger..... Ont.	Ont.	1914	208,936	1,786,679	1,170,000	.....	10,622	12.87	4.50
Honestake..... U.S.	U.S.	1914	1,587,774	.....	2,210,208	.....	.....	3.88	.....
Hornsilver..... U.S.	U.S.	1914	24,121	.....	.....	10,000	.....	.....	.....
Hurtli Gold Mines..... Ind.	Ind.	1914	33,425	£11,081	£9,783	64,000	.....	11.71	10.10
Indep. (Stratton's)..... U.S.	U.S.	'13-'14	.....	72,000	29,820	.....	2,311	.....	.....
Inspiration Con..... U.S.	U.S.	1914	172,722	.....	400,000	97,143,000	102,066	.....	.....
Iron Blossom..... U.S.	U.S.	1914	40,480	306,150	100,000	.....	4,914	22.23	14.67
Iron Silver..... U.S.	U.S.	1914	52,490	174,629	.....	.....	.....	.....	.....
Isle Royale..... U.S.	U.S.	1914	474,349	24,374	.....	.....	9,919	.....	.....
Ivanhoe..... Aus.	Aus.	1914	218,420	.....	£105,000	998,718	.....	8.08	.....
Jumbo Extension..... U.S.	U.S.	'14-'15	16,420	339,373	125,317	86,750	.....	39.64	18.97
Kalgurli..... Aus.	Aus.	'13-'14	127,820	£101,330	£96,000	200,000	2,665	.....	4.69

DATA OF THE WORLD'S PRINCIPAL MINES—Continued

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Develop-ment, Feet	Yield per Ton	Cost per Ton
Kerr Lake	Ont.	'13-'14	33,955	£20,785	£15,000	430,500	.....	5.39	4.64*
Knights Central	Tran.	1914	284,960	£42,752	.....	2,480,000	.....	3.52	2.94*
Knights Deep	Tran.	'13-'14	1,112,820	£135,865	£74,352	.....	.....	5.69	4.80*
Lake View & Star	Aus.	'14-'15	218,124	£37,136*	£32,000	426,301	.....	5.91	4.62
Langlaagte Estate	Tran.	1914	589,619	£156,054	.....	886,396	8,000	.....	.....
La Rose	Ont.	1914	54,020	217,979	749,313	47,467	.....	.....	.....
Le Roi No. 2	B.C.	'13-'14	26,679	£6,193	.....	.....	.....	7.21	7.41
Lena Goldfields	Sib.	'13-'14	.....	£50,558	£57,914	.....	5,662	5.44	3.95
Liberty Bell	U.S.	1913	179,178	.....	.....	.....	.....	14.69	11.21
Lonely Reef	Rhod.	1914	61,590	£48,005	£50,023	140,042	.....	.....	.....
Magma Copper	U.S.	'14-'15	44,075	.....	.....	95,000	12,311	6.90	5.63
Main Reef West	Tran.	'13-'14	212,852	£56,640	.....	526,440	.....	.....	.....
Mammoth	U.S.	1914	235,146	.....	.....	.....	.....	.....	.....
Mason & Barry	Spain	1914	259,238	—40,274	£27,775	.....	1,995	.....	.....
Mason Valley	U.S.	1914	75,038	.....	.....	.....	2,760	.....	.....
Mass Copper	U.S.	1914	209,354	64,546	.....	1,250,000	.....	1.98	.....
Meyer & Charlton	Tran.	1914	177,176	£207,608	£140,000	469,839	.....	11.42	5.73
Miami	U.S.	1914	1,096,633	.....	.....	36,500,000	22,865	4.04	2.87
Modderfontein B	Tran.	1914	440,100	£402,000	£385,000	2,772,500	.....	.....	.....
Montana-Tonopah	U.S.	'14-'15	63,754	.....	.....	.....	.....	.....	.....
Mount Boppy	Aus.	1914	70,059	£35,416	£14,325	199,559	.....	9.08	.....
Mount Elliott	Aus.	'13-'14	37,875	259,000	178,000	533,750	.....	.....	.....
Mt. Lyell	Tas.	—1914	163,596	£61,954	£80,424	3,122,723	.....	8.85	7.00
Mt. Morgan	Aus.	'13-'14	303,428	£199,054	£200,000	3,125,000	.....	15.00	11.94
Mysore	Ind.	1914	304,375	£379,725	£350,750	1,014,000	26,249	14.36	7.98
Namaqua Copper	Cap.Col	1914	35,021	£30,070	£23,582	80,875	.....	.....	.....
Nevada Con.	U.S.	1914	2,640,294	716,977	2,249,389	41,020,296	.....	2.67	2.40
Nevada Wonder	U.S.	'13-'14	48,578	247,743	281,636	.....	4,126	14.47	4.65
New Goch	Tran.	1914	359,850	£124,580	.....	825,896	4,701	4.96	3.22*
New Heriot	Tran.	1914	154,228	£120,32*	£74,750	588,315	.....	8.87	5.08*
New Idria	U.S.	1914	62,578	—45,014	10,000	.....	12,367	4.70	5.44
N. Y. & Hond. Rosario	Hond.	1914	109,170	.....	329,814	418,978	15,700	11.36	8.34
New Kleinfontein	Tran.	1914	601,000	£272,942	£115,154	2,890,731	.....	6.48	4.27*

DATA OF THE WORLD'S PRINCIPAL MINES—Continued

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Develop-ment, Feet	Yield per Ton	Cost per Ton
Nigel	Tran.	1914	141,400	£30,351	£16,732	150,400	9,866	7.29	6.25
Nipissing	Ont.	1914	80,037	1,578,715	1,380,000	225,474	12,148		11.60
North Butte	U.S.	1914	337,415	358,215	635,000				
North Star	U.S.	1914	107,250	560,115	450,000		2,053	10.40	5.43
Nourse Deep	Tran.	'13-'14	539,800	£160,879	£155,216	2,443,700		6.88	5.42
Nundydroog	Ind.	1914	89,950	£97,818	£99,050	164,800		16.40	11.12
Old Dominion	U.S.	1914	129,213		445,500		15,665		5.20
Oregum	Ind.	1914	154,898	£149,272	£138,270	266,260		11.52	6.83
Oriental Con.	Chosen	'13-'14	301,162	622,780	644,780	822,500	32,378	5.50	3.68
Oroyo-Links	Aus.	1914	145,130	£14,416	£14,375	160,111		5.24	4.76
Oceola	U.S.	1914	1,108,447	353,677	289,541		4,836	1.77	1.45
Otavi	W.Af.	'13-'14	50,070						
Ouro Preto	Braz.	1914	80,138			112,678		6.94	
Plymouth Con.	U.S.	1914	44,773	£221				4.37	3.17
Poderosa	Chile	1914	5,206	£28,514		2,740			
Portland	U.S.	1914	275,129	590,595	360,000		15,592	6.91	4.80
Prestea Block A	W.Af.	1914	270,732			544,137		7.65	6.82
Progress	N.Z.	1914	33,150	—£7,708		80,000		7.00	
Quincy	U.S.	1914		205,593	55,000				
Randfontein Central	Tran.	1914	686,330	£698,493	1,089,322	2,493,924		5.61	4.27
Ray Con.	U.S.	1914	2,427,000	2,015,378	£737,500	74,765,789	75,261	3.13	2.17
Rio Tinto	Spain	1914		£899,939	£275,000				
Robinson Deep	Tran.	'13-'14	619,140	£324,532	£275,000	1,533,000		6.68	4.13*
Roosberg Minerals	Tran.	'13-'14	11,422 tails 29,181 mine	£51,131	£31,500	20,097		18.28	12.02
Rose Deep	Tran.	1914	48,230	44,931			4,707	6.00	5.06
Santa Gertrudis	Mex.	'13-'14	393,836	£126,627		967,000			
Seoul Mining	Chosen	1914	74,550		250,000	1,200,136		9.44	3.90*
Simmer & Jack Prop.	Tran.	'13-'14	769,900	£322,678	£337,500	2,320,000		5.00	3.00
Simmer Deep	Tran.	1914	643,000	£39,037		1,429,000		4.03	3.75*
Sons of Gwalia	Aus.	1914	160,963	£42,148	£48,750			6.55	6.29
South Crofty	Eng.	1914	69,342	£2,653	£4,375			5.53	5.00

DATA OF THE WORLD'S PRINCIPAL MINES—Continued

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Develop-ment, Feet	Yield per Ton	Cost per Ton
South Kalgurri	Aus.	1914	116,179	\$9,634	£64,626	165,146	5,036	11.58	\$5.35
St. John del Rey	Braz.	'14-'15	191,500	£144,092	258,390	.....	.....	.....	7.92
St. Joseph Lead Co.	U.S.	1914	1,989,977	£20,000	£200,000	.....	.....	.....	.....
Sudan Goldfield	S. Af.	1914	16,456	£165,227	.....	.....	.....	.....	.....
Sulphide Corporation	Aus.	'13-'14	209,074	—15,982	.....	.....	5,424	11.38	.....
Superior & Boston	U.S.	'13-'14	25,625	.....	.....	.....	66,465	.....	.....
Superior & Pittsburg	U.S.	1914	485,796	.....	.....	.....	.....	.....	.....
Talisman, Con.	N.Z.	'13-'14	41,680	.....	£120,750	37,515	.....	26.14	13.78
Tamarack	U.S.	1914	57,440	—174,944	.....	.....	.....	2.39	5.44
Temiskaming	Ont.	1914	.....	81,422	600,000	.....	.....	.....	.....
Tennessee Copper	U.S.	1914	485,057	751,893	£156,250	.....	.....	.....	.....
Tharsis Sul. & Copper	Spain	1914	501,037	£325,890	£62,000	452,000	.....	7.37	5.07
Tomboy	U.S.	'13-'14	137,456	.....	.....	.....	5,695	24.09	8.66
Tom Reed	U.S.	'13-'14	48,100	.....	1,462,504	226,921	.....	.....	.....
Tonopah Belmont	U.S.	'14-'15	181,424	1,456,698	.....	.....	.....	10.63	6.88
Tonopah Extension	U.S.	'13-'14	58,022	80,399	1,000,000	102,056	16,091	15.02	9.25
Tonopah Mining	U.S.	'14-'15	147,261	.....	.....	.....	18,487	2.43	8.51
Trimountain	U.S.	1914	227,251	58,639	.....	.....	.....	2.22	.....
Tronoh	Malay.	1914	442,394	—£20,109	.....	.....	.....	1.53	1.75
U. S. Smit., R. & M. Co.	U.S.-Mex.	1914	.....	2,265,641	2,228,892	.....	.....	.....	.....
Utah Apex	U.S.	'13-'14	121,675	54,561	.....	.....	.....	.....	.....
Utah Consolidated	U.S.	1914	201,851	.....	.....	256,521	.....	.....	.....
Utah Copper	U.S.	1914	6,470,168	8,678,491	4,827,885	342,500,000	.....	2.51	1.58
Van Roi	B. C.	'13-'14	16,025	—£3,835	.....	.....	.....	.....	.....
Van Ryn	Tran.	1914	483,090	£361,345	£299,223	1,692,349	.....	8.12	7.09
Village Deep	Tran.	1914	600,250	£289,062	£225,392	2,853,470	.....	6.78	4.45
Waithi	N.Z.	1914	183,405	£145,016	£99,181	753,358	.....	8.68	6.22*
Waithi Grand Jc.	N.Z.	1914	185,720	£76,636	£57,656	173,000	.....	9.55	6.34
Wallaroo & Moonta	Aus.	1914	.....	£39,997	£24,000	.....	.....	.....	.....
Wanderer	Tran.	'13-'14	150,060	£1,789	.....	102,300	.....	2.39	2.42
Wasp No. 2	U.S.	1914	176,140	45,465	30,000	.....	.....	1.53	1.29
West Rand Cons.	Tran.	1914	310,750	.....	.....	.....	.....	.....	5.89

DATA OF THE WORLD'S PRINCIPAL MINES

Name of Mine	Situation	Year	Tons	Profit	Dividends	Reserves, Tons	Development, Feet	Yield per Ton	Cost per Ton
Winona	U.S.	1914	123,339						
Witwatersrand Deep	Tran.	1914	518,409	\$251,168	£178,750	1,707,400		6.36	3.99*
Witwatersrand Gold	Tran.	1914	503,350	\$271,023	£234,812	1,221,879			3.24
Wolhuter	Tran.	'13-'14	382,700	\$53,853	£107,500	999,400	15,410	6.08	4.47*
Wolverine	U.S.	'13-'14	182,127	81,075			625	2.66	2.21
Yuanmi	Aus.	'13-'14	50,094						4.71
Yukon Gold	U.S.	1914	11,909,355*	1,184,819	1,050,000				.35
Zinc Corporation	Aus.	1914	144,667	£129,398	£49,139	1,185,870			

Note.—Abbreviations used in above table: Alas., Alaska; Aus., Australia; B. C., British Columbia; Braz., Brazil; Can., Canada; Cap. Col., Cape Colony; Eng., British Isles (Cornwall); Hon., Honduras; Ind., India; Malay, Malay States; Mex., Mexico; N. S. W., New South Wales; N. Z., New Zealand; Port., Portugal; Rhod., Rhodesia; Sib., Siberia; S. A., South Africa; Tas., Tasmania; Tran., Transvaal; U. S., United States; W. Af., West Africa.

— Loss for the year. * Cubic yards. † Second half. All profits and dividends are in dollars except where otherwise noted.

‡ Superintendent, Charcas Unit, National Metallurgical Co., Charcas, S. L. P., Mex.

COMPARISON OF OPERATIONS AND COSTS OF THE "PORPHYRY" COPPERS

Year—1915	Tons Treated	Cu. %	% Rec.	Ratio Conc.	% Cu. Rec.		Cost Per Ton		Net Prod. Lbs. Cu.	Cost per Lb.	Rec'd per Lb.
					in Cncts.	per Ore	Sm. Mktg. Etc.	Mill			
Bradley (a)	1,106,420	2.09	74.92	11.29:1	17.68				32,733,576	8.78c	
Chino	2,379,800	2.155	66.59	15.02:1	21.55	28.70	\$0.1947(b)	\$0.5419	64,887,788	7.12	17.42c
Inspiration (c)	778,851	1.702	79.95	24.6:1	32.67	26.4	.681	.487	20,067,310	8.136	
Miami	1,348,122	2.17	75.17	25.66:1	41.91	32.66	1.016	.579	41,832,059	8.765	17.331
Nevada Con.	3,081,520	1.54	70.18	7.18:1	7.77		.1524		62,726,651	8.23	17.647
Ray Cons	2,848,969	1.673	64.11	17.99:1	19.293	21.45	.627	.509	60,338,936	9.497	17.352
Utah Cop.	8,494,300	1.43	64.13		19.17	18.39	.244	.340	148,397,006	7.56	17.679

(a)—Year ending Oct. 31, 1915. (b)—Waste handled, 16.51c per ton. (c)—Last 6 months of 1915. (d)—Total operating.

CHAPTER IX

OBSOLETE SECURITIES AND CORPORATIONS.

A LIST OF DORMANT OR DEAD MINING COMPANIES.

This is a list of mining companies that are merged, dead, liquidated, dissolved, bankrupt or otherwise out of business. It possibly also includes a few companies that have been inactive for years and have been reported by local authorities as dead. As complete sets of the Copper Handbook are not accessible to many readers, excerpts from former volumes, describing any company in this list, when the volume is in stock, will be furnished for 50 cents each by the Mines Handbook office, 29 Broadway, New York.

Any errors will be gladly corrected on receipt of authentic information.

- Aberdeen C. Co. Lordsburg, N. M. See Vol. V.
Accidental M. & M. Co. Granite, Colo. See Vol. VI.
Acme M. & M. Co. Cotopaxi, Colo. See Vol. X.
Ada Copper Mining Co., Basin, Mont.
Adams C. Co. Saratoga, Wyo.
Adams C. M. & Ref. Co. Steamboat Springs, Colo. See Vol. X.
Admiral Togo-Ely C. Co. Formerly at Ely, Nev. See Vol. VIII.
Aduddell Mines Co. Merged, 1910, in Frontenac Cons. Mines, Central City, Colo.
Advance Dev. & M. Co. Bisbee, Ariz. See Vol. VIII.
Aeolian Copper Cons. Mng. Co., Ltd. Succeeded by Columbia Copper Co.
Aetna G. & C. M. Co. Bingham Canyon, Utah. See Vol. X.
Aetna M. Co. Bonanza, Colo. See Vol. X.
African Noble Duke G. & C. M. Co. Bisbee, Ariz.
Afro-American M. & M. Co. Butte, Mont. See Vol. VIII.
Afterthought M. Co. Lands sold to Great Western G. Co., succeeded, 1909, by Afterthought C. Co., Redding, Cal.
Afton M. & S. Co. Helena, Mont. See Vol. V.
Agassiz M. Co. Ray, Ariz. See Vol. VI.
Ajax M. Co. Merged, 1909, in Gold Chain M. Co. See Vol. VIII.
Ajo C. Co. Ajo, Ariz. See Vol. X.
Ajo C. Mountain Mines Co. Property sold, 1907, to Rendall Ore Red. Co. See Vol. VIII.
Ak-Sar-Ben C. Co. Merged, 1907, in Shawnee-Wyo. C. Mg. Co. Carbon, Wyo.
Alabama G. & C. Co. Orogrande, N. M. See Vol. VIII.
Aladdin Mng. Co. Clinton, Mont. See Vol. XI.
Alamo C. Co. Tucson, Ariz.
Alamos Silver & C. Co. Succeeded by Alamos M. Co. Alamos, Mex.
Alaska Amalgamated C. Co. Succeeded, 1907, by Alaska United C. Ex. Co.
Alaska C. Ass'n. Valdez, Alaska. See Vol. VIII.
Alaska C. Co. Ely, Nev. See Vol. VIII.

- Alaska Copper & Coal Co. Dissolved 1915. Formerly owned Kennecott mines.
- Alaska Dev. Co. McCarthy's Creek, Alaska. See Vol. VIII.
- Alaska-Galena M. Co. Ketchikan, Alaska. See Vol. X.
- Alaska G. & C. Co. Succeeded, 1907, by Chisna Cons. Mines Co. McCarthy's Creek, Alas.
- Alaska Imperial M. Co., Ketchikan, Alaska. See Vol. VI.
- Alaska Mines Securities Co. Hadley, Alaska. See Vol. VIII.
- Alaska M. Co. Silver City, Utah. See Vol. VIII.
- Alaska Northwest C. Co. Sidney Inlet, Victoria, B. C. See Vol. V.
- Alaska S. & R. Co. Hadley, Alaska. See Vol. VIII.
- Albany Copper Co. Morningstar, Nev. Supposedly dead; mail returned.
- Albayside; *Cia Min. De. Gomez del Palacio, Mex.* See Vol. X.
- Alberni G. & C. Co., Ltd. Alberni, B. C. See Vol. V.
- Alessandro C. M. Co. Lands sold, 1908, to Copper Gulf M. Co. See Vol. VI.
- Alexandria G. & C. M. Co. Randsburg, Cal. See Vol. VIII.
- Algona Commercial Co., Ltd. Property sold, 1912, to Dominion Nickel Co. Sault Ste. Marie.
- Alice Dev. Co. Succeeded by Alice G. Mills Corp. See Vol. IX.
- Alice G. M. Co. Chewelah, Wash. See Vol. VI.
- Alleghony M. Co. Belvidere, N. J. See Vol. VIII.
- Allen M. Co. Old Glory, Ariz. See Vol. X.
- Alliance C. Co. Greenwood, B. C. See Vol. VIII.
- Alliance C. M. Co. Absorbed, 1902, by Iconoclast Cons. Mines Co., Keller, Wash.
- Alma May C. Co. Lost lands, 1908. Holmes, Wyo. See Vol. VIII.
- Alma M. & M. Co. Cañitas, Mex. See Vol. VIII.
- Almado & Terito Cons. M. Co. Succeeded by Nag. Min. de Clemente Ybarra. Alamos, Mex. See Vol. V.
- Almeda M. Co. Succeeded, 1905, by Almeda Cons. Mines Co. Galice, Ore.
- Almonte C. Co. Hanover, N. M. See Vol. VIII.
- Alpena Copper Mng. Co. Saltse, Mont. Dead, 1914.
- Alpha C. Co. Property sold at sheriff's sale, June, 1912, to Geo. H. Gardner, for \$5,000 subject to \$315,000 mortgage of Manhattan Trust Co., N. Y., and \$2,500 mtge. of Camden Safe Deposit, N. Y. City. Somerville, N. J. See Vol. X.
- Alphabet C. Co. Courtland, Ariz. See Vol. VIII.
- Alpha Mining Co. Dolomi, Alaska. See Vol. XI.
- Alsacia Dev. Co. Reorganized, 1905, as Alsacia M. Co., Fronteras, Sa. Mex.
- Alsacia M. Co. Fronteras, Mex. See Vol. VIII.
- Alta C. Co. Succeeded, 1908, by Alta Montana C. Co. Corbin, Mont.
- Alta C. Mines. Succeeded, 1909, by Boston & Alta C. Co. Corbin, Mont.
- Alta C. M. Co. Ketchum, Idaho. See Vol. VIII.
- Alta Crown C. Co. Ivanpah, Cal. See Vol. VIII.
- Alta & Hecla M. & M. Co. Merged, 1910, in South Hecla M. Co. See Vol. VIII.
- Alta M. & M. Co. Merged, 1907, in Ibex M. Co., Eureka, Utah.
- Alta M. & M. Co. Lusk, Wyo. See Vol. VIII.
- Alta Mizpah C. & G. M. Co. Alta, Utah. See Vol. VIII.
- Alta-Montana Co. Succeeded by Helena M. & Red. Co. Shares worthless.
- Alta-Montana C. Co. Succeeded, 1909, by Boston & Alta C. Co. Corbin, Mont.
- Alta-Quincy M. Co. Merged, 1906, in South Columbus M. Co. Alta, Utah.
- Alta-St. Louis M. Co. Alta, Utah. See Vol. X.

- Alta-Superior M. Co. Alta, Utah. See Vol. VIII.
- Alta-Zoani Mining Co. Hamilton, Nev.
- Altata M. Co. Chloride, Ariz. See Vol. X.
- Alto C. Co. Reorganized, 1909, as Cons. Mines, Smelter & Trans. Co. Patagonia, Ariz.
- Alto M. Co. Lands sold, 1908, to Leontine Cons. M. Co. Poland, Ariz.
- Alton M. Co. Needles, Cal. See Vol. X.
- Altona M. Co. Grand Forks, Idaho. See Vol. X.
- Amador Copper & Gold Mng. & Mfg. Co. Iron Mountain, Mont. Property held by Intermountain Copper Mining Co.
- Amalgamated Arizona C. Co. at Swansea, Ariz. See Vol. X.
- Amalgamated C. M. & Extr'n. Co. Merged, 1909, in Hecla Cons. Mines Co., Hecla, Wyo.
- Amalgamated G. & C. Co. Huron, Ariz. See Vol. VI.
- Amalgamated Greenwater C. Co. Greenwater Cal. See Vol. VIII.
- Amalgamated Metal & Expl'n Co. Reorganized, 1910, as Amalgamated Metals Co., Jerome, Ariz.
- Amalgamated Metals Co. Liquidated, 1913. Jerome, Ariz.
- Amarillo M. Co. Property sold to Jarilla Cons. C. Co., 1912. Jarilla, N. M.
- Amazon-Butte C. Co. Property relinquished. Butte, Mont. See Vol. X.
- Amazon C. M. Co. Victorville, Cal. See Vol. VIII.
- Amazon-Montana Dev. Co. Property reverted to former owners. Amazon, Mont. See Vol. X.
- America-Britannia M. Co. Baring, Wash.
- America M. Co., S. A. Transferred property to San Pedro C. Co., S. A. Cananea, Mex.
- American Banner C. Co. Property sold, 1910, to Inspiration C. Co., Globe, Ariz.
- American Cons. C. Co. Butte, Mont. See Vol. VIII.
- American Cons. C. Co. Santa Fé, N. M. See Vol. V.
- American C. Co. Succeeded, 1905, by American C. & G. Co., also dead. See Vol. X.
- American C. M. Co. Succeeded, 1909, by Alpha C. Co. Somerville, N. J. See Vol. VIII.
- American C. M. & Extr'n. Co. Denver, Colo. See Vol. V.
- American C. M. & S. Co. Was a swindle, promoted by J. R. Keer & Co.
- American Dev. Co. Merged, 1906, in American-Saginaw Dev. Co. See Vol. VI.
- American Dev., M. & Red. Co. Silver City, N. M. See Vol. X.
- American Eagle C. M. Co. Encampment, Wyo. See Vol. X.
- American G. & C. Co. Globe, Ariz. See Vol. X.
- American G. & C. Co. Merged, 1904, in Poland-American G. M. & M. Co. Morristown, Ariz. See Vol. XI.
- American G. & C. M. Co. Jelm, Wyo. See Vol. VI.
- American G. M. Co. of New Mexico. Nogal, N. M. See Vol. VIII.
- American Gulch M. Co. Bingham Canyon, Utah. See Vol. VIII.
- American Metals Co. Organ, N. M. See Vol. VIII.
- American Mines Dev. Ass'n. Needles, Cal. See Vol. X.
- American Mines Dev. Co., Ltd. Globe, Ariz. See Vol. VIII.
- American Mines & Expl'n Co. Hillside, Ariz. See Vol. X.
- American M. Co. Central Mine, Mich. See Vol. VIII.
- American M. Co. Callao, Utah. See Vol. VI.
- American M. Co. Monte Cristo, Wash. See Vol. X.
- American M. & Dev. Co. French Corral and Sweetland, Cal. See Vol. X.
- American M. & Dev. Co. Naco, Mex. See Vol. VIII.
- American M., M. & S. Co. Was a brazen swindle. See Vols. VI and VII.

- American M. & S. Co. Twisp, Wash. See Vol. X.
 American Prospecting & Dev. Co. Jerome, Ariz. See Vol. X.
 American Queen M. Co. Lands passed to Colorado-Arizona Mines Co. Gold Hill, Colo.
 American-Saginaw Dev. Co. Liquidated, property sold to Calumet & Ariz. M. Co. Warren, Ariz.
 American Smelters Expl'n. Co. Changed name, 1905, to American Sm. Sec. Co.
 American Venture Co. Ayutla, Mex. See Vol. VIII.
 American Zinc Extraction Co. Tucson, Ariz. See Vol. VI.
 Amygdaloid M. Co. Lands sold, 1905, to Calumet & Hecla M. Co. Central Mine, Mich.
 Anaconda Cons. C. Co. of Greenwater, Greenwater, Cal. See Vol. VIII.
 Anaconda-Corral Cons. Mines Co. Bouse, Ariz. See Vol. VIII.
 Anaconda M. Co. Dissolved, 1907. Parent of Anaconda C. M. Co. Butte, Mont.
 Anaconda Mizpah C. Co. Merged, 1907, in Ely-National C. Co. Ely, Nev.
 Anaconda-Sonora C. Co. Sahuaripa, Mex. See Vol. VIII.
 Anderson M. Co. Alberní, B. C. See Vol. X.
 Angang C. Co. Chiranganguero, Mex. See Vol. X.
 Anganguero; Cia. Met. de. Anganguero, Mex. See Vol. VIII.
 Angel M. Co. Wickenburg, Ariz. See Vol. X.
 Anglo-American C. Co., Ltd. Succeeded, 1907, by Ray Cons. C. Co. Kelvin, Ariz.
 Anglo-American C. M. Co. of Parry Sound, Ltd. Parry Sound, Ont. See Vol. VIII.
 Anglo-American Dev. Co. Barranca de Cobre, Mex. See Vol. X.
 Anglo-American G. & C. Co. Cananea, Mex. See Vol. IV.
 Anglo-Butte C., Ltd. Liquidated, 1909. Butte, Mont.
 Anglo-Mexican M. & Ex. Co. Guachinango, Mex. See Vol. X.
 Animas M. & S. Co. Llano, Mex. See Vol. VIII.
 Anita Cons. C. Co. Reorganized, 1903, as Anita C. Co. Williams, Ariz.
 Anita C. Co. Property sold, under foreclosure. Succeeded by Titanic C. Co. Williams, Ariz.
 Anita M. Co. Ocotlán, Jalisco, Mex. See Vol. VI.
 Annabel M. Co. Merged, 1909, in Hillside Cons. M. Co. Cherry, Ariz.
 Antelope Mining Co. Eureka, Utah.
 Apache Chief M. Co. Lands sold, 1907, to Ariz. Success. M. Co., Salome, Ariz.
 Apache C. Co. Bouse, Ariz. See Vol. VIII.
 Apache Dev. Co. Lands sold, 1907, to Anderson-Apache C. Co. Hachita, N. M.
 Apex C. Co. Lost River, Idaho. See Vol. VIII.
 Apollo C. M. & M. Co. Frisco, Utah. See Vol. V.
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- Ariz.-Colo. C. Belt & G. M. & M. Co. Succeeded, 1911, by German C. Co. Globe, Ariz.
- Ariz. Commercial Co. Succeeded, 1904, by Ariz. Comm. C. Co., also dead; succeeded, 1912, by Ariz. Comm. M. Co., Globe, Ariz.
- Ariz. Cons. M. Co. Succeeded, 1909, by Ariz. United M. Co., Johnson, Ariz.
- Ariz. C. Chief Sm. Co. No trace of operations secured.
- Ariz. Empire Copper Mines Co. Parker, Ariz. See Vol. XI.
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- Ariz. C. Syn., Ltd. Was an English twin of Ariz. C. Syn.
- Ariz. C. Syn. of Providence. Succeeded, 1910, by Copperox M. Co., Pearce, Ariz.
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- Ariz. G. & C. Co. Lands sold, 1907, to Trenton M. Co. Patagonia, Ariz.
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- Ariz. & Hancock M. Co. Succeeded, 1903, by Ariz.-Hancock Cons. M. Co., also dead. Florence, Ariz.
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Copper State Mining Co. Encampment, Wyo. See Vol. X.
Copper Tempering Co. Forfeited charter, 1909. New Jersey.
Coppertown M. & S. Co. Hornitos, Cal. See Vol. VI.
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Copper Verde M. Co. Forfeited charter, 1910. Utah.
Copper World M. Co. Jerome, Ariz.
Copper World M. Co. Manvel, Cal. See Vol. V.
Copper World M. Co. Merged, 1903, in Carolina King M. Co. Holloway, N. C.
Copper World M. Co. Succeeded by Copper World M. & S. Co. Loomis, Wash.
Copper World M. & S. Co. Succeeded by Copper World G. M. Co., also dead. Loomis, Wash. See Vol. IV.
Copper Zone M. Co. Lost lands. Watrous, N. M.
Copperopolis C. Co. Prairie City, Ore. See Vol. VIII.
Copperopolis M. Co. Searchlight, Nev. See Vol. VIII.
Copperosity C. Co. Succeeded, 1911, by Silver Leaf M. & S. Co. See Vol. X.
Corbin-Clancey Creek M. Co. Corbin, Mont. See Vol. VIII.
Corbin Cons. M. Co. Corbin, Mont. See Vol. X.
Corbin Copper M. Co. Succeeded by Corbin-Mont. Mines Co. Corbin, Mont.
Corbin Hidden Treasure C. Co. Corbin, Mont. See Vol. IX.
Corbin-Mont. C. Co. Name changed, 1910, to Corbin Metal M. Co. Jefferson City, Mont. See Vol. VIII.
Corbin-Mont. Mines Co. Succeeded by Corbin-Mont. C. Co. Corbin, Mont. See Vol. VIII.
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Cordova Copper Co. Cordova, Alaska. See Vol. VIII.
Cordova-Tacoma C. Co. Cordova, Alaska.
Corinth Copper Co. Corinth, Vt.
Cornelia Copper Co. Reorganized, 1909, as New Cornelia C. Co. Ajo, Ariz. See Vol. VIII.
Cornelia Mng. Co. Sheridan, Mont.
Cornell G., S. & C. M. Co. Silver City, N. M. See Vol. VI.
Cornell Operating Co. Van Anda, B. C.
Cornucopia C. Co. Cornucopia, Ore.
Cornucopia G. & C. M. Co. Cherry, Ariz.
Corncwall Copper Mng. & Sm'g Co. St. Genevieve, Mo.
Corona Cons. G. & C. Co. Turkey, Ariz. See Vol. X.
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Corona Copper Co. Superior, Wis. See Vol. VI.
Corona G. & C. Co. Santa Rita, N. M.
Coronado Copper Co. Clayton, N. M. See Vol. VIII.
Coronado G. & C. M. Co. Prescott, Ariz.
Corra-Rock Island M. Co. Butte, Mont. See Vol. V.
Cortez Mining Co. Operated in Ontonagon Co., Mich., 1852.

- Cortland G. & S. M. Co. Ohio, Colo. See Vol. VIII.
 Cory Bros. Mining Co. Helena, Mont.
 Cotton Belt M. Co. Kamloops, B. C.
 Cottonwood C. Co. Groom Creek, Ariz. See Vol. VIII.
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 Courtland Mining Co. Courtland, Ariz. See Vol. X.
 Cove Copper Mines, Ltd. Liquidated, 1911. Goose Cove, Newfoundland.
 Cow Creek Copper M. Co. Encampment, Wyo.
 Cowles Electric Sm. & Alum. Co. Succeeded, 1895, by Electric Sm. & Alum. Co.
 Coyote Copper Co. New York. No trace of operations secured.
 Crackerjack Cons. C. Co. Los Angeles, Cal.
 Crawford Copper Co. Los Angeles, Cal.
 Crawford Copper Co. Prairie du Chien, Wis. See Vol. VIII.
 Crawford Gold M. Co. Clifton, Ariz.
 Creede Copper M. Co. Rawlins, Wyo.
 Creo M. & M. Co. Ibadah, Utah. See Vol. X.
 Crescendo Copper Co. Operated in Lander Co., Nev., 1907.
 Crescent Copper Co. Boulder, Colo.
 Crescent Copper Co. Encampment, Wyo. See Vol. VI.
 Crescent C. M. Co. Bisbee, Ariz. See Vol. VIII.
 Crescent Mines, Ltd. Phoenix, B. C. See Vol. VIII.
 Creston Cons. Mines Co. Loreto, Mex.
 Crona Copper Co. Lyons, Colo.
 Crown Copper Co. Valdez, Alaska. See Vol. X.
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 Crown Mining Co. Keller, Wash. See Vol. X.
 Crown Point Copper Co. Globe, Ariz. See Vol. VIII.
 Crown Point M. Co. Chelan, Wash.
 Crown Princess M. Co. Merged, 1908, in Clara Cons. G. & C. M. Co. Planet, Ariz.
 Crown Queen Mines Co. Merged, 1908, in Clara Cons. G. & C. M. Co. Planet, Ariz.
 Crusader Cons. M. Co. Eureka, Utah.
 Cruz; Cia. Min. de la. La Cruz, Mex.
 Crystal Copper Co. Ingot, Cal. See Vol. VIII.
 Crystal C. M. Co. Merged, 1906, in Bristol Cons. Mines & Sm. Co. Nevada.
 Crystal Lake G. & C. M. & Sm. Co. Lake City, Colo. See Vol. VIII.
 Crystal Mining Co. Bolster, Wash. See Vol. VIII.
 Crystal Mountain M. & Drainage Co. Crystal, Colo.
 Crystalina C. Co. Clifton, Ariz.
 Cuartas Mining Co. Ayutla, Autlán, Mex.
 Cuarto Señores, S. A. Cia. Min. Coyamé, Iturbide, Mex. See Vol. VIII.
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 Cuba M. Co. Bingham Canyon, Utah. See Vol. X.
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 Culligan M. Co. West Superior, Wis.
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 Cumberland M. Co. Turkey, Ariz.
 Cumora M. Co. Property sold, 1913, to Melcher M. & M. Co.
 Cuprite C. Co. Sulzer, Alaska.

- Cuprite Copper Co. Vail, Ariz. See Vol. III.
 Cuprite Copper M. Co. Goldfield, Nev. See Vol. VIII.
 Cuprite Mining Co. Holmes, Wyo.
 Cuprite M. & S. Co. Vail, Ariz. See Vol. VIII.
 Cutter Copper Co. Cutter, N. M. See Vol. X.
- Dacotah Mining Co. Houghton, Mich. See Vol. III.
 Daggett Lead Mining Co. San Bernardino, Cal. See Vol. X.
 Daisy Bell G. & C. Dev. Co. Whitehall, Mont. See Vol. VIII.
 Daisy Bell G. & C. M. Co. Whitehall, Mont. See Vol. VIII.
 Dakota Calumet Co. Succeeded 1913 by Continental C. M. & S. Co. Hill City, S. D.
 Dakota Heights Co. Succeeded by Naumkeag Cop. Co. in 1912.
 Daly Mining Co. Owned by Marcus Daly Estate, Butte, Mont. See Vol. X.
 Dandy Mining & Milling Co. Sandpoint, Bonner Co., Idaho.
 Dane Copper Mining Co. Dane, Ont. See Vol. XI.
 Danville & Virginia C. M. Co. Merged, 1903, in Carolina King Mg. Co. Virgilina, Va.
 Darnell M. & M. Co. Kalama, Wash. See Vol. VI.
 Darrington-Indiana Mining Co. Darrington, Wash. See Vol. VIII.
 David Harum Copper Co. Van Horn, Texas. See Vol. X.
 Davis-Daly Estates C. Co. Succeeded, 1908, by Davis-Daly Co. See Vol. VIII.
 Davis Mining & Smelting Co. Succeeded by Southwestern Sm. Co., 1903. Cal.
 Dawson Mining Co. Moctezuma, Son., Mex. See Vol. X.
 Deadwood Gold & Copper Mines Co. Deadwood, S. D.
 Death Valley Copper Glance Mining Co. Greenwater, Calif.
 Death Valley Cop. Mines & Smelter Co. Greenwater, Calif.
 Decatur Cop. Mng. Co. Jerome, Ariz.
 Dedham Copper Mining Co. Superior, Wis. See Vol. VIII.
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 Deer Creek Gold & Copper Mining Co. Silverton, Wash.
 Deerlodge Cons. Mines, Ltd. Liquidated voluntarily 1910. Anaconda, Mont. See Vol. VIII.
 De Lamar's Copper Ref. Co. Succeeded, Oct. 15, 1906, by U. S. Metals Ref. Co. N. J. See Vol. VI.
 De Lamar-Wall M. & M. Co. Lands sold, 1903, to Utah Copper Co., Bingham Canyon, Utah. See Vol. III.
 Delaware Mining Co. Reorganized, 1880, as Conglomerate M. Co. Mich.
 Del Cobre Cons. Mining Co. Red Rock, Pinal Co., Ariz. See Vol. VIII.
 Delfina Mining Co. Chilpancingo, Guerrero, Mex. See Vol. X.
 Delmas Copper Co. Succeeded, 1908, by Delmas Cons. Copper Co., also dead. Lee, Nev. See Vol. VIII.
 Del Norte Copper Co. Kirkland, Yavapai Co., Ariz. See Vol. V.
 Del Norte Copper Co. Smith River, Del Norte Co., Cal.
 Del Roy Copper M. & S. Co. A swindle. Alamogordo, N. M. See Vol. VI.
 Democrata Mining Co. Succeeded, 1905, by Democrata Cananea Sonora C. Co. Cananea, Son., Mex. See Vol. V.
 Denn-Arizona Dev. Co. Reorganized, 1907, by Denn-Arizona C. Co. Bisbee, Ariz. See Vol. VI.
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 Denver C. M. & Leasing Co. Morrison, Colo. See Vol. X.
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 Denver Group Gold & Copper Co. Wickenburg, Ariz. See Vol. X.
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- De Soto Mining Co. Charter forfeited, 1910. See Vol. X.
 Deseret Mining & Reduction Co. Leastalk, Cal. See Vol. X.
 Deseret Mountain Copper King M. Co. Eureka, Utah. See Vol. VIII.
 Deseret View Mining Co. Lucin, Ariz. See Vol. VIII.
 Despatch Copper-Gold M. Co. Morrison, Colo. See Vol. X.
 Dessie Boyer Copper-Gold Mine, Ltd. Vontrigger, Cal. See Vol. VIII.
 Detroit & Parry Sound M. Co., Ltd. Parry Sound, Ont. See Vol. X.
 Detroit Quo Vadis Copper Co. Moctezuma, Mex. See Vol. VIII.
 Detroit Sonora Mining Co. Cananea, Mex. See Vol. X.
 Devlin Arizona Copper Co. Bouse, Ariz. See Vol. VIII.
 Dewey Cons. Copper & Gold M. & M. Co. Grangeville, Idaho.
 Dewey Mining Co., Bear, Ida.
 Dewey Mining Co. Irapah, Utah.
 Dexter Mining Co. Globe, Ariz.
 Diana Gold & Copper Expl'n. Co. Brighton, Utah.
 Diaz, Fernando. Taxpan, Tepic, Mex.
 Dill Gold & Copper Mining Co. Rambler, Wyo. See Vol. X.
 Dillon-Argenta M. Co. Lands sold 1910, by sheriff, Argenta, Mont. See Vol. VIII.
 Dillon Cons. Mining & Tunnel Co. Dillon, Wyo. See Vol. VIII.
 Diluvio Gold & Copper Mining Co. Bouse, Ariz. See Vol. X.
 Dipper Gold M. & M. Co. Alta, Utah. See Vol. X.
 Dirigo-La Sal Gold & Copper M. Co. Castleton, Utah, sold to Boston & Utah C. Co. See Vol. VIII.
 Dixie M. & S. Co. Succeeded by Utah & Eastern C. Co., Utah.
 Dixie Queen Copper Co. Marcos, Colo. See Vol. X.
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 Dold & Voelker. Ayutla, Jalisco, Mex.
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 Dolly Varden United Copper Co. Currie, Nev. See Vol. X.
 Dolores Copper M. Co. Sold to American Smelters Securities Co. Mat-huala, Mex. See Vol. V.
 Domingo M., M. & S. Co. Republic, Wash. See Vol. VIII.
 Dominguez Copper M. Co. Delta, Colo. See Vol. X.
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 Dominican Smelting Co., Ltd. Parry Sound, Ont. See Vol. VIII.
 Donald Copper Co. Midway, Boundary district, B. C. See Vol. X.
 Dona Louisa Cons. Copper Co. Coapa, Michoacán, Mex. See Vol. VIII.
 Dona Louisa Copper & Gold M. Co. A swindle, Coapa, Michoacán, Mex. See Vol. VIII.
 Don Carlos & Eureka Cons. C. M. Co. Nombre de Dios, Durango, Mex. See Vol. X.
 Don Juan Mining Co. Fronteras, Mex. See Vol. X.
 Donna Dora Mining Co. New Mexico. Succeeded by Mineral Hill Mining Co.
 Dorotea M. Co. Lands sold, 1905, to Fay-Cananea C. Co., Cananea, Son. Mex.
 Dos Cabezas Cons. Mines Co. Sold lands, 1907, to Mascot Copper Co., Dos Cabezas, Ariz. See Vol. VI.
 Dos Estrellas Mines & Dev. Co. Taxco de Alarcón, Guerrero, Mex. A swindle for which Geo. W. Emanuel was given a prison sentence; Louis A. Prince was arrested, but jumped a \$6,000 bail bond, and Mark J. Samuels, indicted under United States laws, stayed out of reach in Mexico. See Vol. VIII.
 Dos Naciones M. Co. Lands sold to Cananea-Duluth M. Co., Cananea, Son. Mex. See Vol. VI.

- Double Sunset M. & M. Co.** Paradise, Ariz.
Douglas-Arizona-Sonora Dev. Co. Patagonia, Ariz. See Vol. VIII.
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Douglas Copper M. Co. Succeeded, 1906, by Nevada-Douglas C. Co. Yerington, Nev. See Vol. VI.
Douglas M. & M. Co. Rambler, Wyo. See Vol. VI.
Douglas M. & S. Co. Succeeded by Douglas Copper M. Co., latter bankrupt, 1905. Yerington, Nev. See Vol. IV.
Douglas Mountain Gold M. & Tunnel Co. Loomis, Wash. See Vol. VIII.
Dover Mining Co. Idaho Springs, Colo. See Vol. X.
Dragon M. & Dev. Co. Succeeded by San Rafael C. Co. Terrazas, Chih., Mex.
Dragoon Copper M. & S. Co. Tombstone, Ariz. See Vol. X.
Dragoon M. C. Lands sold, 1907, to Bonanza Belt C. Co. Johnson, Ariz.
Dragoon Mountain M. Co. Pearce, Ariz. See Vol. X.
Dripping Springs Mines & Smelters. Succeeded, 1907, by London-Arizona C. Co. Kelvin, Ariz. See Vol. VIII.
Drummers Development Co. Chelan, Wash. See Vol. X.
Duchess M., M. & S. Co. Holmes, Wyo.
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Duluth-Pacific Copper Co. Chelan, Wash. See Vol. X.
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Dunkirk G. & S. M. Co. Lands sold to Mt. Tritle C. Co. Prescott, Ariz. See Vol. VI.
Durango; Cia. Minera De Cobre De. Ortiz, Durango, Mex.
Durango Copper Syn., Ltd. Sold property, 1899, to Avino Mines of Mex., Ltd., since reorganized as Avino Mines, Ltd. Avino, Dur., Mex.
Durango Inv. & Dev. Co. San Francisco del Mezquital, Durango, Mex. See Vol. X.
Dutch Miller M. & S. Co. Skykomish, Wash. See Vol. VIII.
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Eagle Cons. Gold M. & M. Co. Lands sold, 1908, to Blue Star M. Co. Chewelah, Wash.
Eagle Cons. Mines Co. Wenden, Ariz. See Vol. VIII.
Eagle Copper Co. Encampment, Wyo. See Vol. VI.
Eagle Copper & Gold M. Co. Wickenburg, Ariz.
Eagle Copper M. Co. Chewelah, Wash. See Vol. X.
Eagle Mining Co. Ketchikan, Alaska. See Vol. VIII.
Eagle M. Co. Lands sold, 1909, to Arizona Empire Copper Mines Co. Parker, Ariz.
Eagle M. & S. Co. Title changed, 1907, to Copper Eagle M. & S. Co. Butte, Mont.
Eagle Mountain C. M. Co. A swindle. Harrisburg, Ore. See Vol. VIII.
Eagle River C. Co. Lands sold, 1905, to a subsidiary company of the Calumet & Hecla. Eagle River, Mich. See Vol. II.
East Buffalo M. Co. Saltese, Mont.
East Cumberland Ely Co. Ely, Nev. See Vol. X.
East Greenwater Copper Co. Greenwater, Cal. See Vol. VIII.
East-Side Gold M. Co. Bisbee, Ariz. See Vol. VII.
East Snowstorm-Coeur D'Alene M. Co. Fraudulent. Mullan, Idaho. See Vol. VIII.

- East Tintic Terminal M. Co.** Eureka, Utah. See Vol. VIII.
Easter Sunday M. Co. Bisbee, Ariz.
Echo Copper M. & M. Co. Rudefeha, Wyo. See Vol. X.
Eclipse G. & C. M. Co. Merged, 1904, in Eclipse-Argo M. Co. Argo, Mont.
Edison M. Co. Yreka, Vancouver Id., B. C.
Edna May M. Co. Winfield, Colo.
Eighty-Five M. & M. Co. Reorganized, 1909, as Eighty-Five M. Co. Lordsburg, N. M. See Vol. VIII.
El Aguaje M. Co. Moctezuma, Sonora, Mex. See Vol. VIII.
El Capitan C. Co. Douglas, Lacey & Co. Swindle, Kirkland, Ariz. See Vol. IV.
El Capitan Dev. Co. Globe, Ariz.
El Capitan M. Co. Kirkland, Ariz. See Vol. VIII.
El Carmen M. Co. San Javier, Sonora, Mex.
El Cobre M. Co. A swindle. Hermosillo, Sonora, Mex. See Vol. VIII.
El Corral G. & C. Co. Rosario, Chih., Mex. See Vol. X.
El Diaz G. & C. Co. San Martin Hidalgo, Jalisco, Mex. See Vol. V.
El Dorado Copper Co. Globe, Ariz. See Vol. VIII.
El Dorado C. M. Co. Succeeded, 1906, by Woodside-Eureka M. Co. Georgetown, Cal. See Vol. V.
El Paso Home M. Co. Chloride, N. M.
El Paso M. Co. Orogrande, N. M.
El Porvenir M. & M. Co. Cuatro Ciénegas, Coah., Mex. See Vol. VIII.
El Progreso C. M. Co. Stockholders were given shares of Imperial Corona Gold Min. Co. in exchange. Ayutla, Jalisco, Mex. See Vol. III.
El Rey Gold & Copper M. Co. Encampment, Wyo.
El Rico Copper M. Co. Tepezala, Aguascalientes, Mex.
El Sueño M. Co. Tijuana, Baja Cal., Mex. See Vol. X.
El Verde Grande C. Co. Imuris, Son., Mex. See Vol. VIII.
Elder M. Co. Waldo, Ore.
Electra M. & M. Co. Wickenburg, Ariz.
Electric M. & M. Co. Orogrande, N. M.
Electrolytic Copper Co. White Bird, Ida.
Electrolytic Copper M. & S. Co. Imnaha, Ore.
Elite Gold & Copper M. Co. Index, Wash. See Vol. V.
Elizabeth Copper Co. Succeeded, 1907, by Vermont Copper Co. South Strafford, Vermont. See Vol. VI.
Elizabeth C. M. Co. Succeeded by Elisabeth Gold Hill M. Co. No. Yakima, Wash.
Elizabeth M. Co. Succeeded, 1905, by Elizabeth C. Co. South Strafford, Vermont. See Vol. V.
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Elkhorn Mng. Co. Elkhorn, Mont.
Ella Copper M. & Dev. Co. New Almaden, Cal. See Vol. X.
Ella M. Co. Lands passed to Reins Copper Co. Butte, Mont. See Vol. VII.
Elliston Copper Mng. Co. Elliston, Mont.
Elsie M. Co. Winfield, Colo.
Ely Amalgamated Copper Co. Ely, Nev.
Ely Blackhorse M. Co. Blackhorse, Nev. See Vol. VIII.
Ely-Bonanza Copper Co. Ely, Nev. See Vol. VIII.
Ely Centennial C. Co. Succeeded, 1911, by Centennial Dev. Co., Ely, Nevada. See Vol. X.

- Ely Central Copper Co. Succeeded, 1912, by New Ely Central C. Co. Ely, Nev. See Vol. X.
- Ely Cons. Co. Ely, Nev. See Vol. X.
- Ely Copper Queen M. Co. Ely, Nev. See Vol. VIII.
- Ely-Copperton M. Co. McGill, Nev. See Vol. VIII.
- Ely-Duck Creek Lead & Copper Co. Ely, Nev. See Vol. X.
- Ely-Giroux Extens. C. Co. Lands sold, 1909, to Giroux Cons. Mines Co. Ely, Nev. See Vol. VIII.
- Ely Globe Copper Co. Ely, Nev. See Vol. VIII.
- Ely Golden Ledge M. Co. Ely, Nev., and Callao, Utah. See Vol. VIII.
- Ely-Grand Central C. M. Co. Ely, Nev. See Vol. X.
- Ely-Hercules M. Co. Lake City, Colo., and Blackhorse, Nev. See Vol. VIII.
- Ely-Homestake Copper Co. Ely, Nev.
- Ely-Jackpot M. Co. Ely, Nev. See Vol. VIII.
- Ely Jumbo Copper Co. Merged, 1907, in Ely National C. Co. Ely, Nev.
- Ely King Copper & Lead Co. Ely, Nev. See Vol. VIII.
- Ely Mines Co. Property sold, 1907, to Cons. Copper Co. Ely, Nev.
- Ely M. Co. Ely, Nev. See Vol. VIII.
- Ely M. & M. Co. Lands sold, 1906, Ely, Nev. See Vol. VI.
- Ely Nevada Copper Co. Ely, Nev.
- Ely Nev. Exploration Co. Ely, Nev.
- Ely Northern Copper Co. Ely, Nev. See Vol. VIII.
- Ely-Ogden M. Co. Ely, Nev.
- Ely & Osceola Ledge M. & M. Co. Ely and Osceola, Nev. See Vol. VIII.
- Ely-Phoenix Copper M. Co. Ely, Nev. See Vol. VIII.
- Ely-Rand Copper Co. Ely, Nev.
- Ely-Resurrection Copper Co. Deeded property, 1911, to C. W. Freed for judgment of \$13,408.07. Resurrected as Princess C. Co. Ely, Nev. See Vol. VIII.
- Ely-Rochelle Copper Co. Kimberley, Nev.
- Ely Standard Copper Co. Ely, Nev.
- Ely Sulphide Copper Co. Ely, Nev.
- Ely Superior Copper Co. Ely, Nev.
- Ely-Verde C. Co. Succeeded, 1912, by new company of same name. Ely, Nev.
- Ely-Waneta M. & M. Co. Utah charter forfeited, 1910. Ely, Nev.
- Ely Western C. Co. Absorbed by Boston Ely, 1909. Ely, Nev.
- Ely-Wildhorse Copper Co. Ely, Nev. See Vol. VIII.
- Emerald M. & S. Co. Succeeded by Esmeralda C. M. & S. Co. Santa Catarina del Norte, Baja Cal., Mex. See Vol. V.
- Emma M. & Dev. Co. Butte, Mont.
- Empire Copper Co. Reno, Nev. See Vol. III.
- Empire Copper M. & M. Co. Tusas, N. M.
- Empire Copper Syn., Ltd. Rainy Hollow, B. C. See Vol. VIII.
- Empire Gold Bug M. Co. Empire, Colo. See Vol. VI.
- Empire Gold & Copper Co. Central City, Colo. See Vol. VIII.
- Empire Mines Co. Hanover, N. M. See Vol. V.
- Empire M. Co. Lands sold, 1905, to Keweenaw C. Co. Delaware Mine, Mich.
- Empire M. Co. Whitefish, Algoma, Ont.
- Empire Mining & Dev. Co. Arizona. See Vol. X and XI.
- Empire Sm. Co. Property sold, under foreclosure, 1906, to W. F. Wilie, Benson, Ariz. See Vol. V.
- Empire & Star M., M. & S. Co. Succeeded by Hecla M. Co. Hecla, Wyo. See Vol. V.

- Empire Tun. & G. M., M. & Trans. Co.** Empire and Leadville, Colo. See Vol. VIII.
- Empress M. Co.** Merged in Great Belcher of Arizona Co. Belcher, Ariz.
- Encampment Boss M. & M. Co.** Apparently succeeded by Boss M. Co. Encampment, Wyo. See Vol. VIII.
- Encampment M. Co.** Lost Lands, 1913. Encampment, Wyo.
- Encinillas Mines, Ltd.** Santa Rosalia, Chih., Mex. See Vol. V.
- Encinito Copper Co.** Succeeded, 1905, by Encinitas C. & Sm. Co. also dead. Encinitas, Cal.
- Enterprise Dev. Co.** Cananea, Sonora, Mex. See Vol. VIII.
- Enterprise M. & M. Co.** Succeeded by Enterprise M. Co., which was merged, 1907, in Swarthmore Cons. M. Co. Eldorado, Colo. See Vol. VI.
- Enterprise M. Co.** Tonopah, Nev. See Vol. VIII.
- Ephia Dev. Co.** Succeeded, 1906, by Ephia M. Co. also defunct. Fronteras, Son., Mex.
- Equitable Copper Co.** Encampment, Wyo.
- Erie Cons. M. & Red. Co.** Name changed from Wahnita Copper Co. Both fraudulent. Matchwood, Mich.
- Erie Copper M. Co.** Milford, Utah. See Vol. VI.
- Erie Gold & Copper M. Co.** Calzona, Cal.
- Erie-Ontario Dev. Co.** Liquidated voluntarily. Winona, Mich. See Vol. VIII.
- Eriega Copper & Coal M. & S. Co.** Bozeman, Mont. See Vol. VI.
- Erik M. Co.** Cananea, Son., Mex. See Vol. VIII.
- Esmeralda Copper Co.** Luning, Nev. See Vol. VIII.
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- Essex Copper Co.** Matchwood, Mich. See Vol. VIII.
- Esterbrook M. Co.** Property sold to Boston-Wyo. C. Co. Esterbrook. Wyo. See Vol. VIII.
- Estey M. & M. Co.** Succeeded, 1902, by Dividend M. & M. Co. Estey, N. M. See Vol. V.
- Estrella M. Co.** Milford, Utah. See Vol. VI.
- Ethel Cons. Mines Co.** Index, Wash. See Vol. VIII.
- Ethel C. M. Co.** Succeeded, 1902, by Ethel Cons. Mines Co. Index, Wash. See Vol. II.
- Ethel Gold M. Co.** Turret, Colo. See Vol. VI.
- Ethel M. Co.** Callao, Utah. See Vol. X.
- Euclid Dev. Co.** Benson, Ariz. See Vol. VI.
- Eureka Cons. Copper Co.** Gold Hill, N. C.
- Eureka Cons. M. Co.** Merged, 1905, in Richmond-Eureka M. Co. Eureka, Nev.
- Eureka Copper Co.** Globe, Ariz. See Vol. V.
- Eureka Copper M. Co.** Encampment, Wyo. See Vol. VI.
- Eureka Diamond Drill M. Co.** Jackson, Cal. See Vol. X.
- Eureka Mines Co.** Reorganized, 1910, as Eureka Mines Co. Cons. Orogande, N. M. See Vol. IX.
- Eureka M. Co.** Succeeded Eureka Dev. Co. Property sold, 1909, to Bisbee Coalition M. Co. Bisbee, Ariz.
- Eureka M. & M. Co.** Ft. Huachuca, Ariz. See Vol. X.
- Evans-Tanzer Cons. Copper Co.** Lavic, Cal. See Vol. V.
- Evanson Mng. Co.** Gabriel, San Juan del Rio, Durango, Mex.
- Evelyn M. & Leasing Co.** Lost charter. Leadville, Colo. See Vol. X.
- Evening Star M. Co.** Riverside, Wyo. See Vol. VII.
- Evergreen-Eureka Gold & Copper Co.** Was a fake. Former office, 31 Union Square, New York City.

- Evergreen M. & Tun. Co.** Alta, Utah. See Vol. VIII.
Excelsior Copper Co. West Broughton, Quebec.
Excelsior C. & G. M. Co. Riverside, Wyo.
Excelsior G. & C. M. Co. Flagstaff, Ariz.
Excelsior G. & C. M. Co. Bouse, Ariz.
Excelsior M. Co. Organ, N. M. See Vol. V.
Excelsior M. & S. Co. Yerington, Nev. See Vol. VI.

Fairview M. Co. Basin, Mont.
Falls Creek Copper M. Co., Ltd. Nelson, B. C. See Vol. X.
Fargo Gold & Copper M. Co. Imnaha, Ore. See Vol. VII.
Farmington Gold & Copper M. & M. Co. Farmington, Utah.
Farrell C. Co. Succeeded, 1902, by Pittsburg & Mont. C. Co. Butte, Mont. See Vol. II.
Fauquier Copper Co. Warrenton, Va. See Vol. X.
Federal C. Co. Lands sold to Ojibway M. Co. Phoenix, Mich. See Vol. VII.
Federal Copper Co. Laramie, Wyo.
Federal C. Co., Ltd. Succeeded, 1902, by Federal G. & C. Co. Superior, Wis. See Vol. IV.
Federal Copper M. & S. Co. Wound up by receiver, 1907; property sold. El Paso, Tex. See Vol. VI.
Federal Exploration Co. Dissolved in 1911. Ingot, Calif.
Federal G. & C. Co. Eureka, Nev. See Vol. VIII.
Federal G. & C. M. Co. Blue Acre, Utah. See Vol. VII.
Federal M. Co. Reorganized, 1905, as Gila Valley C. Co. Safford, Ariz. See Vol. V.
Fenochia M. Co. Magdalena, Mex. See Vol. IV.
Fentress M. Co. Succeeded by Century Dev. Co. Center, N. C. See Vol. VI.
Fernando M. Co. San Fernando, Mex. See Vol. VI.
Fidelity M. Co., Ltd. Victoria, Mich. See Vol. VIII.
Fifty Five Cons. M. Co. Lands sold to Magus M. Co., Silverton, Wash.
Fifty Gold Mines Corp'n. Colo. Liquidated.
Finley G. & C. M. & M. Co. Castleton, Utah. See Vol. VI.
First Chance M. Co. Excelsior, Wash. See Vol. X.
First National Mining Co. New Mexico. See Vol. XI.
Fitts Copper Co. Clifton, Ariz.
Five Points C. M. Co. Merged, March, 1911, in Maniton Hill Co. Globe, Ariz.
Flagstaff Copper Mng. Co. Consol. with Wasatch Mines Co.
Flagstaff District Silver M. Co., Ltd. Alta, Utah. See Vol. X.
Flor De Nieve; Cia Min. Concepción del Oro, Mex. See Vol. IX.
Floredia Copper M. Co. Promoted by notorious Financial Securities & Trust Co., Denver. See Vol. X.
Florence Copper Co. Newhouse, Utah.
Florence M. Co. Property passed to Uteland M. Co. Ouray, Utah.
Florence M., M. S. & Ref. Co. Westcliffe, Mont.
Florence Sm., M. & M. Co. Price, Ariz. See Vol. X.
Florencia M. Co. Chih., Mex. See Vol. X.
Flying Dutchman M. Co. Property presumably sold to Copper Jack M. Co. Ibapah, Utah.
F. M. & D. Copper M. Co. Abandoned. Near Morrison, Colo.
Forest Hill Cons. M. & M. Co. Foreclosed by bondholders. Tin Cup, Colo. See Vol. VI.
Fortuna Gold & Copper Co. Reorganized as Sturdy Gold Mng. Co.

- Fortuna Grande Copper Co. Ely, Nev. See Vol. X.
 Fortuna M. Co. Cananea, Mex. See Vol. X.
 Four B's M. Co. Turret, Colo.
 Four Metals Mng. Co., Washington, Ariz. See Vol. VIII.
 Four Metals Mng. Co. Telluride, Colo.
 Four Metals Mining Co. Callao, Utah.
 Four Metals Smelter & Mng. Co. Property now owned by Inyo Cerr
 Gordo Mng. & Power Co. Keeler, Calif.
 Fourth of July Mng. Co. Boulder, Colo.
 Fraser Mountain Copper Co. Twining, N. M. See Vol. VI.
 Fraser River Copper M. Co. Kamloops, B. C. See Vol. VIII.
 Fraternity Copper Co. A stockjobbing enterprise. Ely, Nev. See Vol.
 VIII.
 Frederick Warde G. & C. M. Co. Goodsprings, Nev.
 Freeland Cons. Mines Co. Succeeded, 1904, by Freeland Dev. & Trans.
 Co. Freeland, Colo. See Vol. IV.
 Freeland Extens., M. & M. Co. Idaho Springs, Colo.
 Freeland Mercantile & M. Co. Freeland, Colo. See Vol. V.
 Fremont Copper Co. Riverside, Wyo. See Vol. X.
 Fremont Copper Mines Co. Copperfield, Colo. See Vol. X.
 Frémont C. M. Co. Lands sold, 1905, to St. Joe M. & M. Co. Riverside,
 Wyo. See Vol. VI.
 Fremont Development Co. Houghton, Mich., and Shoshone, Wyoming.
 French Creek Copper Co. French Creek, Pa.
 French Creek M. Co. Centennial, Wyo. See Vol. VIII.
 Fresno Copper Co. Ltd. Clovis, Calif. See Vol. XI.
 Frisco M. Co. Title changed, 1903, to Frisco Contact M. Co., and merged,
 1909, in Frisco Cons. M. Co., Frisco, Utah. See Vol. VIII.
 Frontenac Copper Co. Calumet, Mich.
 Frontenac M. Co., Ltd. Succeeded, 1910, by Frontenac Cons. Mines, Ltd.
 also dead. See Vol. XI. Central City, Colo. See Vol. VIII.
 Fronteriza Copper M. Co. Ascension, Chih., Mex.
 Furnace Creek Cons. C. Co. Greenwater, Cal.
 Furnace Creek Copper Co. Greenwater, Cal., and Spokane.
 Furnace Creek Extens. C. M. Co. Greenwater, Cal. See Vol. VIII.
 Furnace Creek G. & C. Co. Greenwater, Cal. See Vol. VIII.
 Furnace Creek Oxide C. Co. Greenwater, Cal. See Vol. VIII.
 Furnace Creek So. Extens. C. Co. Was a fake. Greenwater, Cal. See
 Vol. VIII.
 Furnace Valley Copper Co. Greenwater, Cal. Address Hon. Patrick
 Clark, Spokane, Wash.
 Futurity M. & M. Co. Newett, Colo. See Vol. VI.
- Galena Ridge Mng. Co. Metcete, Wyo. Property owned by Thos. J.
 Grier, Lead, S. Dak. See Vol. XI.
 Galice Cons. M. Co. Galice, Ore.
 Gallaher, M. & M. Co. Property sold by receiver, 1909, for \$2,800, to Lee
 A. Johnson. Cle Elum, Wash. See Vol. VIII.
 Gallatin County Basin Copper M. Co. Bozeman, Mont.
 Garcia; Tiburcio. Galeana, Mex.
 Gardiner, Worthen & Goss Co. Tucson, Ariz.
 Garduño y Anexas; Cia Min. Placeres del Oro, Mex.
 Garfield M. Co. Brigham, Utah.
 Garfield-Salvador M. Co. Butte, Mont. See Vol. VIII.
 Garland Copper Mng. Co. Encampment, Wyo. See Vol. XI.

- Garrison G. & C. M. Co.** Merged, 1907, in Garrison-Monster M. Co. Iba-
pah, Utah. See Vol. V.
- Gem Cons. M. Co.** Property sold, 1909, to Tenabo, M. & S. Co. Tenabo
Nev. See Vols. IX and X.
- Gem. M. Co.** Coolin, Idaho.
- Gen. Grant M. Co.** West Creek, Colo.
- Geo. A. Treadwell M. Co.** Property sold to satisfy \$130,000 mortgage
in 1911. Stockholders asked, May, 1912, to pay 75 cts. a share for stock
in a new company, Iron Queen M. & S. Co., which proposed to take
up former Treadwell holdings and develop them. Plans regarded un-
favorably. Property still a prospect. Address Wm. T. Read, 15 Wil-
liam St., New York City. See Vol. VIII.
- George Third M., M. & S. Co.** Carson, Colo. See Vol. III.
- Georgetown Gold M. Co.** Georgetown, Colo. See Vol. X.
- Geronimo C. M. Co.** Was a swindle "succeeded," 1909, by Am. Dev., M. &
& Red. Co. Silver City, N. M. See Vol. VIII.
- German American Cop. Co.** Alamos, Sin., Mex. See Vol. XI.
- Gertrude M. Co.** Succeeded by Eagle Copper Co. Battle, Wyo.
- Geyman M. Co.** Butte, Mont. See Vol. VIII.
- Giant-California Mng. Co., Ltd.** British Columbia. See Vol. XI.
- Giant Chief Cons. M. Co.** Succeeded Giant Chief M. Co. Property sold,
1908, to Utah-Bingham M. Co. Bingham Canyon, Utah.
- Giant M. Co., Ltd.** Rosseano, B. C. See Vol. X.
- Gibosa y Anexas; Cia Min. La.** Lands sold to American Sm., Sec. Co.
Jimenez, Chih., Mex.
- Gibraltar Copper M. Co.** Encampment, Wyo.
- Gila Canyon Copper Co.** Winkelman, Ariz. See Vol. X.
- Gila Copper Co.** Was a twin of the Ray Cons. Co., and merged therein,
1910. Ray, Ariz.
- Gila Copper Sulphide Co.** Christmas, Ariz. See Vol. XI.
- Gila County M. Co.** Globe, Ariz.
- Gila River Copper Mines Co.** Alaska & Mont. See Vol. XI.
- Gila Valley C. Co.** Succeeded by Gila Mountain C. Co. See Vol. X.
- Giroux-Ely Extens. C. Co.** Property sold, 1910, to Giroux Cons. Mines
Co., Ely, Nev.
- Gladstone Dev. Co.** Iron Bridge, Algoma, Ont.
- Gladstone-Greenwater C. Dev. Co.** Greenwater, Cal. See Vol. VIII.
- Gladys M. Co.** Alburni, B. C. See Vol. VIII.
- Gladys Proprietary Gold Mines, Ltd.** Vencedora, Mex. See Vol. IX.
- Globe-Amalgamated Copper Co.** Globe, Ariz. See Vol. VIII.
- Globe-Arizona Copper Co.** Globe, Ariz.
- Globe & Arizona Dev. Co.** Lands, sold, 1906, to Superior & Boston C. Co.
Globe, Ariz. See Vol. VI.
- Globe-Boston C. M. Co.** Lands sold, 1906, to Globe Cons. C. Co. Globe,
Ariz. See Vol. V.
- Globe Cons. C. Co.** Merged, May, 1909, in Cordova C. Co. Globe, Ariz.
See Vol. VIII.
- Globe Copper Co.** Ely, Nev.
- Globe Copper M. Co.** Property sold to Old Dominion M. & S. Co. Globe,
Ariz.
- Globe Copper M. Co.** Hecla, Wyo. See Vol. VIII.
- Globe Mines Exploration Co.** Ely, Nev. See Vol. X.
- Globe & Pinto M. Co.** Globe, Ariz. See Vol. VIII.
- Globe Standard M. Co.** Globe, Ariz. See Vol. VIII.
- Globe Sulphide C. Co.** Globe, Ariz. See Vol. VIII.

- Globe Western C. Co.** Lost lands, 1908. No relation to company of same name, organized 1911. Globe, Ariz. See Vol. VIII.
- Globe-Wheatfields M. Co.** Globe, Ariz. See Vol. VIII.
- Gloriso Gold & Copper M. Co.** Wenden, Ariz.
- Golconda Cons. Co., Ltd.** Title changed, 1909, to Silverfields M. Co., Ltd. Golconda, Nev. See Vol. VIII.
- Gold Basin M. Co.** Montrose, Colo. See Vol. VIII.
- Gold Belt Dev. & Red'n Co.** Morenci, Ariz. Property sold 1911 to Eagle Gold & Copper Mng. Co.
- Gold Belt M. Co.** Empire, Mont. See Vol. VIII.
- Gold Bug Cons. M. Co.** Bossburg, Wash.
- Gold & Copper Co. of Bingham.** Succeeded, 1901, by Bingham Cons. M. & S. Co. Bingham Canyon, Utah.
- Gold & Copper Cons. M. & M. Co.** Was a bad egg. Succeeded, 1907, by Hassayampa C. Co. Groom Creek, Ariz. See Vol. VI.
- Gold & Copper Crown M. Co.** Needles, Calif.
- Gold-Copper M. Co.** Lands sold, 1909, to Aztec Mines Co. Prescott, Ariz. See Vol. VIII.
- Gold-Copper M. Co.** Lincoln, Cal.
- Gold & Copper M. Co.** Rociada, N. M.
- Gold-Copper M. & Dev. Co.** Deadwood, S. D. See Vol. V.
- Gold Cross M. & M. Co.** Pitkin, Colo. See Vol. VIII.
- Gold Flint M. Co.** Succeeded, 1907, by Lion Gulch Dev. Co. Homestake, Mont.
- Gold Hill Copper Co.** Sold by receiver, 1909, for \$45,000 to Wm. H. Geraghty and Frank Van Wagenen, and practically reorganized as Gold Hill Cons. Co. Gold Hill, N. C. See Vol. VIII.
- Gold Hill Quartz M. Co.** Gold Hill, Jackson Co., Ore.
- Gold Hyacinth M. Co.** Needles, Cal. See Vol. X.
- Gold King Cons. Mines Co.** Succeeded by New Gold King Mines, Silverton, Colo. See Vol. VIII.
- Gold Quartz M. Co.** Bullion, Nev.
- Gold Ridge M. Co.** Merged, 1910, in Copper Prince Cons. M. & M. Co. of Idaho. Coeur d'Alene, Idaho.
- Gold Rose M. & M. Co.** Helena, Mont. See Vol. VIII.
- Golden Desert M. & M. Co.** Quartzite, Ariz.
- Golden Eagle Copper Co.** Cima, Cal.
- Golden Eagle Gold Mng. Co.** Keswick (Copley) Calif. See Vol. XI.
- Golden Edge M. Co.** Rambler, Wyo.
- Golden Gate M. & Dev. Co.** Cle Elum, Wash. See Vol. VIII.
- Golden Marguerite S & C. M. Co.** Mullan, Idaho. See Vol. VIII.
- Golden Queen M. Co.** Osburn, Idaho. See Vol. X.
- Golden Rule Copper M. & S. Co.** Was a swindle. Vail, Ariz. See Vol. VI.
- Golden Shower Copper Co.** Tucson, Ariz. See Vol. VIII.
- Golden Star M. Co.** Doniphan, Idaho.
- Golden State Mines, Ltd.** Dragoon, Ariz.
- Golden Sun M. & M. Co.** Dissolved, 1911. Property now owned by Sun Tunnel M. & Trans. Co. Denver, Colo.
- Goldfield Copper-Gold M. Co.** Hawthorne, Nev. See Vol. VIII.
- Goldfield Copperopolis M. Co.** Goldfield, Nev.
- Goldfield Ely Fairview Wonder M. Co.** Was a stock-jobbing scheme. Ely, Nev.
- Goldsmith Copper Co., Ltd.** Howe Sound, B. C.
- Goldsmith M. Co.** Butte, Mont. See Vol. VIII.
- Golden Curry Cons. Mng. Co.** Elkhorn, Mont.

- Goleta Cons. Mines.** Jordan, Cal. See Vol. VII.
Goodlander M. & M. Co. Succeeded by Sonora Dev. Co. Moctezuma, Son., Mex. See Vol. VI.
Good Springs Cons. M. & S. Co. Goodsprings, Nev. See Vol. VIII.
Goodsprings Sm. & Dev. Co. Goodsprings, Nev. See Vol. VI.
Good Venture Copper M. Co. Woodsville, N. H.
Goodventure M. & M. Co. Hecla, Wyo.
Goose Lake Copper Co. Cooke, Mont. See Vol. VIII.
Gothic M., M. & Power Co. Crested Butte, Colo. See Vol. VI.
Goulais Bay M. Co. Sault Ste. Marie, Ont. See Vol. VIII.
Gould M. Co. Centennial, Wyo. See Vol. VII.
Governor Greenwater C. Co. Greenwater, Cal. See Vol. X.
Gower Mines Syn., Ltd. Blackhawk, Colo. See Vol. VIII.
Graham County M. Co. Succeeded, 1906, by Advance M. Co. Ft. Grant, Ariz. See Vol. VIII.
Grand Arizona C. Co. Property sold for debt, 1912. Address C. M. Iverson, Sec., Douglas, Ariz. See Vol. X.
Grand Canyon Copper Co. Grand View, Ariz. See Vol. VII.
Grand Cons. Dev. Co. Kingman, Ariz. See Vol. X.
Grand Deposit Copper Co. Cherry Creek, Nev. See Vol. X.
Grand Eastern Mng. Co. Eureka, Utah.
Grand Gulch Mng. Co. St. Thomas, Nev. See Vol. XI.
Grand Island M. Co. Lands passed to Louisiana M. Co. See Vol. VIII.
Grand Junction Sm. Co. Grand Junction, Colo. See Vol. X.
Grand La Sal M. Co. Castleton, Utah. See Vol. VIII.
Grand Marais Copper M. Co. Grand Marais, Minn.
Grand National Sm. Co. San Juan de Allende, Mex.
Grand Prize Copper M. Co. Lost lands, 1902. See Vol. III.
Grand Rapids C. Co. Sold lands to Saginaw Valley C. M. Co. See Vol. III.
Grand Republic Copper M. Co. Pearl, Colo. See Vol. VIII.
Grand View M. Co. Lands sold, 1907, to Night Hawk M. Co. Loomis, Wash.
Granite Creek Sm. & Red. Co. Golconda, Nev.
Granite Wells M. Co. Daggett, Cal. See Vol. VIII.
Grant Copper M. Co. Pearl, Colo. See Vol. VI.
Gray Copper M. Co., Ltd. Absorbed, 1911, by Lead King M. Co. Osburn, Idaho.
Great Belcher G. & C. Co. Merged in Great Belcher of Ariz. Co., also dead. See Vol. V.
Great Bonanza Gold Mng. Co., Ltd. Central City, Colo. See Vol. XI.
Great Copper Flat M. Co. Draper, Utah.
Great Divide G. Co. Redding, Cal.
Great Eastern Dev. Co. Globe, Ariz. See Vol. X.
Great Hope M. Co. Mojave, Cal. See Vol. VIII.
Great Lakes Copper Co. Algoma, Ont. See Vol. VIII.
Great Lakes M. & M. Co. Encampment, Wyo.
Great Lakes M. & S. Co. Encampment, Wyo. See Vol. VI.
Great Mammoth C. M. Co. Index, Wash.
Great Northern C. M. Co. Utah Hot Springs, Utah. See Vol. X.
Great Northern G. & C. Mng. Co. Lostine, Ore.
Great Northern M. Co. Burke, Idaho.
Great Northern M. Co. Baring, Wash.
Great Peck Mine Co. Providence, Ariz. See Vol. VIII.
Great Republic C. & G. M. Co. Succeeded, 1912, by Buckeye C. & G. M. Co. Turkey, Ariz.

- Great Standard Copper Mng. Co. Wyoming. See Vol. XI.
 Great Western C. Co. Globe, Ariz. See Vol. VIII.
 Great Western C. Co. Butte, Mont. See Vol. VI.
 Great Western C. Co. Reno, Nev. See Vol. VI.
 Great Western G. Co. Succeeded, 1909, by Afterthought C. Co. at Ingot, Cal. See Vol. VIII.
 Great Western G. & C. M. Co. Butte, Mont.
 Great Western M., M. & S. Co., Ltd. Pocatello, Idaho. See Vol. X.
 Green C. Co. Put out of business, 1906, by injunction secured by Amalgamated C. Co.
 Green Dragon C. Co. Greenwater, Cal. See Vol. VIII.
 Greene Gold-Silver Co. Temósachic, Mex. See Vol. VIII.
 Green Hope M. & M. Co. Guernsey, Wyo. See Vol. VI.
 Greenhorn C. M. Co. Cañon City, Colo. See Vol. VIII.
 Green Mountain C. Co. Raymond, Cal. See Vol. VIII.
 Green Mountain C. Co. Rinconada, N. M. See Vol. VII.
 Green Mountain C. M. Co. Property sold, 1904, to Saginaw Valley, C. M. Co.
 Green Mountain Mng. & Mllg. Co. Howardsville, Colo. See Vol. X.
 Green River C. Co. Superior, Ariz. See Vol. VIII.
 Greenwater, Arcturus C. M. Co. Greenwater, Cal. See Vol. VII.
 Greenwater Bimetallic C. M. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Black Jack C. M. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Black Oxide C. M. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater & Boston C. Co. Greenwater, Cal.
 Greenwater, Calif. C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater-Calumet C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Central C. Co. Greenwater, Cal. See Vol. X.
 Greenwater Cons. M. Co. Greenwater and Cima, Cal. See Vol. VIII.
 Greenwater C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater C. Helmet Co. Greenwater, Cal.
 Greenwater C. M. Co. Formerly at Greenwater, Cal. See Vol. VIII.
 Greenwater C. M. Syn. Greenwater, Cal. See Vol. VIII.
 Greenwater C. Queen M. Co. Greenwater, Cal.
 Greenwater C. Range M. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater & Death Valley C. Co. Greenwater, Cal. See Vol. X.
 Greenwater Death Valley C. M. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater & Death Valley Extens. Co. Greenwater, Cal.
 Greenwater El Captain C. Co. Greenwater, Cal.
 Greenwater Ely Cons. C. Co. Greenwater, Cal., and Ely, Nev. See Vol. VIII.
 Greenwater-Etna C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Furnace Creek C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Ibx C. & G. M. Co. Greenwater, Cal.
 Greenwater-Mohawk Mines Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Pay C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Polaris C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Prospectors Ex. Co. Merged, 1907, in C. Mines & Smelters Corp. of America. Greenwater, Cal. See Vol. VIII.
 Greenwater Red Boy C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater-Saratoga C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Sunset C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Superior C. M. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Victor C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater-Vindicator C. Co. Greenwater, Cal. See Vol. VIII.
 Greenwater Willow Creek C. Co. Greenwater, Cal. See Vol. VIII.

- Greenwood-Phoenix Tun. Co., Ltd.** Reorganized, 1909, as Greenwood-Phoenix Tramway Co., Ltd. Phoenix, B. C. See Vol. VIII.
- Grey Eagle G. M. Co.** Merged, 1901, in Granby Cons. M., S. & Power Co., Ltd.
- Greyton C. Mines Co.** Pearl, Colo.
- Grindall M. & S. Co.** Kasaan, Alaska. See Vol. VIII.
- Growler C. Co.** Was a reorganization of the Boston G.-C. Co. Succeeded by Colonial C. Co. Gila Bend, Ariz. See Vol. VIII.
- Guadalajara, S. A.; Fundición Metalurgica De.** Guadalajara, Mex. See Vol. VIII.
- Guadalupaño M. Co.** Torres, Sonora, Mex.
- Guadalupita; Cia. Min. De La.** Santa Engracia, Mex.
- Guardian C. M. Co.** Lands sold, 1906, to Butte Coalition M. Co. See Vol. V.
- Guaynopa Dev. Co.** Temósachic, Mex. See Vol. VIII.
- Guaynopa S. & Red. Co.** Merged, 1904, in Internat'l. Cons. S. & M. Co. See Vol. IV.
- Guaynopita C. Co.** Temósachic, Mex. See Vol. VIII.
- Guerrero Dev. Co.** Chilpancingo, Mex. See Vol. VI.
- Guggenheim-Greenwater C. Co.** Property sold, 1908, to Lee Cons. Mines Co. See Vol. VIII.
- Gum Tree G. M. & M. Co.** Succeeded by Gum Tree Cons. M. & M. Co. See Vol. VI.
- Gypsy Blair M. Co.** Sold lands, 1905, to Kennebec M. Co. Brighton, Utah.
- Hackberry M., M. & Dev. Co.** Dewey, Ariz. See Vol. VIII.
- Hadley Cons. C. Co.** Ketchikan, Alaska. See Vol. VIII.
- Haggarty Copper M. Co.** Rudefeha, Wyo.
- Haggarty-Jordan Copper M. Co.** Was a bad egg. Battle, Wyo. See Vol. VIII.
- Hague & Hulbert Expl'n. Co.** Laurium, Mich. See Vol. VIII.
- Halifax Copper Co.** Virgilina, Va.
- Halliwell Copper Co.** Ontonagon, Mich. See Vol. VIII.
- Hall Mines, Ltd.** Succeeded, 1900, by Hall M. Co., Ltd. Nelson, B. C.
- Hall Mining & Smelting Co., Ltd.** Nelson, B. C. See Vol. VIII.
- Ham; Clemente.** Promontorio, Mex.
- Hamilton Mining Co.** Matchwood, Mich. See Vol. II.
- Hamilton M., M. & Trans. Co.** Winfield, Colo.
- Hancock Copper M. Co.** Succeeded, 1906, by Hancock Cons. M. Co. Hancock, Mich. See Vol. II.
- Hancock Mines Co.** Organ, N. M. See Vol. III.
- Hancock Mining Co.** Succeeded, 1880, by Hancock C. M. Co. Hancock, Mich.
- Handspike C. M. Co.** Succeeded by Little North Fork C. M. & M. Co. Shoshone, Idaho. See Vol. X.
- Hane Copper M. Co.** Butte, Mont.
- Hannibal Cons. M. Co.** Silver City, Utah. See Vol. IX.
- Hanover Copper Co.** Hanover, N. M. See Vol. VIII.
- Hanover Mining Co.** Copper Harbor, Mich. See Vol. X.
- Hanover M. & M. Co.** Hanover, N. M. See Vol. V.
- Happy Jack C. M. & Dev. Co.** Was a bad egg. Valdez, Alaska. See Vol. VIII.
- Happy Jack M. Co.** Succeeded, 1910, by Happy Jack M. & Red. Co. Patagonia, Ariz. See Vol. VIII.
- Harcuvar Copper Co.** Wenden, Ariz. A. Gavigan Isbell. Wildcat. Liquidated 1914. See Vol. XI.
- Hardscrabble M. Co.** Magdalena, N. M. See Vol. VIII.

- Harrington M. Co.** Property the Tiger Mine. Crown King, Ariz.
H. C. Harrison. Cerralvo, N. L. Mex.
Hartford Cons. C. Co. Redding, Cal. See Vol. VIII.
Hartford C. & G. M. Co. Ketchikan, Alaska. See Vol. X.
Hartford M. Co., Ltd. Osburn, Idaho. See Vol. X.
Haskins Mining Co. Tucson, Ariz.
Hassayampa C. Co. Groom Creek, Ariz. See Vol. X.
Hassayampa G. & C. M. Co. Groom Creek, Ariz.
Hattie Bell C., G. & Nickel M. Co. Sold to Cons. C. Co. of Parry Sound, Parry Sound, Ont.
Hattie G. & C. M. Co. Doniphan, Idaho.
Hauxhurst Copper Co. Agua Caliente, Ariz. See Vol. X.
Hawkeye Copper M. Co. Encampment, Wyo. See Vol. VII.
Hawkeye Mining Co. Encampment, Wyo. See Vol. X.
Haynes Copper Co. Jerome, Ariz. Bankrupt. Property owned by Verde-Calumet C. Co.
Hayman M. & Tunnel Co. Cripple Creek, Colo.
Hazel Co. Succeeded by Butte-Homestake C. M. Co. Butte, Mont. See Vol. VIII.
Headlight Copper M. Co. Encampment, Wyo. See Vol. II.
Heart of Ariz. G. & C. Co. Mayer, Ariz. See Vol. VI.
Heath Mining Co. Heath, Idaho. See Vol. X.
Heckley G. & C. M. Co. Wickenburg, Ariz.
Hecla & Ariz. Dev. Co. Title changed, 1903, to Red Jacket & Bisbee Dev. Co. Bisbee, Ariz.
Hecla & Ariz. G. & C. M. Co. Bisbee, Ariz. See Vol. VIII.
Hecla Cons. M. Co. Lands sold to Ariz. Cons. Mines Co., 1909. Wellton, Ariz.
Hecla Cons. M. Co. Dillon, Mont. See Vols. VI and VIII.
Hecla C. & G. M., M. & S. Co. Reorganized, 1904, as Hecla M. Co. Hecla, Wyo.
Hecla Copper M. Co. Encampment, Wyo. See Vol. II.
Hecla Mining Co. Merged, 1909, in Hecla Cons. Mines Co. Hecla, Wyo. See Vol. VIII.
Heffern M. & Dev. Co. Courtland, Ariz. Bankrupt. See Vol. X.
Helena-Butte M. Co. Clancey, Mont. See Vol. XI.
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Hendrick's Twenty C. Properties. Copper Creek, Ariz. See Vol. X.
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Mastodon G. & C. Co. Idaho. Succeeded by Pennsylvania M. & M. Co.
Matilda M. Co. Utah. Lands sold, 1910, to Chief Cons. M. Co.
Matracal G. & C. M. Co. Mex. Property sold, 1909, to Indé Red'n. Co.
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 Oquirrh-Bingham C. Co. Bingham Canyon, Utah. See Vol. VI.
 Orange Blossom Extension M. & M. Co. Company dissolved 1910. Bagdad, Cal. See Vol. IX.
 Orange Blossom M. & M. Co. Forced into receivership and succeeded, 1910, by Bagdad M. & M. Co. Bagdad, Cal. See Vol. VIII.
 Ordenaura M. Co. Velardeña, Dur. Mex.
 Ore Knob C. Co. Jefferson, N. C. See Vol. X.
 Ore Knob M. Co. Jefferson, N. C. See Vol. V.
 Oregon & Arizona M. Co. Old Glory, Ariz. See Vol. VIII.
 Oregon Homestead M. & Red. Co. Galice, Ore. See Vol. VIII.
 Oregon Ore Red. Works. A fake. Portland, Ore. See Vol. II.
 Oregon Short Line M. Co. Sold lands to Bristol Cons. Mines Co. Pioche, Nev.
 Oregon Sm. & Ref. Co. Reorganized as Northwest Sm. & Ref. Co. Sumpster, Ore. See Vol. VIII.
 Orford Copper Co. Bayonne, N. J. Absorbed by Internat'l Nickel Co., 1912.
 Orient Gold M. Co. Succeeded by Orient Gold Mines, Ltd. Bossburg, Wash. See Vol. X.
 Oriental M. & M. Co. Succeeded, 1913, by Aladdin M. Co., Providence, Ariz.
 Original Cons. M. Co. Butte, Mont. See Vol. VIII.
 Original Yerington C. Co. Yerington, Nev. No trace of operations.
 Oriole M. & M. Co. Succeeded by Metaline Oriole M. Co., 1910. Metaline, Wash.
 Orion M. Co. Lordsburg, N. M. See Vol. VIII.
 Orion Oro Dev. Co. Vicksburg, Ariz.
 Orizaba Cons. M. & S. Co. Modena, Utah. See Vol. X.
 Oro Cons. M. Co. Mineral Point dist., Yavapai Co., Ariz. See Vol. X.
 Oro Denoro Mines, Ltd. Succeeded by Denoro Mines, Ltd. Rossland, B. C. See Vol. V.
 Oro Grande M. Co. Globe, Ariz. See Vol. VIII.
 Oro Maximo M. Co. Bacoachi, Son., Mex. See Vol. X.
 Oro Plata M. & Dev. Co. Dillon, Mont. See Vol. VIII.
 Orogrande Sm. Co. Orogrande, N. M. See Vol. IX.
 Osceola G. & C. M. Co. Property sold, 1902, to North American C. Co. Rudefeha, Wyo.
 Osceola Junior M. Co. Dillon, Wyo. See Vol. X.
 Otate Copper Co. Llano, Son., Mex.
 Ottumwa C. Co. Holmes, Wyo.
 Ouras; Cia. Min. Cas. Tepezalá, Mex. See Vol. IV.
 Ouray Chief M. Co. Ouray, Colo.
 Ouray Cons. M. Co. Ouray, Colo. See Vol. X.
 Overland G. M. Co. Cableville, Ore.
 Overlock Copper Co. Moctezuma, Son., Mex. Owned by Arizona & New Mexico Trading Co., % E. R. McBurnie, Douglas, Ariz.
 Owl Head M. Co. Succeeded, 1910, by Owl Head C. Co. Red Rock, Ariz. See Vol. VIII.
 Pacific Coast C. Co. Reorganized as Pacific Coast M., M. & Dev. Co., also dead. Ketchikan, Alaska.

- Pacific Coast of Mexico Expl'n. Co.** Mex. No trace of operations secured.
Pacific Coast Ore Sampling Works. Oakland, Calif.
Pacific Coast Sm. & Ref. Works. Bay Point, Cal.
Pacific Cons. M. Co. Reno, Nev. See Vol. VIII.
Pacific Cons. M. & S. Co. Property sold, 1913, to Ely Cons. Copper Co., Nev.
Pacific Copper Expl'n. Co. Prescott, Ariz. See Vol. X.
Pacific Dev. Co. Riddle, Ore. See Vol. IX.
Pacific Gold & Copper Co. No trace of operations.
Pacific G. & C. M. Co. Ocotlán, Oax., Mex. See Vol. VIII.
Pacific Metals Co. Operated on Glacier Creek, Goose Bay, B. C. 1910-11.
Pacific Mining Co. Operated in Ontonagon Co., Mich., in the '60s.
Pacific Mng. & Metals Co. Globe, Ariz. See Vol. VI.
Pacific M., M. & Sm. Co. Oregon. No trace of operations.
Pahgamarry Copper Co. Delaware Water Gap.
Palace G. & C. Co. Was a swindle. Wickenburg, Ariz. See Vol. VIII.
Pallant & Stoffel. Charcas, S. L. P., Mex. See Vol. VIII.
Palm Dev. Co. Acton, Cal. See Vol. VI.
Palmer Mountain C. M. & M. Co. Loomis, Wash. See Vol. VIII.
Palmer Mountain G. M. & Tun. Co. Reorganized, 1905, as Palmer Mtn. Tunnel & Power Co., a swindle, succeeded by Palmer Mtn. Tun. Co., reorganized, 1912, as Tillicum Dev. Co. See Part I. Loomis, Wash.
Palo Verde C. M. Co. Vail, Ariz. See Vol. VIII.
Palo Verde M. Co. Yucca, Ariz. See Vol. X.
Paloma M. Co. Ayutla, Jal., Mex. See Vol. VI.
P. A. Mining Co. Succeeded, 1911, by Keystone-Arizona C. Co., also dead. Skull Valley, Ariz.
Panama C. M. Co. Curlew, Wash. See Vol. X.
Pan-American Dev. Co. Aguacaliente de Baca, Sin., Mex. See Vol. VIII.
Pan-American Expl'n. Co. Manzanillo, Col., Mex. See Vol. VIII.
Pan-American Federal Sm. & Ref. Co. Had option on the old Billings Smelter, Socorro, N. M. See Vol. X.
Pan-American Mines Co. Etzatlán, Jal., Mex. See Vol. V.
Panamint Greenwater G. & C. M. Co. Was a Denver swindle. Greenwater, Cal. See Vol. VIII.
Panamint M. Co. No trace of operations.
Panamint Mtn. Mines Syn. Operated, 1910, in the Wild Rose district; Inyo Co., Cal.
Panhandle M. & Sm. Co. Coolin, Idaho. See Vol. X.
Panhandle Sm. Co., Ltd. Ponderay, Idaho. See Vol. VIII.
Pánuco C. Co., Ltd. Lands sold, 1905, to Continental Copper Co. Pánuco de Monclova, Coah., Mex. See Vol. V.
Paola Mining Co. Central City, Colo.
Papago Copper Co. Tucson, Ariz. See Vol. VIII.
Papago Mining Co. Aztec, Ariz.
Paradise Dev. Co. Succeeded, 1907, by Paradise M. Co. Paradise, Ariz. See Vol. VI.
Paradox C.-G. Mining Co. Absorbed, 1903, by San Juan Sm. & Ref. Co. Silverton, Colo.
Paragon Dev. Co. Operated near Redding, Cal., 1901.
Park City Queen M. Co. Utah. No trace of operations.
Park City Majestic M. Co. Park City, Utah. See Vol. IV.
Park City M. Co. Keller, Wash. See Vol. X.
Park Copper Co. Elkhorn, Mont. See Vol. X.
Park C. M. Co. Dillon, Mont.
Parker-Brown M. Co. Nev. No trace of operations.
Parker G. & C. M. Co. Parker, Ariz. See Vol. X.

- Parks Copper Mines Co.** Ely, Nev.
Parks Mining Co. Polaris, Mont.
Parral Sm. Co. Parral, Chih., Mex. See Vol. VIII.
Parrot M. & M. Co. Leadville, Colo. See Vol. VIII.
Par Value Cons. G. & C. Co. Turret, Colo. See Vol. VIII.
Paso G. & C. Producing Co. Brighton, Utah.
Passaic Mining Co. Operated, 1847, near Bellville, N. J.
Pass City C. Co. Ahumada, Chih., Mex. See Vol. VIII.
Patagonia Mining Co. Succeeded by Hardshell Flux M. and Dev. Co.
 Owned the R. R. R. mine, under bond, 1913, to N. L. Amster.
Patch M. & M. Co. Central City, Colo.
Pathfinder Cons. Mines, Ltd. Grand Forks, B. C. See Vol. VIII.
Pathfinder G. & C. Co. Atlanta, Idaho. See Vol. VIII.
Paudorne Copper M. Co. Houston, Va. See Vol. X.
Pay Car Mines Co. Bouse, Ariz.
Pay Copper Co. Greenwater, Cal. See Vol. VIII.
Paymaster Cons. Mines Co. Succeeded, 1909, by Victoria Dev. Co. Tucson, Ariz. See Vol. VIII.
Paymaster Copper Mining Co. Encampment, Wyo. No trace of operations.
Paymaster Mining Co. Wash. No trace of operations.
Paymaster M. & S. Co. Operated in Coconino Co., Ariz., 1906.
Peach Bottom Copper Co. Elk Creek, N. C. See Vol. III.
Peacock Copper Co. Lavic, Cal. See Vol. V.
Peacock Copper M. & M. Co. Idaho. New Jersey charter forfeited, 1905.
Peak Copper Co. Bessemer, Mich. See Vol. III.
Pearl Cons. M. Co. Property, in Ferry Co., Wash., sold 1910.
Pearl Copper M. Co. Pearl, Colo.
Pearl C. M. & S. Co. Pearl, Colo. See Vol. VIII.
Pearl Sm. Co. Pearl, Colo. See Vol. VI.
Peck Mining Co. Lands passed to Great Peck M. Co. Providence, Ariz.
Peerless C. Extraction Co. Florence, Ariz. See Vol. X.
Peerless G. & C. M. Co. Silver Cliff, Colo. See Vol. X.
Peerless San Juan M. Co. Silverton, Colo.
Pellon Copper King Mines. Ariz. No trace of operations.
Pend D'Oreille G. & C. M. Co. Davenport, Wash.
Peninsula C. M. Co. Property sold, 1895, to Franklin M. Co., Houghton, Mich.
Peninsula M. Co. Organized about 1846, but never operated. Houghton, Mich.
Peninsula M. & S. Co. Lost lands, 1904. Santa Catarina, Baja Cal. Mex. See Vol. V.
Penn-Arizona C. Co. Skull Valley, Ariz. See Vol. X.
Penn Chemical Works. Reorganized, 1910, as Penn Mining Co. Campo Seco, Cal. See Vol. VIII.
Penn Mining Co. Sold lands to Lake and Cherokee Copper Co.'s. Lake Mine, Ontonagon Co., Mich. See Vol. II.
Penn Mining Co. N. M. Succeeded, 1912, by Mulberry M. Co.
Penn-Mont M. & M. Co. Elliston, Mont. See Vol. X.
Pennsylvania & Arizona Cons. C. Co. Hot Springs, Ariz. See Vol. VIII.
Pennsylvania & Cananea C. Co. Merged, 1909, in Duiuth & Sonora M. Co. Cananea, Son., Mex. See Vol. VIII.
Pennsylvania, Cananea & Globe M. Co. Globe, Ariz. See Vol. VIII.
Pennsylvania C. Co. San Pedro, N. M. See Vol. VI.
Pennsylvania C. M. Co. Delaware charter repealed, 1903. Was a bad egg promoted by Paul Morris & Co. Pottstown, Pa. See Vol. VI.
Pennsylvania M. Co. of Mich. Operated in Keweenaw county, 1861-71.

- Pennsylvania Mining Co.** Merged in New England Lead-Zinc Mines Co. of N. M. Los Cerillos, N. M. See Vol. X.
- Pennsylvania M. & M. Co.** Succeeded by Royal M. Co., Idaho.
- Pennsylvania & Montana M. Co.** Succeeded by Western Reserve M. Co. Basin, Mont. See Vol. X.
- Percival Mining Co.** Succeeded, 1898, by Percival C. M. Co., also dead. Gordon, Wis.
- Percy-Chester Cons. M. Co.** Succeeded by Percy-Chester Mines Co., also dead. Red Cliff, Colo. See Vols. VIII and X.
- Perico Expl'n. Co.** Mex. No trace of operations.
- Perkiomen Cons. M. Co.** Shannonville, Pa.
- Permian & Trans-Pecos C. Co.** Texas charter forfeited, 1905, for taxes.
- Perseverance M. Co.** Owned White Pine group. Warm Springs, Mont.
- Peruvian M. & M. Co.** Alta, Utah. See Vol. VIII.
- Petanque M. Co.** No trace of operations.
- Petherick M. Co.** Property sold, 1877, and now part of Ashbed M. Co.'s property, Mich.
- Petoskey M. Co.** Williams, Ariz. See Vol. X.
- Petro M. Co.** Lands sold, 1905, to Utah-Apex M. Co. Bingham Canyon, Utah.
- Pewabic M. Co.** Wound up, 1905, and lands passed to Quincy M. Co. Hancock, Mich. See Vol. II.
- Pfau Gold M. & Ref. Co.** Merged, 1907, in Verde River Copper Co. Jerome, Ariz.
- Phi Delta Theta C. M. Co.** Dillon, Carbon Co., Wyo.
- Philadelphia & Arizona M. Co.** Chloride, Mohave Co., Ariz. See Vol. VIII.
- Philadelphia & Boston M. Co.** Operated in Keweenaw Co., Mich., years ago.
- Philadelphia C. & G. M., M. & Sm. Co.** Organized, 1910, as La Regina M. Co. San Martin Hidalgo, Jalisco, Mex. See Vol. VIII.
- Philadelphia C. Mines Co.** Sold property, 1911, for \$164,000 to United States Copper Co. N. M.
- Philadelphia M. & M. Co.** Succeeded, 1906, by Hillsboro Cons. Mines Co. Hillsboro, N. M.
- Phoenix Amal. C. Mines, Ltd.** Phoenix, B. C. See Vol. VIII.
- Phoenix C. Co.** Succeeded by Phoenix Cons. C. Co., Mich.
- Phoenix & Eastern Sm. & Ref. Co.** Phoenix, Ariz. Regarded with suspicion. See Vol. X.
- Phoenix G. & C. M. Co.** Tenabo, Nev. See Vol. X.
- Phoenix M. Syn.** Berlin, Wash. See Vol. VIII.
- Pic C. & G. M. Co. of Lake Superior, Ltd.** Port Arthur, Ont.
- Picacho Blanco M. Co.** Property passed to Cababi M. Co. Morristown, Ariz. See Vol. VIII.
- Picayune Mining Co.** Payson, Utah. See Vol. X.
- Piedmont C. Co.** New Jersey charter forfeited, 1904, for non-payment of taxes.
- Piedmont C. M. & S. Co.** Elkton, Va. See Vol. VIII.
- Piedras Verdes M. Co.** Fuerte, Sin., Mex.
- Pierce M. Co.** Central City, Colo. See Vol. X.
- Picket Creek Dev. Co.** Merlin, Oregon. Vol. XI.
- Pilot Butte Copper M. Co.** Succeeded, 1910, by Pilot Butte M. Co. Butte, Mont. See Vol. VIII.
- Pilot Butte Mng. Co.** Butte, Mont.
- Pilot Knob C. M. Co.** Nev. No trace of operations.
- Pilot Range M. Co.** Luning, Nev. See Vol. VIII.
- Pioneer Smelting Co.** Reorganized as the Pioneer Mining & Smg. Co.
- Pima C. M. & S. Co.** Ariz. No trace of operations.

- Pinal Butte G. & C. Co. Forbestown, Cal. See Vol. VIII.
- Pinal Copper Co. Reorganized, 1905, as Arizona Banner C. Co. Globe, Ariz. See Vol. VI.
- Pinal Mining Co. Ariz. New Jersey charter forfeited, 1904, for non-payment of taxes.
- Pinal Mtn. C. Co., Ltd. Globe, Ariz.
- Pinal Mtn. M. Co. Globe, Ariz. See Vol. X.
- Pine Mtn. C. Co. Globe, Ariz. See Vol. X.
- Pintado Copper Co. Pintada, N. M. See Vol. X.
- Pinto Copper Co. Santa Rita, N. M. See Vol. VIII.
- Pinto Creek C. Co. Title changed to Arizona & Hancock M. Co., which see.
- Pinto Creek M. & S. Co. Ariz. Succeeded, 1911, by Manitou Hill C. Co. Vol. X.
- Pioche & Arizona C. & G. M. Co. Bouse, Ariz. See Vol. IX.
- Pioche Monitor M. Co. Pioche, Nev.
- Pioneer C. & S. M. Co. Oasis, Cal. See Vol. X.
- Pioneer Walker Lake G. & C. M. Co. Yerington, Nev. See Vol. VIII.
- Piscataugua Mining Co. Mich. Lands sold, 1853, to Bohemian M. Co.
- Pit River G., S. & C. M. Co. Redding, Cal.
- Pitechin Copper Co. Me. No trace of operations.
- Pittsburg & Arizona Gold & Copper Co. Property sold, 1912, to satisfy judgment for \$52,533. Tombstone, Ariz.
- Pittsburg & Arizona M. Co. Johnson, Ariz. See Vol. VIII.
- Pittsburgh & Boston Copper Co. Property sold to Tamarack M. Co. Phoenix, Mich. Described under title Cliff mine, Vol. II.
- Pittsburgh & Boston Copper Harbor Co. Operated, 1846, in Keweenaw Co., Mich.
- Pittsburg & Chippewa Co. Operated near Lac La Belle, Mich.
- Pittsburg & Chiricahua Development Co. Paradise, Ariz.
- Pittsburg Copper Co. Clayton, N. M. See Vol. X.
- Pittsburg C. M. & Red. Co. Planet, Ariz. Was a swindle by Theo. Stegner, notorious character with a prison record. See Vol. VIII.
- Pittsburg & Duluth Dev. Co. Succeeded, 1904, by Pittsburg & Duluth M. Co. Bisbee, Ariz. See Vol. IV.
- Pittsburg & Duluth M. Co. Merged, 1907, in Superior & Pittsburg M. Co. Bisbee, Ariz. See Vol. VI.
- Pittsburg & Greenwater C. Co. A Dr. J. Grant Lyman swindle. Greenwater, Cal. See Vol. VIII.
- Pittsburg & Hecla Dev. Co. Bisbee, Ariz. See Vol. V.
- Pittsburg-Idaho M. Co. Succeeded by Pittsburg-Idaho M. & M. Co. Greer, Idaho. See Vol. VI.
- Pittsburg & Isle Royale M. Co. Operated, 1846-1858. Isle Royale, Mich.
- Pittsburg-Jerome C. & G. M. Co. Succeeded, 1904, by Pittsburg-Jerome C. Co. Jerome, Ariz.
- Pittsburg-Mayer M. Co. Reorganized, 1909, as Mayer Cons. M. Co. Mayer, Ariz. See Vol. X.
- Pittsburg Mining Co. Operated, 1852-1856, Ontonagon Co., Mich.
- Pittsburg M. & M. Co. White Bird, Idaho.
- Pittsburg & Montana Copper Co. Butte, Mont. See Vol. XI.
- Pittsburg-New York Copper Mng. Co. Marysville, Mont. See Vol. XI.
- Pittsburg, Philadelphia & Lake Superior C. M. Co. Mich. No trace of operations.
- Pittsburg & Portage Lake M. Co. Mich. No trace of operations.
- Pittsburg & Sonora Dev. Co. Cumpas, Son., Mex. See Vol. VIII.
- Pittsburg & Tennessee C. Co. Property owned by Tennessee C. Co. Copper Hill, Tenn.

- Pittsburg & Utah G., S., C. & L. M. Co.** Ophir, Utah.
Piute Copper Mines Co. No trace of operations.
Piute G. & C. M. Co. Utah charter forfeited, 1910, for non-payment of taxes.
Pizarro C. M. Co. Was a swindle. Silver City, N. M. See Vol. VIII.
Placerville C. M. & Red. Co. Placerville, Colo. See Vol. X.
Plainfield C. M. Co., N. Y. No trace of operations.
Planet C. M. Co. Succeeded, 1909, by New Planet C. M. Co. Planet, Ariz. See Vol. VIII.
Plant & Callahan M. Co. Conconully, Wash.
Plata Cobre M. & Trans. Co. Florence, Ariz. See Vol. VI.
Plata C. M. Co. Pima, Ariz.
Platte C. M. Co. Encampment, Wyo. See Vol. VIII.
Pleasant View M. & M. Co. Kellogg, Wash.
Plenty Copper Co. Pima, Ariz.
Plutus Cons. M. & M. Co. Utah. No trace of operations.
Poland-American G. M. & M. Co. Humboldt, Ariz. See Vol. X.
Poland Extension G. M. & M. Co. Merged, 1904, in Poland-American G. M. & M. Co. Formerly at Poland, Ariz. See Vol. V.
Polk County Copper Co. Copper Hill, Tenn. Property owned by the Tennessee C. Co.
Polkinghorn Mining Co. Ingot, Calif.
Pollyton Gold M. Co. Holmes, Wyo. See Vol. X.
Pomeroy United C. Co. Tonopah, Nev.
Ponderoy Copper Co. Operated, 1908, Barker Mtn., Wash.
Ponderosa C. Co. Bagdad, Cal. See Vol. VIII.
Pontiac Copper Mines, Ltd. Changed title, 1906, to Keremeos-Pontiac Mines, Ltd. Olalla, B. C.
Pontiac G. & C. M. Co. Tres Piedras, N. M.
Pontiac M. Co. Property sold, 1895, to Quincy M. Co., Houghton, Mich.
Pontiac Mining Co. Virgilina, Va. See Vol. XI.
Porcupine Mtn. M. Co. Succeeded, 1901, by Porcupine Mtn. Copper Co. also dead. Ontonagon, Mich.
Portage Lake & Calumet Dev. Co. Reorganized, 1903, as Portage Lake & Bisbee M. Co. Bisbee, Ariz.
Portage Lake & Copper River M. Co. Mich. No trace of operations.
Portage Mining Co. Succeeded, 1860, by Grand Portage M. Co. Mich.
Portage Mining Co. of N. Y. Operated in Houghton Co., Mich., about 1846.
Portland Copper Co. Calumet, Mich. Merged in Calumet & Hecla M. Co., 1871.
Portland Copper Co. Berlin, Wash. See Vol. X.
Portland C. M. Co. Rambler, Wyo. See Vol. VIII.
Portland G. & C. M. Co. Spirit Lake, Wash. See Vol. X.
Portland-Imnaha C. M. Co. Imnaha, Ore. Disincorporated, 1902, with all debts paid.
Portland Luning C. Co. Luning, Nev. See Vol. VIII.
Portland (Rossland) Mine, Ltd. Merged, 1904, in Velvet-Portland Mine. Ltd. Rossland, B. C. See Vol. IV.
Portlock Harbor C. M. Co. Wash. No trace of operations.
Porvenir De Sonora Co. Reorganized, 1902, as Coast Line Copper Co. Calera, Son., Mex.
Postal G., Platinum & C. M. Co. Rambler, Wyo. See Vol. V.
Postal Savings M. & M. Co. Centennial, Wyo. See Vol. VIII.
Potomac C. Co., N. Y. No trace of operations.
Potomac Mining Co. Dumfries, Va.
Potosi M. Co., Ltd. Silver City, Idaho.

- Potosina; Cia. Min. Charcas, S. L. P., Mex.
 Potrerillos; Cia. Min. Chañaral, Chile.
 Premier Copper M. Co. No trace of operations or lands.
 Premier, M., M. & Leasing Co. Pinos Altos, N. M. See Vol. VIII.
 President C. & G. M. Co. Boulder, Mont. See Vol. X.
 Presidential Mining Co. Owned Hosey mine, Patagonia, Ariz. See Vol. VIII.
 Preston Peak Copper Co. Yreka, Cal. West Virginia charter forfeited 1902; lands sold, 1907, by sheriff. See Vol. V.
 Pride of Arizona C. Co. Prescott, Ariz.
 Pride M. Co. Montezuma, Colo. See Vol. IV.
 Pride of the West M. & M. Co. Patagonia, Ariz. See Vol. II.
 Priest Lake Mng. & Smg. Co. Coolin, Idaho.
 Prince Copper Co. Bisbee, Ariz.
 Prince M. & Dev. Co., Ltd. Revelstoke, B. C. See Vol. X.
 Prince of Wales C., G. & S. M. Co. Utah charter forfeited, 1910, for unpaid taxes.
 Prince William C. Co. Valdez, Alaska. See Vol. VIII.
 Prince William Sound Amal. C. Co. Ellamar, Alas. See Vol. VIII.
 Prince William Sound M. Co. Valdez, Alas. See Vol. VIII.
 Prince William Sound M. Dev. Co. West Virginia charter forfeited, 1902, for unpaid taxes.
 Princess Royal G. & C. M. Co. Port Essington, B. C. See Vol. VII.
 Princeton M. Co. Princeton, B. C. See Vol. X.
 Princeton Copper Mng. & Smg. Co. Ft. Huachuca, Ariz.
 Producer G. & C. M. & M. Co. Encampment, Wyo. See Vol. VIII.
 Producer M. Co. Idaho Springs, Colo. See Vol. X.
 Producer M. & S. Co. Lands reverted to former owner. Casa Grande, Ariz. See Vol. VI.
 Promontorio Cons. M. Co. Nogales, Son., Mex. See Vol. VIII.
 Promontorio M. & S. Co. Lampasos, Son., Mex.
 Promontory Signal M. Co. Promontory Point, Utah. See Vol. X.
 Pro Patria M. & M. Co. Succeeded, 1911, by Rico Mining Co., Rico, Colo.
 Prosper G. M. Co. Hillsboro, N. M.
 Protective M. Co. Succeeded, 1908, by Skagit Queen Cons. M. Co.
 Providence Copper Co. Paradise, Ariz. See Vol. XI.
 Providence C. M. Co. Belen, N. M. See Vol. X.
 Providence G. & C. Co. Kelso, Cal. See Vol. X.
 Providencia G., S. & C. Mining Co. Tucson, Ariz. See Vol. VI.
 Providence M. Co., Ltd. Greenwood, Boundary district, B. C. See Vol. X.
 Prudential M. Co. Crescent City, Cal. See Vol. X.
 Prudential M. & Dev. Co. Patagonia, Ariz. See Vol. X.
 Psyche M. Co. Greenhorn, Ore. See Vol. VI.
 Pueblo Copper M. & M. Co. Johnson, Utah. See Vol. VIII.
 Puertecito Copper Co. Cananea, Son., Mex. See Vol. III.
 Puget Sound C. Co. New Jersey charter forfeited, 1903, for non-payment of taxes.
 Puget Sound Inv. Co. Van Anda, Texada Id., B. C. See Vol. III.
 Pugwash Cons. M. & S. Co. Pugwash, Nova Scotia. See Vol. VI.
 Pugwash River C. Co. Pugwash, Nova Scotia. See Vol. IV.
 Puritan Copper & Gold M. Co. Tres Piedras, N. M. See Vol. II.
 Puritan G. & C. Co. Bingham Canyon, Utah. See Vol. X.
 Pyne Smelting Co. West Alameda, Cal. See Vol. VIII.
 Pyramid Copper Co. La Sal, Utah. See Vol. VIII.
 Pyramid Copper Syn., Ltd. Dissolved, 1905. Golden, B. C. See Vol. V.
 Pyramid G. & C. M. Co. Prescott, Ariz. See Vols. V. and VI.

- Pyramid Peak M. Co.** Lands sold 1905 by sheriff. Lordsburg, N. M. See Vol. VI.
- Pyrite King C. M. Co.** Operated, 1904, in the Black Hills, S. D.
- Q. S. Gold M. & S. Co.** Property sold, under foreclosure, 1909. Reorganized as Q. S. Mng. Co. Conconully, Wash. See Vol. VIII.
- Quebec Copper Co., Ltd.** Deadwood, B. C.
- Queen of Arizona C. Co.** Merged, 1902, in Great Belcher of Ariz. Co. Providence, Ariz. See Vol. III.
- Queen Bee M. & M. Co.** Succeeded, 1902, by Wyoming Queen M. Co. Jelm, Albany Co., Wyo.
- Queen Gold & Copper M. & S. Co.** Wonder, Ore. See Vol. VIII.
- Queen Princess C. Co.** Merged, 1909, in Copperfield Cons. M. Co. Copperfield, Colo. See Vol. VIII.
- Queen Regent C. & G. Co.** Succeeded by Queen Regent Merger Mines Co. See Vol. VIII.
- Quincy & Arizona Dev. Co.** Bisbee, Ariz. See Vol. IV.
- Quincy M. Co.** Property sold, 1902, to Daly West M. Co. Park City, Utah.
- Rainbow Mining Co.** Crown King, Ariz. See Vol. VIII.
- Rainbow Mining & Copper Co.** Eureka, Cal.
- Rainbow M. & M. Co.** Riddle, Ore. See Vol. X.
- Rambler Copper M. Co.** Lands sold, 1903, to Lion C. M. Co. Stoddard, Ariz. See Vol. IV.
- Rambler Copper M. Co.** Succeeded, 1902, by Rambler M. & S. Co. Holmes, Wyo.
- Rambler Mining Co.** Rambler, Wyo. See Vol. VII.
- Rambler M. & S. Co.** Succeeded, 1908, by Rambler C. & Platinum Co. Holmes, Wyo. See Vol. VII.
- Rankin Copper Mining Co.** Rawlins, Wyo.
- Rattler Mining Co.** Globe, Ariz. See Vol. VIII.
- Raven Mining Co.** Reorganized as Raven Copper Co. which was dissolved March, 1911. Butte, Mont. See Vol. VIII.
- Ray-Arizona Copper Co.** Ray, Ariz. See Vol. X.
- Ray Coalition Copper Co.** Supposed to have held lands near Ray, Ariz. See Vol. X.
- Ray C. Mines, Ltd.** Lands sold, 1907, to Ray Cons. C. Co. Ray, Ariz. See Vol. VI.
- Ray Extension Copper Co.** Ray, Ariz. See Vol. X.
- Ray Northern Copper Co.** Ray, Ariz. See Vol. X.
- Raymond C. & Silver M. Co.** Clancey, Mont. See Vol. X.
- Raynor Copper M. Co.** Lewis, Cal. See Vol. VI.
- Raypinco Mining Co.** Succeeded, 1910, by Calzona M. Co. Cal.
- Real Del Monte Union y Bilbao; Neg. Min.** Ojocaliente, Zacatecas, Mex.
- Realito Gold, Silver & Copper Co.** Alamos, Son., Mex.
- Realty Syn.** Succeeded by California Improvement Co. Mills College, Cal. See Vol. V.
- Red Bird M. Co.** Austin, Mont. See Vol. X.
- Red Cloud M. Co.** Salton, Cal. See Vol. VIII.
- Red Cloud M. Co.** Cananea, Son., Mex. See Vol. VIII.
- Red Fox Mining Co.** McGuigan, B. C.
- Red Gulch Gold-Copper M. & M. Co.** Merged, 1909, in Copperfield Cons. M. Co. Copperfield, Colo. See Vol. VIII.
- Red Hill M. & S. Co.** Victor, Cal. See Vol. VIII.
- Red Horse Copper Co.** Springston, Idaho. See Vol. X.
- Red Jacket & Bisbee Dev. Co.** Bisbee, Ariz. See Vol. IV.

- Red Metal M. Co.** Property sold, 1909, to Turkey Creek M. & Dev. Co. Paradise, Ariz.
- Red Metal M. Co.** Luning, Nev. See Vol. VIII.
- Red Metal Cop. Mng. Co.** Dissolved, 1913. See Butte Coalition.
- Red Mountain Copper-Gold M. Co.** Cisco, Cal. See Vol. IX.
- Red River Copper Co.** Red River, N. M. Owned Anaconda mine.
- Red Rock Copper Co.** Red Rock, Ariz. See Vol. X.
- Red Wing Extens. M. Co.** Title changed, March, 1906, to Massasoit M. Co. Bingham Canyon, Utah. See Vol. VI.
- Red Wing M. & M. Co.** Succeeded, 1900, by New Red Wing M. Co. Bingham Canyon, Utah.
- Redwood Copper Mng. Co.** Chewelah, Wash.
- Redding Gold & Copper M. Co.** Redding, Cal. See Vol. X.
- Reforma Mining Co.** Fuerte, Sinaloa, Mex.
- Refugio Syn., Ltd.** Wound up and property abandoned. Cananea, Son., Mex. See Vol. X.
- Reina; Cia. Min. la.** Sold lands, 1907, to Mexican Mines Syn., Ltd. Cusi-huiriac, Chih., Mex. See Vol. VII.
- Reina De Cobre, S. A.; Cia. Min.** Ejutla, Oax., Mexico. See Vol. X.
- Reina de Cobre de Sonora; Cia. Min.** Caborca, and Santa Ana, Son., Mex. See Vol. VIII.
- Reliance Gold & Copper M. Co.** Turkey, Ariz. See Vol. VIII.
- Reliance Gold M. Co.** Groom Creek, Ariz. See Vol. VI.
- Reliance M. & M. Co.** Lands passed to Gem Cons. M. Co. Tenabo, Nev. See Vol. VIII.
- Reliance M. & M. Co.** Hunterstown, Pa.
- Rendall Ore Red. Co.** Lands sold to Ajo C. Co., 1909. Ajo, Ariz. See Vol. VIII.
- Republic Cons. M. & M. Co.** Idaho Springs, Colo. See Vol. VI.
- Rescue Copper Co.** Merged, 1907, in Cornelia C. Co. Ajo, Ariz. See Vol. VII.
- Reservation M. & S. Co.** Lands sold, 1907, to Dominion C. Co., Ltd. Danville, Wash.
- Resolute Copper Co.** Lands sold, 1905, to Keweenaw C. Co. Central Mine, Mich. See Vol. II.
- Restauradora M. & M. Co.** Huautla, Morelos, Mex. See Vol. X.
- Revenue M. & M. Co.** Encampment, Wyo. See Vol. VI.
- Reward Copper M. Co.** Vekol, Ariz. See Vol. X.
- Reward Gold-Copper M. Co.** Princeton Boundary district, B. C. See Vol. VIII.
- Rex Cobre M. Co.** Safford, Ariz. See Vol. VIII.
- Rex Gold Mines & Investmt. Co.** Leadville, Colo. See Vol. XI.
- Reyes; Cia. Min.** Los Zitácuaro, Mich., Mex.
- Richard III Dev. Co. Ltd.** Succeeded, 1904, by Richard III M. Co. Mt. Sicker, Vancouver Id., B. C. See Vol. VI.
- Richfield Cons. M. Co.** Bingham Canyon, Utah. See Vol. IX.
- Richfield M. Co.** Succeeded, 1908, by Richfield C. Co. Querobabi, Son., Mex. See Vol. VI.
- Richmond Group Gold Mines Co.** Hillsboro, N. M. See Vol. VI.
- Richmond M. Co.** Merged, 1905, in Richmond-Eureka M. Co. Eureka, Nev.
- Rickard Ely C. Co.** Property sold, 1909, for \$84,000, to Thos. F. Cole. Ely, Nev. See Vol. VIII.
- Rigby M. & Red. Co.** Succeeded, 1910, by Mayer M. & M. Co. Mayer, Ariz. See Vol. VIII.
- Rillito Mining Co.** Tucson, Ariz.

- Rincon Mines Co.** Succeeded, 1908, by Weaver Mountain M. Co. Congress Junction, Ariz. See Vol. VIII.
- Rincon Mining Co.** Benson, Ariz. See Vol. VIII.
- Ringing Rocks Copper M. Co.** Pottstown, Pa. See Vol. X.
- Rio Arriba Cons. Mines Co.** Tres Piedras, N. M. See Vol. III.
- Rio Bacanuchi M. Co.** Bacanochi, Són., Mex. See Vol. VIII.
- Rio Dolores Copper Co.** Castleton, Utah. See Vol. XI.
- Rio Hondo C. Co.** Property sold, 1900, to San Cristobal C. Co. Arroyo Seco, N. M.
- Rio Tinto Copper M. Co.** Encampment, Wyo. See Vol. VI.
- Rio Tinto Dev. Co.** Denver, Colo. Stock-jobbery. See Vol. VIII.
- Rio Tinto G. & C. Co.** Prescott, Ariz. See Vol. VI.
- Rio Tinto Mexicana, C.a. Min.** Succeeded, 1908, by Rio Tinto C. Co. Terrazas, Chih., Mex. See Vol. VIII.
- Rio Tinto Mines & Sm. Co.** Terrazas, Chih. Mex. See Vol. VIII.
- Rio Tonto C. Co.** Succeeded by Rio Tonto M. & M. C. Wickenburg, Ariz. See Vol. VIII.
- Rio Vista G. & C. M. Co.** Was a bad egg, officers having been prominent state officials of California. Fair Play, Cal. See Vol. VIII.
- Rising Sun Copper M. & S. Co.** Mt. Washington, Md.
- Rito Alto Copper Co.** Hillside, Colo. See Vol. VIII.
- Riverside Copper Co.** Morristown, Ariz. See Vol. VI.
- Riverside Copper M. Co., Ltd.** Kootenai Co., Idaho.
- Riverton Mining & Milling Co.** Shoshoni, Wyo.
- Roaring Fork M. & M. Co.** Rambler, Wyo.
- Rob Roy Mining Co.** Wallace, Ida. See Vol. XI.
- Robinson Mining Co.** Ely, Nev. See Vol. X.
- Robles Grande G. & C. M. Co.** Goldfield, Nev. See Vol. VI.
- Roca Negra; Neg. Min. la.** Mine sold, 1903, to American-Mexico M. & Dev. Co. Velardeña, Dur., Mex. See Vol. IV.
- Rochester Shoshone M. & M. Co.** Shoshoni, Wyo. See Vol. VIII.
- Rociada Gold & Copper Co.** Rociada, N. M.
- Rock Creek Copper M. C., Ltd.** Mullan, Idaho.
- Rock Lake, M. Co., Ltd.** Liquidated, 1905. Property sold to Algoma C. & Sm. Co. Bruce Mines, Algoma, Ont. See Vol. IV.
- Rock Springs Exploration Co.** Rock Springs, Wyo.
- Rocky Mountain C. Co.** Encampment, Wyo. See Vol. VI.
- Rocky Mountain Smelting Co.** Florence, Colo.
- Rodman M. & M. Co.** Guilford College, N. C.
- Rogers-Arizona Mng. Co.** Rogers Spgs., Ariz. See Vol. XI.
- Rogers Copper & Iron Co.** Ducktown, Tenn. See Vol. VI.
- Rogers Mining Co.** Pearl, Colo. See Vol. VI.
- Rogers Springs M. Co.** Merged in Rogers Springs M. & S. Co., 1911. Cave Creek, Ariz. See Vol. X.
- Rogue River M. & S. Co.** Grants Pass, Ore. See Vol. VI.
- Ronquillo Copper Co.** Cananea, Son., Mex. See Vol. X.
- Roosevelt Gold & Copper M. Co.** Ft. Thomas, Ariz. See Vol. X.
- Roosevelt Gold, Silver & Copper M. Co.** Butte, Mont. See Vol. VIII.
- Roosevelt M. & M. Co.** Stagg, Cal. See Vol. X.
- Rosa Amarilla C. Co.** Lands sold at forced sale, 1910, to M. J. Slattery. Pueblo Nuevo, Jal., Mex. See Vol. VIII.
- Roselle Mining Co.** Centreville, Cassiar district, B. C. See Vol. V.
- Rose Springs Mng. Co.** Battle Mtn., Nev.
- Rossland-Great Western Mines, Ltd.** Reorganized, 1902, as Rossland-Kootenay M. Co., Ltd. Rossland, B. C.
- Rouse-Gardner Mining Co.** Central City, Colo. See Vol. VI.

- Routt County, G. & C. M. Co. Steamboat Springs, Colo. See Vol. VIII.
 Rowan Gold & Copper M. Co. Gold Hill, N. C. See Vol. VI.
 Royal Cons. Mines of El Cobre, Ltd. Succeeded, 1902, by El Cobre Mines, Santiago de Cuba.
 Royal Copper M. Co. Title changed, 1902, to Cactus Sm. & Copper Co., also dead. Frisco, Utah. See Vol. II.
 Royal Crown M. Co. Ocotlan, Oax., Mex. See Vol. VIII.
 Royal Metals M. & Leasing Co. Ely, Nev.
 Royal M. & Invest. Co. Silverton, Colo. See Vol. X.
 Royal Morelos C. Co. Succeeded, 1908, by Occidental C. Co. Palomas, Chih., Mex. See Vol. VIII.
 Royal Victoria M. Co. Grand Forks, B. C. See Vol. VIII.
 Ruby Copper & Gold M. Co. Encampment, Wyo. See Vol. VI.
 Ruby Gold & Copper Co. Ortiz, Son., Mex. See Vol. VI.
 Russell-Ball Copper Co. Valdez, Alaska. See Vol. X.
 Russell United C. Co. Property sold, 1904, to Arizona Cons. M. Co. Johnson, Ariz.
 Ruthburg Cons. C. Co. Weiser, Idaho. See Vol. II.
 Rye Copper Co. Payson, Ariz. See Vol. X.
 Sacaton Springs M. Co. Cima, Cal. See Vol. VIII.
 Saginaw Dev. Co. Merged, 1906, in American-Saginaw Dev. Co. Bisbee, Ariz. See Vol. V.
 Saginaw M. Co. Operated, 1876, near Rock Harbor, Isle Royale.
 Saginaw Mining Co. Maple Falls, Wash.
 Saginaw M. Co. of Arizona. No trace of operations secured.
 Saginaw Valley C. M. Co. Lost lands, 1905, Encampment, Wyo. See Vol. V.
 Sahuaripa Expl'n. Co. Sahuaripa, Son., Mex. See Vol. X.
 St. Clair C. Co. Operated, 1863-1872, near Eagle River, Mich.
 St. Croix Cons. C. Mines. Operated in Douglas Co., Wis., 1899.
 St. George Copper M. Co. Irapah, Utah. See Vol. X.
 St. Joe M. Co. Property sold by sheriff, 1908, for \$25,000, and company reorganized, 1908, as Bingham & Orleans M. Co. See Vol. VI.
 St. Joe M. & M. Co. Apparently succeeded, 1909, by Fremont C. Co. Riverside, Wyo. See Vol. VIII.
 St. Julian Gold M. Co. Chico, Mont. See Vol. X.
 St. Lawrence C. Co. New Jersey charter forfeited, 1909, for non-payment of taxes.
 St. Louis Copper Co. Ajo, Ariz. See Vol. X.
 St. Louis Copper M. Co. Duquesne, Ariz. See Vol. X.
 St. Louis Copper M. & Dev. Co. No trace of property or operations.
 St. Louis United C. M. Co. Jarilla, N. M. See Vol. VI.
 St. Margaret Copper Co. No trace of operations secured.
 St. Margaret Copper M. Co. Operated, 1865, in East Canada.
 St. Marie Copper Co. Was a swindle, perpetrated by J. Reilly and W. W. Wilson, two notorious confidence men. Leadville, Colo.
 St. Mary's Copper Co. Hancock, Mich. See Vol. X.
 St. Michael's M., M. & Ref. Co. Tres Piedras, N. M. See Vol. X.
 St. Paul & Butte M. Co. Was in business, 1896. Butte, Mont.
 Salem M. Co. Operated in the vicinity of the Phoenix mine, Mich., 1865.
 Salero Mines Co. Patagonia, Ariz. See Vol. VIII.
 Salida Gold & Copper M. Co. Salida, Colo. See Vol. V.
 Salido Gold-Copper Co. Alamos, Son., Mex. See Vol. X.
 Salt Lake & Ely C. Co., Ely, Nev. See Vol. VIII.
 Salt Lake M. & M. Co. Callao, Utah. See Vol. X.

- Saltese Consol. Copper Mng. & Millg. Co.** Reorganized as the **Saltese Mng. & Milling Co.**
Saluda Copper M. Co. Donalds, S. C. See Vol. X.
Samalayuca M. Co. Operated near Chihuahua, Mex., about 1907.
San Antonio; Cia. Min. De. La Cruz, Tam., Mex. See Vol. VI.
San Antonio-Arizona M. Co. Patagonia, Ariz. See Vol. X.
San Antonio M. & Expl'n. Co. Tapalpa, Jal., Mex. See Vol. X.
San Baltazar C. Co. Tlacolula, Oax., Mex. See Vol. VIII.
San Bernardino C. Co. West Virginia charter forfeited, 1902. Cal.
San Bernardino G., C. & Lime Co. San Bernardino, Cal. See Vol. VIII.
San Bernardino M. Co. Cananea, Son., Mex. See Vol. VIII.
San Bernardino M. & M. Co. Douglas, Ariz. See Vol. VII.
San Bruno C. M. Co. New York. Dissolved, 1883. No trace of operations.
San Calletano M. & S. Co. Calabasas, Ariz. See Vol. VIII.
San Carlos C. Co. Lands sold to Saddle Mountain M. Co. Christmas, Ariz.
San Carlos C. Co. Linares, Nuevo León, Mex. See Vol. X.
San Carlos Dev. Co. Globe, Ariz. See Vol. VIII.
San Carlos M. Co. Ures, Son., Mex. See Vol. X.
San Cristobal Copper Co. Arroyo Seco, N. M. See Vol. XI.
San Diego; Cia. Min. Parras de la Fuente, Coah., Mex.
San Diego M. Co. Near Kingman, Ariz.
San Domingo G. & C. Co. Merged, 1903, in Picacho Blanco M. Co. Morristown, Ariz.
San Felipe M. Co. Mexico. No trace of operations secured.
San Fernando; Cia. Min. De. Zimatlán, Oax., Mex.
San Fernando C. M. Co. Operated, 1854, near Cienfuegos, Cuba.
San Fernando Copper M. & S. Co. Ensenada, Baja Cal., Mex. See Vol. VIII.
San Fernando M. Co. New Jersey charter forfeited, 1908, for non-payment of taxes, Ariz.
San Fernando y Santa Rosa; Soc. Anom. Indust. de Minas De Cobre. Santa Clara, Cuba. See Vol. VIII.
San Francisco y Anexas; Neg. Min. Asientos, Aguascal., Mex.
San Francisco C. Co. Campo Seco, Cal.
San Francisco C. Co. Spenceville, Cal.
San Francisco Del Oro Mines, Ltd. Was reorganized, 1908, as **San Francisco del Oro M. Co., Ltd.** Parral, Chih., Mex. See Vol. VIII.
San Francisco M. Co. Felipe, Son., Mex. See Vol. X.
San Javier Copper Co. San Javier, Son., Mex. See Vol. X.
San José Cons. M. Co. Nacozari, Son., Mex. See Vol. VIII.
San José M. Co. Succeeded, 1902, by El Cobre Mines, El Cobre, Santiago de Cuba.
San Juan Mining Co. Central City, Colo. See Vol. X.
San Juan S. & Ref. Co. Property sold by sheriff, 1909, partly to Ross M. & M. Co. and partly to Henrietta M. & M. Co. Silverton, Colo. See Vol. VIII.
San Luis; Cia. Min. Tepezalá, Aguascal, Mex.
San Luis Potosi; Cia. Min. De. Mapimi, Dur., Mex.
San Marcos M. Co. Etzatlán, Jal., Mex. See Vol. IX.
San Marcus-Salomé Dev. Co. Salome, Ariz. See Vol. X.
San Marino M. & M. Co. Nespelem, Wash. See Vol. X.
San Pedro Cons. M. & M. Co. Operated, 1882, in Pinal Co., Ariz.
San Pedro C. Co. San Pedro, N. M. Idle since 1899.
San Pedro Dev. Co. Dissolved. Property sold, 1911, Ariz.

- San Poil Mng. Co. Wash.
 San Rafael Copper M. Co. Property passed to Rio Tinto C. Co. Terrazas, Chih., Mex. See Vol. VIII.
 San Rafael Copper M. Co. Hermosillo, Son., Mex. See Vol. VI.
 San Rafael M. Co. Succeeded by Mercer-San Rafael M. Co. Tapalpa, Jal., Mex. See Vol. VI.
 San Remo Copper Co. Gleeson, Ariz. See Vol. V.
 San Salvador M. Co. Terrazas, Chih., Mex. See Vol. X.
 Sanca Cons. M. Co. Priest River, Idaho. See Vol. VIII.
 Sanitary C. M. Co., N. Y. No trace of operations.
 Santa Ana M. Co. Jiménez, Chih., Mex. See Vol. IX.
 Santa Barbara M. & M. Co. Property passed, 1907, to Hinds Cons. M. Co. Mex.
 Santa Casilda C. Co. Uruapán, Mich., Mex. See Vol. X.
 Santa Cruz Copper Co. Santa Cruz, Son., Mex.
 Santa Cruz M. Co. Patagonia, Ariz. See Vol. X.
 Santa Cruz M. Co. Cananea, Son., Mex.
 Santa Elena Del Cobre y Anexas, S. A.; Cia Min. Sultepec, Mexico, Mex. See Vol. X.
 Santa Emilia C. Co. Maine charter forfeited, 1909. Mex. See Vol. X.
 Santa Eulalia M. & M. Co. Velardeña, Dur., Mex. See Vol. VI.
 Santa Fe; Cia. Min. Ia. Galeana, Nuevo León, Mex. See Vol. X.
 Santa Fé Bonanza M. & Tun. Co. N. M. No trace of operations secured.
 Santa Fé Copper Co. San Pedro, N. M. See Vol. X.
 Santa Fé Copper & Gold Mng. Co. A Sonora Central fledging.
 Santa Fé Dev. Co. Ysabal, Son., Mex. See Vol. VIII.
 Santa Fé Mining Co. Luning, Nev.
 Santa Fé Mining & Red. Co. Santa Fé, N. M.
 Santa Rita C. Co. Property sold, 1898, for \$1,000,000. Company practically reorganized as Santa Rita M. Co. Santa Rita, N. M.
 Santa Rita C. & Iron Co. N. M. Property sold, 1899.
 Santa Rita M. Co. Santa Rita, N. M. See Vol. VIII. Property passed to Chino Copper Co., 1909.
 Santa Rosa C. Co. Lands sold, 1905, to Detroit C. M. Co., of Ariz. Metcalf, Ariz. See Vol. V.
 Santa Rosa De Mazapil M. Co. Mazapil, Zac., Mex. See Vol. VIII.
 Santa Rosa Dev. Co. Lands sold, 1907, to Cabullona Dev. Co. Fronteras, Son., Mex. See Vol. VI.
 Santa Rosa Dev. Co. Succeeded by Santa Rosa de Mazapil M. Co. Mazapil, Zac., Mex. See Vol. IV.
 Santa Teresa, S. A., Cia. Min. Ben. De. Coyuca de Catalán, Guerrero, Mex. See Vol. IX.
 Santiago Copper M. Co. Succeeded, 1902, by El Cobre Mines, El Cobre, Santiago de Cuba.
 Santo Domingo M. Co. Velardena, Dur., Mex. See Vol. X.
 Santo Niño M. Co. Symón, Dur., Mex. See Vol. V.
 Sapho Mining Co. Ely, Nev. See Vol. X.
 Sapphire Gold & Copper Co. Swansea, Arizona. See Vol. XI.
 Saranac M. Co. Meyers Falls, Wash. See Vol. X.
 Saratoga Dev. Co. Property was a lease on the Saratoga-Gaston group. Russell Gulch, Colo.
 Saratoga Pyritic Sm. Co. Ironton, Colo. See Vol. VI.
 Saratoga S. & Ref. Co. Ironton, Colo. See Vol. X.
 Satellite Mining Co. Helena, Mont.
 Sater Copper Co. N. M. Lands sold under foreclosure, 1906. See Vol. VI.
 Sauk River M. Co. Darrington, Wash. See Vol. VIII.

- Sault Gray Copper Co.** Absorbed, 1903, by Copper Queen M. Co., Ltd., Bruce Mines, Algoma, Ont.
- Sault Prosp. & Dev. Co.** Succeeded, 1903, by Copper Queen M. Co., Ltd., Bruce Mines, Algoma, Ont.
- Saux Head Copper M. Co., Ltd.** Marquette, Mich. See Vol. VIII.
- Savage Copper Co.** Encampment, Wyo. See Vol. XI.
- Savage Gold & Copper Co.** Paradise, Ariz. See Vol. XI.
- Savage Gold & Copper Mng. Co.** Santa Rita, N. M. See Vol. XI.
- Scottic Gold M. & M. Co.** White Cross, Colo. and Charcas, S. L. P., Mex. See Vol. VIII.
- Schell Creek Range Ore Dev. Co.** McGill, Nev. See Vol. X.
- Schoolcraft M. Co.** Succeeded by Centennial M. Co., Mich.
- Schuyllkill Copper Co.** Chloride, Ariz.
- Schuyler Copper Co.** Property, the Jones mine, in Caernarvon township, Berks Co., Pa.
- Schwab Cons. M. Co.** Robinson, Utah. See Vol. X.
- Scotia M. & M. Co.** Bossburg, Wash.
- Scott Copper Co.** Merged in Calumet & Hecla M. Co., Mich.
- Scott Mines Co.** Bouse, Ariz. See Vol. X.
- Scottish Chief M. Co.** Park City, Utah. See Vol. X.
- Scottish Copper Mines Syn. of B. C., Ltd.** Kamloops, Yale district, B. C. See Vol. V.
- Scranton Extens. M. Co.** Eureka, Utah. See Vol. X.
- Seager-Coryell G. & S. Mining Co., Ltd.** Custer, Idaho. See Vol. VIII.
- Sea Island Copper Co.** Kasaan, Prince of Wales Id., Alaska. See Vol. X.
- Searchlight Central M. Co., Nev.** No trace of operations secured.
- Searchlight G. & C. Co.** Patagonia, Ariz. See Vol. VIII.
- Seaton M. & M. Co.** Idaho Springs, Colo.
- Seattle M. Co.** Idaho. Property passed, 1912, to Ray-Jefferson M. Co.
- Seattle S. & Ref. Co.** New Jersey charter forfeited, 1905, for nonpayment of taxes.
- Security Gold & Copper Co.** Atlantic City, Wyo.
- Security M. & Dev. Co.** Princeton, Mont. See Vol. IX.
- Seguranza M. Co.** S. A. Zacualpam, Mex., Mex. No trace of operations secured. See Vol. X.
- Selkirk Mother-Lode C. Mines, Ltd.** B. C. No trace of operations secured.
- Selma Cons. M. Co.** Reconstructed, 1909 as Selma Mines Co.
- Seminole Copper Co.** Callao, Utah. See Vol. XI.
- Seminole Copper M. Co.** Property sold, 1904, by sheriff, to Carl Henrich, for \$33,000. Owned by Lincoln Gold & Copper Mining Co. See Vol. III.
- Senator Mines Co.** Black Hawk, Colo. See Vol. X.
- Serrano Gold & Copper M. Co.** Cananea, Son., Mex. See Vol. X.
- Seth Bullock M. Co.** Wenden, Ariz.
- Seven Devils Cons. C. Co.** Lost lands, 1912, by failure to do annual assessment work. Landore, Idaho. See Vol. X.
- Seven Devils M. & Dev. Co.** Landore, Idaho.
- Seven Dials C. M. Co.** N. Y. No trace of operations.
- Sewannee M. Co.** Tenn. No trace of operations.
- Shackett M. Co.** Skidoo, Cal. See Vol. X.
- Shamrock C. Co.** Nogal, N. M. See Vol. VIII.
- Sharon M. Co.** Ontonagon Co., Mich.
- Shasta C. M. Co.** Shasta, Cal.
- Shasta G. & C. Co.** Redding, Cal. See Vol. VI.
- Shasta-Kennett C. Co.** Kennett, Cal. See Vol. VIII.
- Shasta May Blossom M. & S. Co.** Reorganized, 1903, as Shasta May Blossom C. Co., Cons. Winthrop, Cal. See Vol. IV.

- Shaw-Gibson M. Co.** Lordsburg, N. M.
Shawmut Cons. Copper Co. Dissolved Mch. 1911. See Vol. VIII. and X.
Shawmut G., S. & C. M. & M. Co. Bonanza, Colo. See Vol. VIII.
Shawmut Mining Co. Mich. Operated, 1856-57, on the Kaūkauna lands.
Shawmut M. Co. Succeeded, 1905, by Shawmut Cons. C. Co. Bingham Canyon, Utah. See Vol. III.
Shawnee Copper Co. McCoy, Colo. See Vol. VIII.
Shawnee Copper M. Co. Merged, 1908, in Shawnee-Wyoming M. Co. Holmes, Wyo.
Shawnee-Wyoming Copper Mng. Co. Holmes, Wyo. See Vol. XI.
Sheep Mountain M. & Tun. Co. Crystal, Colo.
Sheldon Mining Co. Mich. Merged, 1854, in Sheldon & Columbian Copper Co.
Shirley Copper Co. Mich. Absorbed in the 50's by Forest M. Co.
Shonee Mining & Mllg. Co. Danville, Wash. Vol. XI.
Shoshone Copper Co. Latah, Wash.
Shoshone Mountain Mng. Co. Metetse, Wyo. See Vol. XI.
Shotwell Tri-Mountain C. Co. Absorbed. Feb. 19, 1907, by Cornelia Copper Co. Gila Bend, Ariz. See Vol. VI.
Siegel Cons. M. Co. Siegel, Nev. See Vol. VIII.
Sierra-Alto C. M. Co. Phoenix, Ariz. See Vol. II.
Sierra Blanca M. Co. Sierra Blanca, Tex. See Vol. X.
Sierra de Cobre M. Co. Mex. Subsidiary of the Indiana-Sonora Copper & Mining Co. Properties were transferred, 60% to the Cananea Cons. C. Co. and 40% to the San Pedro C. Co., both subsidiaries of the Greene Cananea C. Co.
Sierra G. & C. Co. Reno, Nev. See Vol. VIII.
Sierra G. & C. Mining Co. Loyalton, Cal.
Sierra Madre M. & Dev. Co. Choix, Sin., Mex.
Sierra Nevada C. Co. Luning, Nev. See Vol. VIII.
Sierra De Oaxaca M. & M. Co. Ixtlán de Juárez, Oax., Mex.
Sierra Pacific Sm. Co. Butte, Mont. See Vol. V.
Sierra-Sonora Smelting Co. Title changed, 1903, to Sierra-Pacific Smelting Co., also dead. Butte, Mont.
Sierrita M. & M. Co. Office and mine: Tucson, Ariz.
Siete Amigos; Cia. Min. Formerly at Topia, Tamazula, Dur., Mex. See Vol. X.
Signal Copper Co. Merged: August, 1908, in Clara Cons. G. & C. Mining Co. Planet, Ariz. See Vol. VI.
Silers Meadows Copper Co. Bushnell, Swain Co., N. C. See Vol. VIII.
Silver Bar C. M. Co. Property sold, 1902, to Mogollon G. & C. Co. Cooney, N. M. See Vol. II.
Silver Bell C. Co. Arizona. Title changed, 1903, to Imperial C. Co. Silver Bell, Ariz. See Vol. III.
Silver Bow M. Co. Butte, Mont. See Vol. VIII.
Silver City Copper Co. Santa Rita, N. M. See Vol. X.
Silver & Copper Co. of Ontonagon Rapids, Mich. Operated, 1846.
Silver-Copper King M. Co. Utah. Charter forfeited, 1910, for nonpayment of taxes.
Silver Creek G. & C. M. Co. Index, Wash. See Vol. VIII.
Silver Creek Gold M. Co. Index, Wash.
Silver Creek M. Co. Keweenaw Point, Mich.
Silver Crown M. & S. Co. Milford, Utah. See Vol. X.
Silver Dollar M. Co., Utah. No trace of operations. See Vol. X.
Silver Flat M. & M. Co. American Fork, Utah. See Vol. X.

- Silver Hill M. Co.** Silver Hill, Davidson Co., N. C.
Silverhorn M. Co. Minersville, Utah. See Vol. IX.
Silver King G. & C. M. Co. Mackay, Idaho.
Silverman-Alaska M. Co. Ketchikan, Alaska. See Vol. VIII.
Silver Reef Mining Co. Luning, Nev.
Silver Mtn. M. Co. Succeeded by Silver Mtn. Mine & Mill Co. Empire, Clear Creek Co., Colo. See Vol. IV.
Silver Peak M. Co. Chewelah, Wash. See Vol. VIII.
Silver Queen M. Co. Superior, Ariz. See Vol. X.
Silver Queen M. Co. Kettle Falls, Wash.
Silver Tip Gold M. Co. Maple Falls, Whatcom Co., Wash.
Silverton Mining Co. Silverton, Snohomish Co., Wash. See Vol. VI.
Similkameen Copper Mines Co. Princeton, B. C. See Vol. VI.
Sims Mtn. C. Co. Johnson, Cochise Co., Ariz.
Sinaloa Expl'n Co. Guadalupe de los Reyes, Sin., Mex. See Vol. VIII.
Sinaloa & Sonora M. & S. Co., Mex. New Jersey charter forfeited, 1910, for nonpayment of taxes.
Sin Rival M. Co. Nacozari, Son., Mex. See Vol. X.
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Siskiyou G. & C. Co. Rollins, Cal. A swindle of "Baron" W. E. von Johannsen. See Vol. VII.
Siskowit Mining Co., Mich. Dissolved, 1909, by order of Circuit Court.
Six Eagles M. Co. Reorganized, 1907, as Little Chopaca M. Co. Loomis, Wash. See Vol. VIII.
Skagit Queen Mining Co. Succeeded, 1908, by Skagit Queen Cons. Mining Co., also dead. Property passed, 1911, to British M. Co. Marblemount, Wash. See Vol. X.
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Snow Flake M. Co. Property sold, 1910, to Victoria M. Co., Utah.
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Snowstorm Extension M. Co., Ltd. Succeeded, October, 1909, by Snowstorm Extension C. M. Co. Mullan, Idaho. See Vol. VIII.
Snowstorm Mountain C. M. Co. Mullan, Idaho.
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Sonora; Cia. Min. De La. Cumpas, Son., Mex.

- Sonora Bonanza M. Co.** Reorganized, 1907, as Superior-Bonanza M. Co. Imuris, Son., Mex. See Vol. VI.
- Sonora-Cananea Dev. Co.** Cananea, Son., Mex. See Vol. VIII.
- Sonora Cons. Mines Co.** Hermosillo, Son., Mex. See Vol. IX.
- Sonora Copper Co., S. A.** Mexico. Lost lands, 1906.
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- Sonora & Kansas City Dev. Co.** Suaqui de Batuc, Son., Mex.
- Sonora Mexican C. Co.** Mexico. No trace of operations.
- Sonora Mining Co.** Succeeded, 1906 by Antigua Copper Co. Aguacaliente de Baca, Sin., Mex. See Vol. VI.
- Sonora M. & Inv. Co.** Santa Ana, Son., Mex. See Vol. X.
- Sonora M. & M. Co.** Succeeded, 1906, by Juárez Mining Co. Tubutama, Son., Mex. See Vol. V.
- Sonora & Southwestern Mines Co.** Ures, Son., Mex. No trace of operations.
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- South Bisbee Copper M. & Townsite Improvement Co.** Wound up, 1904. Lands sold to Lake Superior & Pittsburg M. Co. Bisbee, Ariz. See Vol. II.
- South Butte C. M. Co.** Butte, Mont. See Vol. VIII.
- South Butte Zone M. Co.** Butte, Mont. See Vol. VIII.
- South Cananea C. M. Co., S. A.** Mexican incorporation of Penn. & Cananea C. Co., merged, 1909, in Duluth & Sonora M. Co. Cananea, Son., Mex. See Vol. X.
- South Columbus Cons. M. Co.** Merged, Sept. 15, 1910, in South Hecla M. Co. Alta, Utah.
- South Columbus M. Co.** Reconstructed, 1906, as South Columbus Cons. M. Co. See Vol. VIII.
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- Southern Bell C. M. Co.** Cal. No trace of operations.
- Southern Copper Co.** Maine. No trace of operations.
- Southern Copper Co.** Gold Hill, N. C.
- Southern C. M. Co.** Milford, Utah. See Vol. X.
- Southern Cross Copper Mine Co., Ltd.** Alberni, B. C.
- Southern Cross M. Co.** Lands sold, 1912, to Anaconda C. M. Co., Butte, Mont.
- Southern Mineral Dev. Co.** Birmingham, Ala.
- Southern Nevada C. Co.** Gold Butte, Lincoln Co., Nev. See Vol. X.
- Southern Nevada G. & C. M. Co.** Luning, Nev. See Vol. VIII.
- Southern Oregon Co.** Hutton, Cal. See Vol. X.
- Southern Sm. & Ref. Co.** Was abortive. El Paso, Tex. See Vol. VI.
- Southern Zinc & Copper M. Co.** Gillham, Sevier Co., Ark. See Vol. VI.
- South Fork & Kalispell Copper Co.** Kalispell, Mont. See Vol. XI.
- South Furnace Creek C. Co.** Greenwater, Cal. See Vol. VIII.
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- South Packer M. & S. Co.** Ivers, Idaho. See Vol. X.
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- South Pewabic Copper Co.;** Mich. Merged, 1878, in Atlantic M. Co.
- South Quincy Copper Co.** Houghton, Mich. See Vol. X.
- South Swansea M. Co.** Merged, June, 1908, in Swansea Cons. M. Co. Silver City, Utah. See Vol. VIII.

- Southwest Co. Mex. Succeeded, 1904, by the Douglas Copper Co.
- Southwestern Cons. Sm. Co. A stock-jobbing scheme, of Kaye, De Wolfe & Co. Letcher, San Bdo. Co., Cal. See Vol. VIII.
- Southwestern C. Co. Sierra Blanca, Tex. See Vol. VIII.
- Southwestern Copper & Iron Co. Lands sold, May, 1906, to Burro Mountain C. Co. Leopold, N. M.
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- Southwestern G. & C. Co. Douglas, Ariz. See Vol. V.
- Southwestern Mine & Sm. Co. Organized, 1903, to build a smelter at Gleeson, Ariz.
- Southwestern M. Co. Merged, August, 1908, in Kansas-Cananea C. Co. Cananea, Son., Mex. See Vol. VI.
- Southwestern Sm. Co. Letcher, San Bdo. Co., Cal. See Vol. V.
- Southwestern Sm. & Ref. Co. Property sold, Sept. 15, 1906, by sheriff, to Walter L. Willie, Benson, Ariz. See Vol. VI.
- South West Sm. & Ref. Co. Property sold by receiver, June 6, 1909; reorganized as Orogrande Sm. Co. Orogrande, N. M. See Vol. VIII.
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- Spanish-American Federal Sm. & Ref. Co. Ariz. No trace of operations. See Vol. X.
- Spar Copper Mines & Tunnel Co. Whitepine, Gunnison Co., Colo. See Vol. VIII.
- Spar G. & C. Co. Property sold, 1908, to Pocahontas Copper Queen M. Co. Mayer, Ariz.
- Sparta M. & Dev. Co. Sparta, Baker Co., Ore. See Vol. VIII.
- Spnazuma C. Co. Succeeded by Graham County M. Co., also dead. Duncan, Graham Co., Ariz.
- Spirit Lake Power & M. Co. Chehalis, Wash.
- Spitzee Gold Mines, Ltd. Reconstructed August, 1905, as Spitzee M. Co., Ltd. Rossland, B. C. Described Vol. V.
- Spokane-Alaska M. Co. Operated under lease near Ketchikan, Alaska. 1908.
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- Spokane Dev. Co. Property passed, 1910, to Revias Creek M. & Power Co.
- Spokane-Montana M. & M. Co. Iron Mountain, Mont. See Vol. X.
- Sprague Copper Mining Co. Chewelah, Wash.
- Springdale, C. M. Co. Athena, Umatilla Co., Ore.
- Square Deal M. & M. Co. Cave Creek, Maricopa Co., Ariz. See Vol. IX.
- Standard Cons. C. Co. Property sold to Detroit Copper Mining Co. Metcalf, Ariz. See Vol. X.
- Standard Cons. Mines Co. Oregon. Property sold, 1907, to Comer Mines Co.
- Standard Cons. M. Co. Cedar City, Utah. See Vol. X.
- Standard Copper Co. Vekol, Ariz.
- Standard Copper Co. Title changed, 1906, to Bingham Standard C. Co. Bingham Canyon, Utah.
- Standard C. Mines. Property sold to Detroit C. M. Co. Metcalf, Ariz. See Vol. X.
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- Standard C. M. & Red. Co.** Divide, Mont. See Vol. VIII.
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- Sultana-Arizona C. Co.** Reorganized, May, 1910, as Kelvin-Sultana C. Co. Kelvin, Ariz. See Vol. VIII.
- Sumas M. Co.** Sumas, Wash.
- Summit C. M. Co.** Maine. No trace of operations.
- Summit G. & C. M. Co.** Rockcut, Ferry Co., Wash. See Vol. X.
- Summit M. Co.** Mich. Reorganized, 1859, as Madison M. Co.
- Summit M. & M. Co.** Keller, Wash.
- Sumner M. Co.** Mich. Reorganized as Hancock C. M. Co.
- Sun-Anchor C. M. Co.** Encampment, Wyo. See Vol. X.
- Sunlight M. Co.** Merged in Great Belcher of Arizona Co. Providence, Yavapai Co., Ariz.
- Sunlight M. & M. Co.** Eureka, Colo. See Vol. X.
- Sun & Moon M. & M. Co.** Succeeded by Sol Luna M. Co. Idaho Springs, Colo. See Vol. VIII.
- Sunnyside C. M. Co.** Riverside, Wyo.
- Sunnyside G. & C. M. Co.** Bisbee, Ariz. See Vol. X.
- Sunol C. M. Co.** Operated, 1863, in Alameda Co., Cal.
- Sunrise Gold & C. Co.** Vontrigger, Cal.
- Sunset Copper Co.** Mayer, Ariz. See Vol. VIII.
- Sunset C. Co., Ltd.** Princeton, B. C.
- Sunset C. M. Co.** Property near Index, Wash., sold, by receiver, 1909, to F. L. Bell and W. W. Black, for \$40,000. See Vol. IV, and V to VIII.
- Sunset M. & S. Co.** Cerillos, N. M.
- Sunset National Mining Co.** Homestake, Mont. See Vol. XI.
- Superior-Alta M. Co.** Merged with Flagstaff C. M. Co. and Columbus Cons. M. Co. as Wasatch Mines Co. Alta, Utah.
- Superior & Boston Copper Mng. Co.** Superior, Wis.
- Superior C. Co.** Tucson, Ariz. See Vol. VI.
- Superior C. Co. Inc.** Ariz. No trace of operations.
- Superior C. Co.** Mich. Dissolved, 1902. Operated, 1846, near Copper Harbor.
- Superior C. & Gold M. Co.** Utah. No trace of operations.
- Superior G. & C. Co. of Michipicoton, Ltd.** Wolf, Thunder Bay dist., Ont.
- Superior M. Co., Mich.** Lands sold, 1899, to Michigan C. M. Co.
- Superior M. Co.** Property sold to 85 Mining Co. Lordsburg, N. M. See Vol. VIII.
- Superior M. Co.** Cerillos, N. M.
- Superior M. Co.** Bingham Canyon, Utah. See Vol. X.
- Superior & Pittsburg Copper Co.** Dissolved, 1916. See Calumet-Arizona Mng. Co.
- Superior-Montana C. M. Co.** Superior, Missoula Co., Mont. See Vol. VIII.
- Superior & Montana M. Co.** Merged, September, 1908, in South Columbus Cons. A. M. Co. Alta, Utah. See Vol. VIII.
- Sure Thing G.-C. M. & Sm. Co.** Succeeded, 1905, by Clipper M. Co. North Bend, Wash. See Vol. V.
- Surprise C. & G. M. Co.** Utah. Charter forfeited, 1910, for unpaid taxes.
- Surprise Eagle M. Co.** Boulder, Mont. See Vol. VIII.
- Sutton Cons. Mng. Co.** Lordsburg N. M. See Vol. XI.
- Susquehanna Nevada C. Co.** Ariz. No trace of operations.
- Swan Creek C. M. Co.** Maine. No trace of operations.
- Swansea Mining Co.** Lands sold, 1905, to Ronquillo C. Co. Cananea, Son., Mex.
- Swarthmore C. Co.** Merged, 1907, in Swarthmore Cons. M. Co. Eldora, Boulder Co., Colo.
- Swastika C. Co.** Jerome, Ariz. See Vol. VIII.

- Sweden Copper Co. Merged, 1903, in Mt. St. Helens Cons. M. Co. Spirit Lake, Wash. See Vol. III.
- Swisshelm Dev. Co. Reorganized, 1911, as Swisshelm Mountain M. Co. Ariz.
- Swiss Girl M. Co. Lands sold, 1901, to Baumann C. Co. Dewey, Ariz.
- Sycamore Mining, Smelting & Devel. Co. Jerome, Ariz. See Vol. XI.
- Sylvania G. & C. M. & M. Co. At Centennial, Wyo.
- Syndicate M. Co., Ltd. Saltese, Mont. See Vol. X.
- Syndicate M., M. & Sm. Co. Landore, Idaho. See Vol. X.
- Syndicated Deep Mines, Inc. Succeeded by Pearl Cons. M. Co., also dead. Republic Co., Wash. See Vol. VIII.
- Takoma Copper Co. No trace of operations.
- Talisman M. Co. Merged October, 1908, in Cedar Talisman Cons. Mines Co. Milford, Utah. See Vol. VIII.
- Tallapoosa C. Mines. Succeeded, 1905, by Georgia & Tenn. C. Co. Temple, Ga.
- Tamaulipas: Compañia Min. De Cobres En. San Carlos, Tamaulipas, Mex. See Vol. X.
- Tantamount M. Co. Park City, Utah. See Vol. IX.
- Tasmania Copper Mining & Millg. Co. Winfield, Colo. See Vol. XI.
- Tatlayoco Lake C. Co. Tatlayoco Lake, Lilloet, B. C.
- Taylor Copper Mines Co., Ltd. Sault Ste. Marie, Ont.
- Taylor's Copper, Ltd. Moab, Grand Co., Utah. See Vol. X.
- Tecolote C. Co. Succeeded by Las Vegas C. Co. Las Vegas, N. M.
- Tecumseh C. Co. Property sold, 1910, to La Salle C. Co., for \$1,648,700. Calumet, Mich. See Vol. VIII.
- Tehama M. Co. Ingot, Cal. See Vol. VI.
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- Telkwa Mines, Ltd. Aldermere, B. C. See Vol. VIII.
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- Tesora Silver M. Co. Silver City, Utah. See Vol. VIII.
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- Texada Cons. M. Co. Van Anda, Texada Island, B. C.
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- Thompson Mining Co. Merged, 1909, in Thompson-Quincy Cons. M. Co. Park City, Utah.
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- Three Jays C. Co. Alberni, Vancouver Island, B. C.
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- Tip Top C. Co.** A swindle. Lands sold, 1908, to Burro Mtn. C. Co., for \$15,000, giving dividend of one mill on the dollar. Silver City, N. M. See Vol. VI.
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- Tom Hal M. Co.** A bad egg. Pateros, Wash. See Vol. VIII.
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- Tom Moore Gold M. Co.** Succeeded, 1909, by Martin M. & Power Co. Eureka, Colo. See Vol. VIII.
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- United Miners' G., C. & Oil M. & Red. Co.** Ariz. No trace of operations.
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- United M. & Dev. Co. of America.** Succeeded, 1905, by United Mining Co. See Vol. VI. Valley, Calaveras Co., Cal.
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- Utah Apex & Highland Bay Cons. M. Co. Utah. No trace of operations.
- Utah-Bingham M. Co. See Vol. X. Succeeded April, 1912, by New Utah-Bingham M. Co. (which see).
- Utah & Boston C. Co. Utah. Property sold for debt, 1902.
- Utah Buckhorn M. Co. Utah. Succeeded, 1908, by Del Verde Tunnel Co.
- Utah Cons. Gold Mines, Ltd. Utah. Reorganized, 1903, as Utah Cons. M. Co.
- Utah Copper Co. Lone Pine, Cal. See Vol. X.
- Utah C. & G. M. Co. Utah. No trace of operations.
- Utah Dev. Co. Succeeded, 1908, by North Utah M. Co. Bingham Canyon, Utah. See Vol. VI.
- Utah Esmeralda C. M. Co. Fitting, Humboldt Co., Nev. See Vol. VIII.
- Utah Extension C. M. Co. Merged, 1908, in North Utah M. Co. of Bingham. Bingham Canyon, Utah.
- Utah Glory M. Co. Operated, 1909, in Big Cottonwood Canyon, Utah.
- Utah G. & C. Mines Co. Lost lands, 1913. Newhouse, Utah. See Vol. X.
- Utah Indian Peak M. Co. Lund, Iron Co., Utah. See Vol. X.
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- Utah Mines Coalition Co. Absorbed, March, 1912, by Michigan Utah M. Co. Alta, Utah.
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- Valenciana Mng. Co. Matchuala, S. L. P., Mex.
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 Yale M. Co., Ltd. Lands sold to Hedley Gold M. Co. Hedley, B. C. See Vol. VIII.
- Yankee Cons. M., M. & Tunneling Co. Merged, 1908, in Continental Mines, Power & Reduction Co. Described Vol. X.
 Yankee Doodle M. Co. Johnson, Ariz. Name changed, 1908, to Centurion Arizona M. Co. (which see).
- Yaqui River Expl'n. Co. San Antonio de la Huerta, Son., Mex.
 Yaqui River G. & C. Co. Nogales, Son., Mex. See Vol. X.
 Yarwell Mtn. C. Co. Steamboat Springs, Colo. See Vol. X.
 Yavapai C. Co. Prescott, Ariz. See Vol. VIII.
 Yavapai Dev. Co. Mayer, Ariz. See Vol. X.
 Yellow Butte C. Co. Edgewood, Cal. See Vol. X.
 Yellow Jacket C. Co. Merlin, Ore.
 Yellow Jacket C. M. Co. Utah. No trace of operations.
 Yellowstone C. M. Co. Mullan, Idaho. See Vol. X.
 Yerington Associated C. Co. Yerington, Nev. See Vol. X.
 Yerington-B. C. M. Co. Wabuska, Nev. See Vol. VIII.
 Yerington C. Co. Nev. Succeeded, 1911, by New Yerington C. Co.
 Yerington C. King M. Co. Yerington, Nev. See Vol. X.
 Yerington Gold M. Co. Mason, Nev.
 Yerington Knob Hill Syn. Yerington, Nev. See Vol. X.
 Yerington Mohawk C. Ass'n. Yerington, Nev. See Vol. VIII.
 Yerington Nat'l. C. Co. Yerington, Nev. See Vol. IX.
 Yerington Nipper C. Co. Yerington, Nev. See Vol. X.
 Yerington Queen C. Co. Yerington, Nev. See Vol. VIII.
 Yerington Red Metal M. Co. Yerington, Nev. See Vol. VIII.
 Yerington United C. Co. Yerington, Nev. See Vol. X.
 Yerington-Utah M. Co. Yerington, Nev. See Vol. X.
 York Harbour C. Co., Ltd. Wound up, 1902. York Harbour, Newfoundland. See Vol. III.
 York Harbour Mine (Newfoundland), Ltd. Property, York Harbour mine, leased from Western C. Co., Ltd. See Vol. X.
 York M. Co. Utah. Merged, 1902, in Utah Apex M. Co.
 Yosemite C. Co. Bagby, Cal. See Vol. X.
 Yosemite C. M. & Red. Co. Daulton, Cal. See Vol. VI.
 Yreka C. Co. Yreka, Vancouver Id., B. C. See Vol. VII.
 Yukon Pueblo Mines Co. Sold, 1910, to Atlas M. Co. White Horse, Yukon. See Vol. VIII.
 Yuma C. Co. Vicksburg, Ariz. See Vol. X.
 Yuma C. & S. M. Co. Ariz. No trace of operations.
- Zacatecas & Durango M. & Sm. Co. Chalchihuites, Zac., Mex. See Vol. VII.
- Zapoteca; Compania Minera. Property sold, 1909, to Mutual M. & Dev. Co. Ocotlán, Oax., Mex.
- Zarthushtra C. Co. Ariz. No trace of operations.
 Zelnora M. Co. Property passed to Bingham-New Haven C. & G. M. Co. Bingham, Utah. See Vol. X.
 Zenith G. & C. M. Co. Encampment, Wyo. See Vol. VI.
 Zimapan M. & Sm. Co. Zimapán, Mex. See Vol. VI.
 Zonia C. M. Co. Kirkland, Ariz. See Vol. X.

CHAPTER X

LIST OF MINING COMPANY OFFICIALS

MINING COMPANY PRESIDENTS

- Agassiz, R. L.**, 12 Ashburton Place, Boston, Mass.
Ahmeek Mining Company.
Allouez Mining Company.
Calumet and Hecla Mining Company.
Centennial Copper Mining Company.
Lake Mining, Smelting and Refining Company.
- Ainsworth, R. G.**, 2151 Lawrence Street, Denver, Colo.
Vulcan Mines and Smelters, Company.
- Aldrich, Sherwood**, 25 Broad St., New York.
Ray Consolidated Copper Company.
- Aldridge, W. H.**, 14 Wall Street, New York.
Magma Copper Company.
- Alexander, J. G.**, Douglas, Ariz.
Nacozari Consolidated Copper Company.
- Allen, J. H.**, Walpole, Mass.
Pike Hill Mines, Incorporated.
- Allen, W. R.**, 35 Congress St., Boston, Mass.
Boston & Montana Development Company.
- Amster, N. L.**, 67 Milk Street, Boston, Mass.
Shannon Copper Company.
- Argall, John C.**, Peyton Building, Spokane, Wash.
Hecla Copper-Silver Mining Company, Limited.
- Armstrong, F. C.**, 25 Broad St., New York.
Ray Hercules Copper Company.
- Arzeno, C. L.**, 9 E. 5th St., Covington, Ky.
Augusta Metal Mining Company.
- Austin, J. S.**, 572 Bullitt Building, Philadelphia, Pa.
Eden Mining Company.
Tonopah Mining Company of Nevada.
- Averill, M. R.**, Tonopah, Nev.
Tonopah 76 Consolidated Mining Company.
- Ayres, G. V.**, Deadwood, S. Dak.
Deadwood-Heidelberg Mining Company.
- Backus, Joseph**, 516 Providence Bldg., Duluth, Minn.
Maria Mining Co.
- Bagge, N. O.**, 46 Cedar Street, New York.
Almoloya Mining Company.
- Bahn, P.**, Gem, Ida.
Tucker Mining and Milling Company, Limited.
- Balliet, S. A.**, Helena, Mont.
Wickes-Corbin Copper Mining Company.

- Bamberger, J. E.**, 32 Broadway, New York.
Ontario Silver Mining Company.
- Barnes, J. H.**, Duluth, Minn.
Keating Gold Mining Company.
- Barnett, A. W.**, 6308 Morton Street, Philadelphia, Pa.
Happy Jack Mining and Red. Company.
- Bell, Dr. Robt.**, Paulsen Bk., Spokane, Wash.
Silver Trail Mining Company.
- Benton, I. A.**, 27 Latimer Block, Salt Lake City, Utah.
American Mining Company.
- Bergeron, Z. J.**, Oatman, Ariz.
Times Mining Company.
- Berry, Truman**, 223 Security Bldg., Los Angeles, Calif.
Jerome Verde Copper Company.
- Birch, Stephen**, 120 Broadway, New York.
Kennecott Copper Corporation.
- Bird, F. H.**, Seven Troughs, Nev.
Willard Mines Company.
- Bishop, J. M.**, Washington, D. C.
Manhattan Exploration Company.
- Black, A. C.**, Santa Ana, Calif.
Azurite Mining Company.
- Blakesley, A. E.**, E. & C. Building, Denver, Colo.
American Mines Company.
- Block, M. H.**, 2019 Vine St., Denver, Colo.
Crown Prince Consolidated Mines Company.
- Bohn, L. B.**, Beaver, Utah.
Progressive Mining Company.
- Bolduc, L.**, Kellogg, Ida.
Wisconsin Mining Company (mgr., treas.).
- Bostwick, F. O.**, Douglas, Ariz.
Washington Mines Development Company (mgr.).
- Boynton, Chas. H.**, 60 Broadway, New York.
Consolidated Copper Mines Company.
- Braden, E. B.**, Merchants Exchange, San Francisco, Calif.
Dairy Farm Mining Company (mgr., dir.).
- Bradley, F. W.**, 1022 Crocker Building, San Francisco, Calif.
Alaska Juneau Gold Mining Company.
Alaska Treadwell Gold Mining Company.
Alaska United Gold Mining Company.
Mercury Mining Company.
Bunker Hill and Sullivan Mining and Concentrating Company.
- Bramhall, F. E.**, Lowell, Mass.
Standard Amalgamated Exploration Corporation.
- Brandt, H. E.**, 1804 W. 46th St., Los Angeles, Calif.
Madera Mining Company.
- Breitenbach, C. G.**, 608 South Dearborn St., Chicago, Ill.
Georgetown Tunnel and Trans. Company.
- Brennan, Wm. P.**, 141 Franklin St., Boston, Mass.
Boston Mine Leasing Company.
- Briggs, Chas.**, Calumet, Mich.
Calumet and Arizona Mining Company.
- Briggs, W. M.**, 77 Franklin Street, Boston, Mass.
Regal Mines Company.
- Broad, J. C.**, Jamieson Building, Spokane, Wash.
Idora Mining Company, Limited.

- Broeser, H. V.**, 628 Hudson Street, Hoboken, N. J.
New Jersey Mines Company.
- Bronson, E. B.**, 5 Nassau Street, New York.
Calavada Copper Company.
- Brown, J. W.**, Waterloo, Ia.
Montana-Illinois Copper Mining Company.
- Brownell, F. H.**, 32 Broadway, New York.
Federal Mining and Smelting Company.
- Burgess, H. J.**, St. George, Utah.
Bull Valley Hassiampie Gold Mining Company.
- Burns, Jas. F.**, Box 563, Colorado Springs, Colo.
Gold Sovereign Mining and T. Company (treas.).
- Burton, H. M.**, 19 Milk Street, Boston, Mass.
Davis Daly Copper Company.
- Bush, W. L.**, Idaho Springs, Colo.
Old Town Mining, Milling and Trans. Company.
- Butters, Chas.**, 6272 Chabot Road, Oakland, Calif.
Butters Divisadero Company.
- Bylund, E. O.**, Santaquin, Utah.
Granite Mining and Milling Company.
- Caddell, J. L.**, Mangum, Okla.
C. & O. Mining and Milling Company.
- Carlson, Jno.**, Gem, Shoshone County, Ida.
Great Eastern Mining Company, Limited.
- Carlton, A. E.**, Cripple Creek, Colo.
Doctor Jack Pot Mining Company.
Cresson Consolidated Mining and Milling Company.
Golden Cycle Mining and Red. Company.
- Carson, J. W.**, 603 Dominion Express Building, Montreal, Canada.
Crown Reserve Mining Company, Limited.
Porcupine Crown Mine, Limited.
- Channing, J. Parke**, 61 Broadway, New York.
Naumkeag Copper Company.
- Catlin, Donald C.**, 7 Wall St., New York.
Proprietary Mines Company of America.
- Channing, R. H.**, Room 707, 42 Broadway, New York.
Utah Consolidated Mining Company.
- Cherry, L.**, State Bank Building, Little Rock, Ark.
New Mescal Mining Company.
- Chisholm, Duncan**, 405 Mining Exchange Bldg., Colorado Springs, Colo.
Nevada Queen Copper Company.
- Clark, Edward H.**, 354 Pine St., San Francisco, Calif.
Homestake Mining Company.
- Clark, Hon. W. A.**, Exchange Place, New York.
United Verde Copper Company.
Equator Mining and Smelting Company.
Clark-Montana Realty Company.
- Clark, W. A. Jr.**, Miner Building, Butte, Mont.
Timber Butte Milling Company.
- Clayton, T. C.**, Gunnison, Colo.
Day Star Mines Company.
- Cobb, Wm. R.**, 1408 Lord's Court, New York.
Iron Silver Mining Company.
- Cochenus, H. F.**, 1536 First National Bank Bldg., Milwaukee, Wis.
Shamrock Mining Company.

- Cockrell**, Dr. W. S., Box 1656, Mexico City, D. F.
Pacific Copper Company, Limited.
- Colburn**, E. A., 416 E. Tenth St., Denver, Colo.
Ajax Gold Mining Company (mgr.).
- Cole**, Thos. F., Alworth Building, Duluth, Minn.
Greene Cananea Copper Company.
Keweenaw Copper Company.
North Butte Mining Company.
- Collbran**, H., First National Bank Building, Denver, Colo.
Collbran-Bostwick Development Company.
Seoul Mining Company.
- Congdon**, Edw. C., Duluth, Minn.
Rainbow Lode Development Company.
- Cook**, Herman, 61 Broadway, New York.
Caribou Cobalt Mines Company.
- Colligan**, J. C., Rochester, Nev.
Rochester Treasure Mining Company.
- Conners**, Joe, Oatman, Ariz.
Tungsten Girl Company.
- Conway**, John H., 203 Essex Building, St. Paul, Minn.
Leviathan Mines Company.
- Coolidge**, W. H., Manchester, Mass.
Wisconsin Zinc Company.
- Coplin**, J. D., Globe, Ariz.
Barney Copper Company (mgr.).
- Cotton**, J. B., 120 Broadway, New York City.
Butte and Ely Copper Company.
Sierra Consolidated Mining Company.
- Cowan**, Jno. F., Salt Lake City, Utah.
Bannack Gold Mining Company.
- Craig**, Geo. L., Long Beach, Calif.
Duplex Mining Company.
- Craig**, J. L., O. S. L. R. R. Freight Office, Salt Lake City, Utah.
Pacific Gold Mining and Milling Company.
- Craig**, R. W., Phoenix, Ariz.
Red Rover Copper Company.
- Crane**, C. H., 61 Broadway, New York.
St. Joseph Lead Company.
- Crane**, T. I., 6444 Greene St., Real Estate Trust Bldg., Philadelphia, Pa.
Northern Ore Company.
- Crawford**, E. B., Mullan, Ida.
Copper King Mining and Smelting Company.
- Crome**, A. A., 27 Latimer Block, Salt Lake City, Utah.
Gold Bond Mining and Milling Company.
- Crosby**, Geo. H., 608 Lonsdale Building, Duluth, Minn.
Copper Queen Mining and Smelting Company.
Alaska Consolidated Mining and Smelting Company.
- Crump**, E. B., Lock Box 233, Bloomington, Ill.
Butte and Great Falls Mining Company.
- Culver**, F. L., 810 Lumsden Building, Toronto, Ont., Canada.
Beaver Consolidated Mines, Limited.
- Cumnock**, Victor I., 15 Broad St., New York.
Consolidated Arizona Smelting Company.
- Cutler**, H. S., 905 S. W. Temple St., Salt Lake City, Utah.
Utah-Arizona Gold and Copper Mining Company.

- Dailey, W. W.**, Wickes, Mont.
Dailey Copper Mining and Smelting Company.
- Dallaire, Chas.**, Kellogg, Ida.
Florence Mining and Milling Company, Limited.
- Darling Richard**, Bouse, Ariz.
Copper Chief Mines Company (treas.).
- Daughtrey, T. R. L.**, Jacksonville, Fla.
Camp Bird Mining, Leasing and Power Company.
- d'Autremont, C. Jr.**, Duluth, Minn.
Angelica Mining and Development Company.
- Day, W. P.**, Ophir, Colo.
Ophir Range Gold Mining Company.
- de Caplane, P. E.**, Paris, France.
Jumper California Gold Mines Company.
- DeLamar, J. R.**, 43 Exchange Place, New York.
Dome Mines Company (treas.).
- Delaney, Phil. S.**, 20 Broad St., New York.
Portland Consolidated Copper Company.
- Denison, Chas. L.**, 14 Wall St., New York.
Buffalo Mines, Limited.
- Dern, John**, National Copper Bank, Salt Lake City, Utah.
May Day Mining and Milling Company.
Seven Troughs Mining Company.
- Diamond, Levi.**, 40 Court St., Boston, Mass.
Boston-Idaho Mining Company.
- Dilthey, Wm. J.**, 25 Broad St., New York.
Arizona Copper Belt Mining Company.
- Douglas, C. I.**, Boyd Park Building, Salt Lake City, Utah.
Copper Shield Mining Company.
- Douglas, James**, 99 John St., New York.
Bunker Hill Mines Company.
United Globe Mines.
Phelps-Dodge & Company.
Old Dominion Company.
- Dubbs, Henry A.**, 716 Foster Building, Denver, Colo.
Bachelor Khedive Mines Company.
- Duffield, O. J.**, Central City, Colo.
Bezant Gold Mining Company.
- Durand, C. S.**, Yerington, Nev.
Yerington Mines and Exploration Company.
- Earle, E. P.**, 165 Broadway, New York.
Nipissing Mines Company.
- Easton, S. A.**, Kellogg, Ida.
Caledonia Mining Company.
- Eaton, J. P.**, Riverdale, Calif.
Cone Mining and Milling Company.
- Eaton, W. A.**, 520 Lyceum Building, Duluth, Minn.
Summit Gold Mining Company.
- Ebblay, Norman**, Wallace, Ida.
Phoenix Mining and Milling Company, Limited.
- Ebert, T. P.**, 407 Exchange Building, Denver, Colo.
Packard North Extension Mining Company.
- Eccles, S. W.**, 120 Broadway, New York.
Nevada Consolidated Copper Company.

- Elliott, R. T.**, Central Building, Victoria, B. C.,
Portland Canal Tunnels, Limited.
- Engels, Henry**, 393 Mills Building, San Francisco, Cal.
Engels Copper Mining Company.
- Eno, E. S.**, Elgin, Ill.
El Centro Mining and Milling Company.
- Evans, M. R.**, Kearns Building, Salt Lake City, Utah.
Rexall Silver and Copper Mining Company.
- Everett, Wesley**, Wallace, Ida.
Amazon-Dixie Mining Company.
- Ewing, L. A.**, Lakewood, Colo.
Tungsten Exploration Company.
- Fay, H. F.**, 70 State St., Boston, Mass.
Old Colony Copper Company.
- Fay, Jos. S.**, 70 State St., Boston, Mass.
Cortez Associated Mines Company.
- Finney, C. E.**, 723 Title Ins. Building, Los Angeles, Calif.
London Arizona Copper Company.
- Fitch, W. H.**, Rockford, Ill.
Antelope Springs Mining Company.
- Force, C. E.**, 109 W. 26th St., New York.
Precious Metals Corporation (treas.).
- Foster, R. J.**, Scranton, Pa.
Square Deal Gold Mining Company.
- Fox, F. D.**, Cherry St., Missoula, Mont.
Advance Mining Company.
- Frankenberger, Max**, Charleston, W. Va.
West Virginia-Wyoming Copper Co.
- Freimuth, I.**, Duluth, Minn.
Butte-Ballaklava Copper Company.
Butte and Zenith City Mining Company.
- Gardner, Geo. P.**, 40 State St., Boston, Mass.
St. Marys Mineral Land Company.
- Gibson, H. M.**, 01723 Cincinnati St., Spokane, Wash.
Vulcan Mining Company.
- Gillies, Donald B.**, Chihuahua, Mex.
San Toy Mining Company.
- Goff, J. L.**, Desloge, Mo.
Down Town Mines Company.
- Goodale, Chas. W.**, Hennessey Block, Butte, Mont.
Barnes King Development Company.
- Gottberg, J.**, Cripple Creek, Colo.
Kishman Leasing Company.
- Grantz, Otto**, Rockford, Ill.
Nevada Superior Mines Company.
- Graves, Jas. P.**, 60 Congress St., Boston, Mass.
Bingham Mines Company.
Eagle and Blue Bell Mining Company.
- Greer, P. P.**, Globe, Ariz.
Gibson Copper Company.
- Gross, R. H.**, 85 Devonshire St., Boston, Mass.
East Butte Copper Mining Company.
- Grote, Wm.**, Elgin, Ill.
El Orito Mining and Milling Company.

- Guggenheim, Daniel**, 120 Broadway, New York.
American Smelting and Refining Company.
Chile Copper Company.
- Guggenheim, S. R.**, 120 Broadway, New York.
Braden Copper Company.
Braden Copper Mines Company.
- Hagan, W. C.**, 1406 Arrott Building, Pittsburgh, Pa.
Arizona-Idaho Copper Extraction Company.
- Hagenbarth, Frank J.**, 500 McCornick Block, Salt Lake City, Utah.
Daly West Mining Company.
- Hambly, F. J.**, San Jose, Calif.
Cerro Gordo Mines Company.
- Hanford, Albt.**, 1908 Hobart Building, San Francisco, Calif.
Green Horn Mountain Copper Company.
- Hanke, H. Otto**, Kearns Bldg., Salt Lake City, Utah.
Judge Mining & Smelting Company.
- Hanson, W. H.**, P. O. Building, Wallace, Idaho.
Idaho-Montana Mining Company.
Pandora Copper Mining Company, Limited.
- Harris, Judge Ira**, The Burns, Colorado Springs, Colo.
Isabella Mines Company.
- Hartwig, Wm.**, Clarence, Iowa.
Hartwig Mining Company.
- Hastings, L. V.**, St. Johnsbury, Vt.
Arizona Gold & Copper Mining Company.
- Hatcher, I. F.**, Morris, Ill.
Providence Extension Gold Mining Company.
- Hauck, L. J.**, 433 Dayton St., Cincinnati, Ohio.
Transvaal Copper Mining Company.
- Hay, Alex M.**, Haileybury, Ont., Canada.
Tretthewey Silver-Cobalt Mines, Limited.
McIntyre Extension Mines, Limited.
McIntyre Porcupine Mines, Limited.
- Hayden, C. M.**, 94 Ames Building, Boston, Mass.
Calaveras Copper Company.
- Hayden, Chas.**, 87 Milk St., Boston, Mass.
Alaska Gold Mines Company.
- Hebbard, B. L.**, 432 Caswell Block, Milwaukee, Wis.
Imperial Copper & Gold Mining Company.
- Heller, C. A.**, 500 Bullitt Building, Philadelphia, Pa.
Belmont Milling Company.
Tonopah-Belmont Development Company.
- Higbee, C. A.**, Bullitt Building, Philadelphia, Pa.
Nevada Wonder Mining Company.
- Hillstrom, R. A.**, 57 W. 109th St., Chicago, Ill.
International Copper Mining Company (treas.).
- Hitchcock, F. H.**, % Eugene Meyer Jr., 14 Wall St., New York.
Mogollon Mines Company.
- Hoffman, Geo.**, Whitefish, Mont.
Lupfer Mining Company.
- Hoffman, H. H.**, Fourth National Bank Building, Cincinnati, Ohio.
Democrata-Cananea Sonora Copper Company (treas.).
- Holmes, G. S. Sr.**, Kingman, Ariz.
Silver Keystone Mining Company.
- Hosier, E. A.**, First National Bank Building, Kansas City, Mo.
Majestic Copper Company.

- Howell, J. M.**, Dooly Block, Salt Lake City, Utah.
Big Cottonwood Consolidated Mining Company.
- Howland, B. A.**, 31 State St., Boston, Mass. (Room 1009).
New Era Mines.
- Hubbard, B. L.**, 423 Caswell Block, Milwaukee, Wis.
Imperial Copper & Gold Mining Company.
- Huff, C. H.**, 50 Columbia St., Boston, Mass.
Champion Mining Company.
- Hufford, S. J.**, Grand Rapids, Mich.
Ideal Copper Company.
- Hummer, G. A.**, 415 Kittredge Building, Denver, Colo.
Gold Bond Consolidated Mines Company.
- Huey, T. B.**, St. Maries, Idaho.
Iron Mask Mining Company.
- Hunter, A. V.**, Leadville, Colo.
Ibex Mining Company (treas.).
- Hyde, A.** Fillmore, 25 Madison Ave., New York.
Rawley Mining Company.
- Hyde, Geo. H.**, Ridgeway, Pa.
Oro Fina Mining Company.
- Ilse, Geo.**, 732 Carlisle St., Spokane, Wash.
National Lead-Silver Company.
- Irving, Wm. A.**, Salem, Mass.
Rilla Mining Company.
- Ivers, Jas.**, 564 E. First South St., Salt Lake City, Utah.
Lost Packer Mining Company.
- Jackson, C. M.**, Stockton, Calif.
Lightner Mining Company.
- Jahnke, W. P.**, Briston, Mont.
Montana Oreway Mining Company (mgr.).
- Jennings, E. P.**, 819 Newhouse Building, Salt Lake City, Utah.
Lowland Tunnel & Trans. Company.
Utah Metal Mining Company.
- Joseph, J. L.**, 565 Mills Building, San Francisco, Calif.
MacNamara Mining & Milling Company.
- Kahn, Louis**, 170 Broadway, New York.
Azure Mining Company.
- Kearn, F. P.**, Atlanta, Ga.
Tularosa Copper Company.
- Keith, F. A.**, 1202 Hollingsworth Building, Los Angeles, Calif.
Good Springs Anchor Company.
- Keith, M. C.**, 17 Battery Place, New York.
Abangarez Gold Fields of Costa Rica.
- Kelley, John**, 1012 Baltimore Ave., Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Kenefick, Wm.**, 115 Broadway, New York.
Kenefick Zinc Corporation.
- Kent, J. F.**, Los Angeles, Calif.
Yellow Pine Mining Company.
- Kepler, J. C.**, 112 Main St., Anaconda, Mont.
Butte & Anaconda Mining & Milling Company.
- Kershaw, L.**, Tacoma, Wash.
Syncline Gold-Silver-Copper Mining Company.

- Kimball, H. S.**, St. Louis, Mo.
American Zinc, Lead & Smelting Company.
Wisconsin Zinc Company.
- Kimball, Jas. H.**, Wakefield, Mass.
Safford Copper Company.
- Kip, G. B.**, Barrytown, N. Y.
Pioneer Mining & Smelting Company.
- Kirk, M. K.**, 805 Newhouse Building, Salt Lake City, Utah.
Big Four Exploration Company.
- Kirkpatrick, Hon. E. W.**, McKinney, Tex.
Las Animas Peak Gold Mines Company.
- Kleinschmidt, A. H.**, 630 Monroe Ave., Helena, Mont.
American Mining Company, Limited (treas.).
- Knight, Jesse**, Knight Block, Provo, Utah.
Iron Blossom Consolidated Mining Company.
Dragon Consolidated Mining Company.
Rico Wellington Mining Company.
- Koontz, L. K.**, Goldfield, Nev.
Diamondfield Black Butte Reorganized Mining Company.
Manhattan Big 4 Mining Company.
Orizaba Mining & Development Company.
- Krug, H. S.**, 915 Ambert Ave., St. Louis, Mo.
Johnson Copper Development Company.
- Lalonde, Henry**, Wallace, Ida.
Artic Mining & Milling Company, Limited.
- Lambert, John**, The Rookery, Chicago, Ill.
Mines Company of America.
- Lassen, Anton**, Lovelock, Nev.
Packard Extension Mines Company.
- Lathrop, B. A.**, Centennial, Wyo.
Kimball Mining Company (mgr.).
- Lawson, Thos. W.**, 1 Charlesgate E., Boston, Mass.
First National Copper Company.
Trinity Copper Company.
- Lawrence, Geo. N.**, 1021 Newhouse Building, Salt Lake City, Utah.
South Cardiff Mining Company.
- Lawrence, Wm. W.**, 111 Broadway, New York.
National Lead Company.
- LeBar, Frank**, 4th and Chestnut Sts., Philadelphia, Pa.
Kimberly Consolidated Mines Company.
- Lee, M. W.**, Duluth, Minn.
Marsh Mines Consolidated.
- Leonard, R. W.**, St. Catharines, Ont., Canada.
Coniagas Mines, Limited.
- Lewisohn, Adolph**, 61 Broadway, New York.
General Development Company.
Kerr Lake Mining Company.
Miami Copper Company.
- Linnell, J. W.**, Brookline, Boston, Mass.
Mass Consolidated Mining Company.
- Lockhart, Henry, Jr.**, 60 Broadway, New York.
Wettlaufer Lorrain Silver Mines, Limited.
- Loughridge, Chas.**, 901 Foster Building, Denver, Colo.
Penn. Mining Company.
- Love, W. F.**, Butte, Mont.
Butte-Bullwhacker Mining Company.

- Lundstrom, J. E.**, Bennett Building, Colorado Springs, Colo.
Hardscrabble Mining Company.
- MacDonald, W. R.**, 50 Congress St., Boston, Mass.
Butte-Central Mining & Milling Company.
- MacKelvie, N. Bruce**, 25 Broad St., New York.
Butte & Superior Mining Company.
- MacNamara, Wm. K.**, Huntington, Pa.
Seven Devils Copper Company.
- MacNeill, C. M.**, 25 Broad St., New York.
Granite Gold Mining Company.
Utah Copper Company.
Chino Copper Company.
- Mackay, Hon. Robt.**, Montreal, Canada.
Vulture Mines Company.
- Madden, Jas.**, Basin, Mont.
Madden Scratch Gravel Mines Company.
- Makeever, Sanford**, 170 Broadway, New York.
Alaska Gold Belt Company.
- Marionaux, Judge Thos.**, 218 Judge Building, Salt Lake City, Utah.
Paloma Gold & Silver Mining Company.
- Martin, J. L.**, Mullan, Ida.
Carney Copper Company, Limited.
- Matthews, W. D.**, 1202 C. P. R. Building, Toronto, Ont., Canada.
Consolidated Mining & Smelting Company of Canada, Limited.
- Mayer, C. H.**, Reno, Nev.
Rochester Buck & Charlie Mines Company.
- Mayer, L. W.**, 14 Wall St., New York.
British Columbia Copper Company.
New Dominion Copper Company, Limited.
Canada Consolidated Copper Company, Limited.
- McAlpine, J. W.**, Hanover, N. M.
U. S. Copper Co.
- McBride, E. E.**, American Fork, Utah.
Plentiful Mining & Milling Company.
- McBride, J. A.**, Elko, Nev.
Nevada Bunker Hill Mining Company.
- McCallum, Dr. Alexander**, Magdalena, N. Mex.
Calumet-New Mexico Mining Company.
- McCallum, D.**, 1777 12th Ave., E. Vancouver, B. C.
Bowena Copper Mines, Limited.
- McCollum, Dr. A. M.**, Sacramento, Calif.
Ruby King Mineral Paint Company.
- McElwain, H. E.**, 850 Equitable Building, Denver, Colo.
Marion Mines & Mills Company.
- McGarry, H.**, Colorado Springs, Colo.
El Paso Consolidated Gold Mining Company.
- McGibbon, D. Lorne**, 201 Inspector St., Montreal, Quebec, Canada.
La Rose Consolidated Mines Company.
- McGinnis, J. F.**, Hillyard Station, Spokane, Wash.
Security Copper Company.
- McIntyre, W. H.**, 503 McIntyre Building, Salt Lake City, Utah.
Grand Gulch Mining Company.
- McKee, H. S.**, Pittsburgh, Pa.
Pittsburgh-Dolores Mining Company.
- McNamee, F. R.**, Los Angeles, Calif.
Atlanta-Home Gold Mining Company.

- McOmney, J. H.**, Butte, Mont.
Butte and Elliston Gold & Copper Mining Company.
- Mead, T. A.**, Greenwich, Conn.
Bunker Hill Mining & Smelting Company.
- Meier, A. J.**, Mine La Motte, Mo.
Mine La Motte Company.
- Merchant, F. D.**, 50 Broad St., New York.
Batopilas Mining Company.
- Merrill, I. L.**, 42 Broadway, New York.
Hedley Gold Mining Company.
- Merwin, F. S.**, Youngstown, Ohio.
Western Reserve Mining Company.
- Mettler, J. N.**, Tucson, Ariz.
Arizona Copper Mining Company.
- Meyer, J. P.**, 821 Security Building, St. Louis, Mo.
Phillipsburg Mining Company.
- Millard, B. F.**, Valdez, Alaska.
Granite Gold Mining Company (treas.).
- Miller, Walter C.**, Jerome, Ariz.
Jerome-Oatman Mining Company.
- Miller, W. S.**, Standard Oil Building, San Francisco, Calif.
Mountain King Mining Company.
- Miller, W. W.**, Newton, Kans.
Keystone Copper Company.
- Milligan, John**, Dewey, Ariz.
Black Chief Copper Company.
- Moffat, A. D.**, Milford, Utah.
Beaver Copper Company.
- Monson, Geo. S.**, St. Paul, Minn.
Paragon Consolidated Mining Company.
- Moody, E. S.**, Pasadena, Calif.
Tom Reed Jr. Mining Company.
- Muir, Wm.**, Titusville, Pa.
Cashier Gold Mining & Refining Company.
- Mumbrue, L. H.**, Lawson, Colo.
Little Giant Gold Mining & Milling Company.
- Murdoch, J. H.**, Washington, Pa.
German Copper Company.
- Murray, Wm.**, Champaign, Ill.
Giant Eclipse Consolidated Mines Company.
- Nelson, P. H.**, Duluth, Minn.
Sullivan Copper Development Company.
- Nenzel, Jos. F.**, 702 Mutual Bank Building, San Francisco, Calif.
Nenzel Crown Point Mining Company.
Rochester Elda Fino Mining Company.
- Nichols, Wm. H.**, 52 Broadway, New York.
Granby Consolidated Mining, Smelting & Power Company, Limited.
- Nordquist, J. H.**, Wallace, Ida.
Northern Light Mining & Milling Company.
- North, Geo.**, Jackson, Mont.
Saginaw Copper Company.
- O'Brien, Judge W. P.**, Fairplay, Colo.
Standard Gold-Copper Mining & Milling Company.

- O'Connor, John, Room 8, Fall City Bk., Spokane, Wash.
New Crystal Mining Company.
- Oldham, Jas. W., 1000 Grand Ave. Temple, Kansas City, Mo.
Wellington Mines Company.
- Orem, A. J., 79 Milk St., Boston, Mass.
New Douglas Consolidated Copper Company.
- Oscanyan, W. H., 136 Liberty St., New York.
Brunswick Consolidated Gold Mining Company.
- Oswald, H. A., % Minneapolis Brewing Company, Minneapolis, Minn.
Calumet & Montana Consolidated Mining Company.
- Page, W. Finch, Victoria, B. C.
Kootenay Bonanza Mines, Limited.
- Paine, Chas. J. Jr., 705 Sears Building, Boston, Mass.
Douglas Copper Company.
Mayflower Mining Company.
Winona Copper Company.
- Paine, W. A., 82 Devonshire St., Boston, Mass.
Lake Copper Company.
Trimountain Mining Company.
Copper Range Company.
Baltic Mining Company.
Copper Range Railroad Company.
Champion Copper Company.
Atlantic Mining Company.
- Palmer, W. J., 40 Cedar St., New York.
Amalgamated Pioche Mining & Smelting Corporation.
- Papesh, W. W., Kellogg, Ida.
Highland Surprise Consolidated Mining Company.
- Parker, A. D., P. O. Box 456, Denver, Colo.
Florence Goldfield Mining Company (treas.).
- Parker, Col. Bowdoin S., 31 Milk St., Boston, Mass.
Crystal Copper Company.
- Parsons, Chas. C., 1710 S. 21 E. St., Salt Lake City, Utah.
Mary Murphy Gold Mining Company.
- Pattison, Martin, Superior, Wis.
Denn-Arizona Copper Company.
- Patton, E. L., Newport News, Va.
Southern Zinc & Mining Company.
- Peck, F. G., Colorado Springs, Colo.
Portland Gold Mining Company.
- Peddicord, W. J., Hood River, Ore.
Oregon & B. C. Mining & Dev. Company, Limited.
- Pellatt, Sir Henry M., 420 Traders Bank Building, Toronto, Ont., Canada.
Peterson Lake Silver Cobalt Mining Company, Limited.
- Peterson, H. J., 2616 Chicago Avenue, Minneapolis, Minn.
British-American Mining Company.
- Peterson, O. F., 54 E. 4th So. St., Salt Lake City, Utah.
Dugway Copper Mining & Smelting Company.
- Peterson, Peter, Salt Lake, Mont.
Boston-Colby Copper Mining Company.
- Phillips, Jas. Jr., 1 E. 39th St., New York.
Ajo Consolidated Copper Company.
- Phinney, Dr. C. H., Los Angeles, Calif.
Lexington Arizona Mining Company.

- Pierce, J. F.**, Rock River, Wyo.
Big Five Copper Company.
- Plank, Abr.**, Wooster, Ohio.
Mid-Colorado Mines Company.
- Pond, S. S.**, 78 S. St., Salt Lake City, Utah.
Cedar Talisman Consolidated Mines Company.
- Pooley, E. F.**, 16th and Indiana St., Philadelphia, Pa.
Philadelphia Mines Company.
- Power, W. I.**, Philipsburg, Mont.
Swastika Mining Company.
- Price, D. W.**, Kellogg, Ida.
Nabob Mining Company.
Big Creek Leasing Company.
- Prindle, C. C.**, 907 Metropolitan Life Building, Minneapolis, Minn.
Helvetia Copper Company.
- Probert, A. Clarence**, 25 Capitol City Bank Bldg., Santa Fe, N. M.
Taos Mining Co.
- Provost, David**, 132 Nassau St., New York.
Walker River Copper Company.
- Pryor, R. C.**, Houghton, Mich.
Onondaga Copper Company.
- Qualey, Frank D.**, Hawthorne, Nev.
Excelsior Mtn. Copper Co.
- Rae, Alexander**, 117 Henry St., Brooklyn, N. Y.
New Planet Copper Mining Company.
- Rand, C. F.**, Room 1209, No. 71 Broadway, New York.
Antimony Corporation.
Ponupo Manganese Company.
- Raymond, A. S.**, Joplin, Mo.
Ornogo Circle Mining Company.
- Rea, Wm. H.**, Farmers Bank Building, Pittsburgh, Pa.
Hussey Howe Mining Company.
- Read, Wm. T.**, 15 William St., New York.
Copete Consolidated Copper Company.
- Reazor, F. D.**, Muskogee, Oklahoma.
Mansfield Mining & Smelting Company.
- Reese, C. W.**, 1790 S. 5th St. E., Salt Lake City, Utah.
Mason Valley Extension Mining Company.
- Reinhart, E.**, Winnemucca, Nev.
Eastern Star Mining Company.
- Reiter, C. G.**, 1123 Broadway, New York.
Bunker Hill Mining & Smelting Company.
- Reynolds, Geo. T.**, Fort Worth, Tex.
Hobson Silver Lead Company.
- Reynolds, W. H.**, Lexington Ave. and 42nd St., New York.
Stoddard Mines Company.
- Rice, Wm. G.**, Houghton, Mich.
Superior & Boston Copper Company.
- Robertson, Lt. Col. D. M.**, 7 Melinda St., Toronto, Ont., Canada.
Preston East Dome Mines.
- Rodgers, E. H.**, 310 W. Missouri St., El Paso, Texas.
Anaconda-Skookum Copper Group (treas.).
- Rorem, E. E.**, 424 Second Ave. So., Minneapolis, Minn.
Norseman Exploration Company.

- Ross, A. S.**, Salt Lake City, Utah.
Cash Boy Consolidated Mining Company.
Pittsburg-Idaho Company, Limited.
Wilbert Mining Company, Limited.
- Ross, F. M.**, Federal Building, Los Angeles, Calif.
Vivian Mining Company.
- Rossi, H. J.**, Wallace, Ida.
Rainbow Mining & Milling Company, Limited.
- Rotch, Wm.**, 157 Bay State Road, Boston, Mass.
Terrible-Dunderburg Mining & Power Company.
- Rothchild, Walter**, 575 Mills Building, San Francisco, Calif.
Treasure Mining Company.
- Rothwell, J. E.**, Brookline, Mass.
Utah Metal & Tunnel Company.
- Roundy, John**, Provo, Utah.
Utah-Yerington Mining Company.
- Ruez, G. F.**, Milwaukee, Wis.
Southwestern Miami Development Company.
- Rundell, Thos.**, Calumet, Mich.
Calumet & California Mining Company.
- Ryan, John D.**, 42 Broadway, New York.
Anaconda Copper Mining Company.
- Schirmer, Frank A.**, 79 Milk St., Boston, Mass.
Utah Apex Mining Company.
- Schley, Grant B.**, 734 Fifth Ave., New York.
Howe Sound Company.
- Schmoll, John**, 503 Odd Fellows Building, St. Louis, Mo.
Nevada Arizona Mines Company.
- Schlesinger, Leo**, 66 Wooster St., New York.
Peabody Consolidated Copper Company.
- Schuette, Wm.**, 220 Fifth Ave., New York.
Arizona-Eastern Mining Company.
- Scott, W. D.**, E. 118 Fourth St., Spokane, Wash.
Methow Gold & Copper Mining Company.
- Seaman, H. W.**, The Rookery, Chicago, Ill.
Trojan Mining Company.
- Seeman, H. I.**, Box 1374, Denver, Colo.
Seeman Investment & Finance Company.
Gilt Edge Mines & Smelting Company (mgr.).
- Seasons, E. A.**, 1005 Kelly St., Portland, Ore.
Cascadia Mining & Development Company.
- Seybold, E.**, 80 Elgin St., Ottawa, Ont., Canada.
Right of Way Mines, Limited.
- Seymour, W. B.**, Goldroad, Ariz.
Blue Ribbon Gold Mining Company.
- Sharp, W. G.**, 55 Congress St., Boston, Mass.
Needles Mining & Smelting Company.
Richmond-Eureka Mining Company.
Centennial-Eureka Mining Company.
U. S. Smelting Company.
U. S. Metal Refining Company of New Jersey.
U. S. Smelting, Refining & Mining Company.
- Shaw, L. V.**, 1226 Ionia St., Los Angeles, Calif.
Empire Copper & Gold Mining Company.

- Shepard, Richard B., 408 State St., Salt Lake City, Utah.
Silver Peak Mining Company.
- Shopleigh, A. L., St. Louis, Mo.
Washington Land & Mining Company.
- Shove, E. P., Colorado Springs, Colo.
Elkton Consolidated Mining & Milling Company.
- Simmons, J. A., Yamhill, Ore.
West Side Gold & Silver Mining Company.
- Simmons, W. H., Reno, Nev.
Old Susan Mining Company.
- Skinner, C. M., 18 Broadway, New York.
Arichise Copper Company.
- Slater, W. M., Pacific Building, F. St. N. W., Washington, D. C.
American Rutile Company.
- Slick, W. B., Boise, Ida.
Slick Bros. Mining & Milling Company.
- Slosson, H. L. Jr., 265 Russ Building, San Francisco, Calif.
Mexican Gold & Silver Mining Company.
Union Consolidated Mining Company.
- Smily, E. D., Panaca, Nev.
Silver Comet Mining Company.
- Smith, Chas. S., 50 Congress St., Boston, Mass.
Old Dominion Copper Mining & Smelting Company.
- Smith, F. M., Syndicate Building, Oakland, Calif.
Halifax Tonopah Mining Company.
- Smith, H. B., Bay City, Mich.
Snow Creek Mining Company.
- Snydaker, J. G., 39 Board of Trade, Chicago, Ill.
National Mines Company.
- Sooy, E. C., 500 Orea Leslie Building, Kansas City, Mo.
Kansas City-Nevada Consolidated Mines Company.
- Spicer, C. C., 800 I. W. Hellman Building, Los Angeles, Calif.
Big Jim Gold Mining Company.
- Sprague, C. S., Goldfield, Nev.
Jumbo Extension Mining Company.
Grandma Mining Company.
- Sprigga, A. E., Helena, Mont.
Alaska Industrial Company.
- Squance, Wm., Wallace, Ida.
Bullion Mining Company, Limited.
- Stanton, J. R., 15 William St., New York.
Mohawk Mining Company.
Wolverine Copper Mining Company.
Michigan Copper Mining Company.
White Pine Extension Copper Company.
- Starr, J. R. L., Canada Life Building, Toronto, Ont., Canada.
McKinley-Darragh-Savage Mines, Limited.
- Stears, A. M., Lockland, Ohio.
Calhoun Consolidated Mines Company.
- Steele, Chas., 13 N. Wyoming St., Butte, Mont.
Balkan-Butte Copper Mining Company (mgt.).
- Steifer, P. B., Coutelenc, Butte County, Calif.
P. B. Steifer Mining Company.
- Steindler, D. M., 42 Broadway, New York.
Dominion Reduction Company.

- Stewart, Judd**, 120 Broadway, New York.
 American Smelting & Refining Company.
- Stremel, C. F.**, 1311 Washington Ave. N., Minneapolis, Minn.
 Minneapolis & Texada Copperite Company, Limited.
- Sturdy, John**, 57 Madison Ave., Crafton, Pa.
 Sturdy Gold Mining Company.
- Sutermelster, H. A.**, 2018 Troost Ave., Kansas City, Mo.
 Ruby Copper Company.
 Southern Arizona Mining Company.
- Tapp, J. S.**, 2000 Hampshire St., Quincy, Ill.
 Evergreen Mines Company.
- Tator, Henry**, Millerton, N. Y.
 Steckner Gold Mining Company.
- Taylor, Frank**, Goff Apartment, Pueblo, Colo.
 Equity Creede Mining Company.
- Taylor, George**, New Liskeard, Ont., Canada.
 Temiskaming & Hudson Bay Mining Company, Limited.
 Dome Lake Mining & Milling Company, Limited.
- Taylor, O. L.**, 48 East 4th St., St. Paul, Minn.
 St. Paul-Montana Mining Company.
- Tegethoff, C. C.**, 475 Fifth Ave., New York.
 Golden Reward Consolidated Gold Mining & Milling Company.
- Terwilliger, C. D.**, Verdi, Nev.
 New Empire Goldfield Mines Company.
- Tew, Martin E.**, 411 Metropolitan Life Building, Minneapolis, Minn.
 Copper State Mining Company.
- Thayer, F. H.**, East Rochester, N. H.
 Royal Gold Mines.
- Thoman, F.**, 1621 Madison St., Denver, Colo.
 Silvered Copper Mining Company.
- Thomas, Dr. J. W.**, Phoenix, Ariz.
 Sterling Copper Company.
- Thompson, Dr. Alfred**, Ottawa, Ont., Canada.
 Yukon Copper Company, Limited.
- Thompson, Wm. B.**, 14 Wall St., New York.
 Inspiration Consolidated Copper Company.
- Thompson, R. V.**, Corona, L. I., New York.
 Tortillita Copper Company.
- Thompson, Wm. D.**, Racine, Wis.
 Black Diamond Copper Mining Company (treas.).
- Thorne, J. E.**, Pleasant Grove, Utah.
 Utah Centennial Mining Company.
- Tillinghast, A. S.**, Toledo, Ohio.
 Buckeye Belmont Mines Company.
- Timmons, Noah A.**, Montreal, Que., Canada.
 Hollinger Gold Mines, Limited.
- Todd, Robt. B.**, Reno, Nev.
 Luning-Idaho Mining Company.
- Todd, Wm. R.**, 32 Broadway, New York.
 Quincy Mining Company.
- Trowbridge, Al.**, 445 Sutter St., San Francisco, Calif.
 Nyman Consolidated Mines Company.
- Underhill, H. B., Jr.**, Merchants Exchange Building, San Francisco, Calif.
 Selby Smelting & Lead Company.

- Vaile, J. F.**, 420 Equitable Building, Denver, Colo.
Druid Gold Mining Company.
- Valentine, W. S.**, 17 Battery Place, New York.
New York & Honduras Rosario Mining Company.
- Wagner, C. H.**, 420 Eighth Ave. S. E., Minneapolis, Minn.
Atlas Mining & Milling Company.
- Walker, C. E.**, 702 Gas and Electric Building, Denver, Colo.
Rainbow Mountain Mining Company.
- Walker, J. R.**, Mercantile Annex, Salt Lake City, Utah.
Walker Mining Company.
- Wall, Col. E. A.**, 163 So. Main St., Salt Lake City, Utah.
Daly Mining Company.
- Wall, J. G.**, 10 Wall St., New York City.
Tri-Bullion Smelting & Development Company.
- Wallinder, E. G.**, 609 First National Bank, Duluth, Minn.
Kamloops Copper Company (mgr.).
- Ward, H. H.**, Washington, D. C.
Porcupine-Vipond Mines, Limited.
- Ward, M. R.**, Wayne, Pa.
Tonopah Extension Mining Company.
- Watson, Geo. H.**, 49 So. Main St., Salt Lake City, Utah.
South Hecla Mining Company (mgr.).
- Watterson, W. W.**, Bishop, Calif.
Lone Star Consolidated Mining Company.
- Webber, R. H.**, 626 Minnesota Ave., Kansas City, Kansas.
Arizona Southwestern Copper Company.
- Wedge, Utley**, 2 Rector St., New York.
Tennessee Copper Company.
- Weldon, Wm. R. H.**, Los Angeles, Calif.
Aurora Mines Company.
- Wells, J. S.**, 257 Second Ave., Salt Lake City, Utah.
Victor Consolidated Mining Company.
- Westfall, A. H.**, Phoenix, Ariz.
Kelvin Sultana Copper Company.
- Whitaker, H. W.**, 72 S. Grant Ave., Columbus, Ohio.
Ohio Mines Company.
- White, S. T.**, Redding, Calif.
Delta Consolidated Gold Mines Company.
- Wilkinson, T.**, Burlington, Iowa.
Oro Cobre Mining Company.
- Williams, D. J.**, No. 40 J. St., Salt Lake City, Utah.
Monetaire Mining Company.
- Williams, Frank**, Goodsprings, Nev.
Kansas-Nevada Mining Company.
- Williams, F. H.**, 60 Congress St., Boston, Mass.
Victoria Copper Mining Company.
- Williamson, Dan R.**, Box 1209, Globe, Ariz.
Inspiration Needles Copper Co.
- Wingfield, Geo.**, Reno, Nev.
Aurora Consolidated Mines Company.
- Winslow, Arthur**, 131 State St., Boston, Mass.
Liberty Bell Gold Mining Company.
- Wittenberg, C. F.**, Tonopah, Nev.
Union Amalgamated Mining Company.
- Wolfe, Conrad**, 416 Hutton Building, Spokane, Wash.
Red Monarch Mining Company.

- Woods, F. M.**, Colorado Springs, Colo.
 Nellie Mining Company.
Worthington, G. H., 812 Hippodrome St., Cleveland, Ohio.
 Underwriters Land Company.
Wright, D. P., Oatman, Ariz.
 Black Range Mining Company (treas.).
Wright, Spencer D., Brown Building and Chestnut St., Philadelphia, Pa.
 Warrior Copper Company.
Wrigley, Wm., Jr., Chicago, Ill.
 Modoc Mines Company.
Yoes, J. C., Greenland, Ark.
 La Luz Copper Company.
Young, W. J., Jr., Courtland, Ariz.
 Great Western Copper Company.
Yount, S. E., Goodsprings, Nev.
 Boss Gold Mining Company.
Zadig, H., 365 Bush St., San Francisco, Calif.
 Tonopah North Star Trans. & Development Company.
Zang, A. J., 603 Symes Building, Denver, Colo.
 Vindicator Consolidated Gold Mining Company.
Zeigler, W. H., Columbia Building, Spokane, Wash.
 Norman Mines Company.
Zimmerman, John, Beloit, Wis.
 Midland Lead & Zinc Company.
Zimmerman, J. L., 914 Columbus Sav. & Trust Building, Columbus, Ohio.
 Hermosillo Copper Company.

VICE-PRESIDENTS.

- Abenheim, Sidney**, 2 Stone Street, New York, N. Y.
 New York and Honduras Rosario Mining Company.
Adams, C. A., 85 South Street, Boston, Mass.
 Mount Champion Mining Company.
Aguilera, Pedro, Santiago de Cuba.
 Ponupo Manganese Company.
Alexander, Wm. H., 45 Broadway, New York.
 Walker River Copper Company.
Allison, D. C., 413 Fletcher Trust Building, Indianapolis, Ind.
 Frontier Mining Company.
Aldridge, W. H., 14 Wall Street, New York, N. Y.
 Mines Company of America.
Ames, C. W., % West Publishing Co., St. Paul, Minn.
 St. Paul Montana Mining Company.
Andreae, Percy, Chicago, Ill.
 Transvaal Mining Company of Utah.
Andrus, F. B., Butte, Mont.
 Swastika Mining Company.
Apfield, John, Phoenix, Ariz.
 Red Rover Copper Company.
Austin, J. S., Bullitt Building, Philadelphia, Pa.
 New Wonder Mining Company (treas.).
Austin, C. H., Vicksburg, Miss.
 Atlas Mining & Milling Company.
Babbitt, Judge K. R., 25 Broad Street, New York, N. Y.
 Butte & Superior Mining Company.
Bachman, B. F., 632 Commonwealth Building, Denver, Colo.
 Pine Martin Mining Company.

- Baker, C. W.**, 120 Broadway, New York, N. Y.
American Zinc, Lead & Smelting Company.
- Baldwin, Geo. P.**, 339 Monadnock Block, Chicago, Ill.
Kelvin Sultana Copper Company.
- Bannow, Alexander**, Johnson, Ariz.
Keystone Copper Company.
- Barnes, J. E.**, 915 Union Bank Building, Pittsburgh, Pa.
Arizona-Idaho Copper Extraction Company.
- Barnett, W. H.**, Patagonia, Ariz.
Happy Jack Mining & Refining Company (mgr.).
- Barrett, R. W.**, 502 Humboldt Bank Building, San Francisco, Calif.
Nyman Consolidated Mines Company.
- Barton, Geo. S.**, Worcester, Mass.
New Planet Copper Mining Company.
- Bell, Geo. E.**, 23 Huron Street, Toledo, Ohio.
Evergreen Mines Company.
- Bemis, G. L.**, 563 East Broadway, Salt Lake City, Utah.
Walker Mining Company.
- Bennett, W. E.**, 120 Broadway, New York, N. Y.
Nevada Consolidated Copper Company (sec.).
- Berryhill, Jas. G.**, Des Moines, Ia.
Nevada-Douglas Consolidated Copper Company.
- Bertoglio, D. G.**, Meaderville, Mont.
Butte and Elliston Gold & Copper Mining Company.
- Bidwell, J. B.**, Twining, N. Mex.
Taos Mining Company.
- Binnow, B.**, 331 D. F. Walker Bldg., Salt Lake City, Utah.
Bannock Gold Mining Company.
- Black, A. T.**, 111 Broadway, New York, N. Y.
Mines Company of America.
- Blackwell, E.**, Beartrack, Ky.
Vincent Creek Gold & Copper Company.
- Blanchard, C. A.**, Pittsburgh, Pa.
San Toy Mining Company.
- Bamberger, Herman**, 161 South Main Street, Salt Lake City, Utah.
South Hecla Mining Company.
- Bloom, Wm.**, 62 Summer Street, Boston, Mass.
Davis Daly Copper Company.
- Bonneau, T. F.**, Reno, Nev.
Louisiana Consolidated Mining Company.
- Boettcher, Claude**, Denver, Colo.
Cresson Consolidated Mining & Milling Company.
- Bostwick, H. R.**, First National Bank Building, Denver, Colo.
Collbran-Bostwick Development Company.
Seoul Mining Company (dir.).
- Bostwick, W. E.**, 34 Elm Street, Passaic, N. J.
Madera Mining Company.
- Braden, E. B.**, Merchants Ex. Building, San Francisco, Cal.
Selby Smelting & Lead Company.
- Bradrick, A. V.**, St. Maries, Ida.
Arizona-Eastern Mining Company.
- Braffet, M. P.**, Judge Building, Salt Lake City, Utah.
May Day Mining & Milling Company.
- Brawley, A. W.**, South Park Foundry & Mach. Company, St. Paul, Minn.
Leviathan Mines Company.
- Brougher, W.**, Carson City, Nev.
Shasta, Belmont Mining Company.

- Briggs, Jos.,** Winthrop, Me.
 Boston Idaho Mining Company.
- Briggs, Walter M.,** 77 Franklin Street, Boston, Mass.
 Ajo Consolidated Copper Company.
- Bronson, E. B.,** 66 Broadway, New York, N. Y.
 Atlanta-Home Gold Mining Company.
- Brown, I. D.,** 800 Eagle Avenue, Cleveland, O.
 Ohio Mines Company.
- Brown, S. A.,** 30 Church Street, New York, N. Y.
 % Tonopah Extension Mining Company.
- Brown, T. W.,** Tonasket, Wash.
 Trinidad Mining & Smelting Company (sec.).
- Brown, W. C.,** Wallace, Ida.
 Arctic Mining & Milling Company.
- Brunner, Jos.,** Tucson, Ariz.
 Arizona Copper Mining Company.
- Brush, Edw.,** 120 Broadway, New York, N. Y.
 Dairy Farm Mining Company.
 American Smelting & Refining Company.
- Buchanan, Geo. H.,** Brown Building, 4th and Chestnut Streets, Phila. Pa.
 Warrior Copper Company.
- Buck, W. F.,** Lake Charles, La.
 Providence Extension Gold Mining Company.
- Bunnell, Milie,** Duluth, Minn.
 Consolidated Interstate Callahan Mining Company.
- Burns, W. G.,** 50 Congress St., Boston, Mass.
 Butte-Central Mining & Milling Company (sec.).
- Burrage, A. C.,** 85 Ames Bldg., Boston, Mass.
 Chile Copper Company.
- Burton, H. M.,** 19 Milk St., Boston, Mass.
 Royal Gold Mines.
- Buscombe, C. M.,** 2275 York St., Vancouver, B. C.
 Bowena Copper Mines, Limited.
- Caddel, Arthur,** Paris, Tex.
 C. & O. Mining & Milling Company.
- Campbell, L. G.,** Winnemucca, Nev.
 National Mines Company.
- Campbell, T. E.,** Phoenix, Ariz.
 Jerome Verde Copper Company.
- Carlson, Gust,** Duluth, Minn.
 Butte Ballaklava Copper Company.
- Carpenter, Geo. O.,** 722 Chestnut St., St. Louis, Mo.
 National Lead Company.
- Carlton, A. E.,** Colorado Springs, Colo.
 Elkton Consolidated Mining & Milling Company.
 Findley Mines Company.
- Carson, J. B.,** 2518 Manito Boulevard, Spokane, Wash.
 Idora Mining Company, Limited.
- Cass, Geo.,** Douglas, Ariz.
 Washington Mines Development Company.
- Chadwick, W. R.,** Lovelock, Nev.
 Packard Extension Mines Company.
- Chalmers, Alex.,** Piedmont, Cal.
 Lightner Mining Company.
- Chady, F. F.,** Lawson, Colo.
 Little Giant Gold Mining & Milling Company.

- Shanning, J. Parke, 61 Broadway, New York, N. Y.
 General Development Company.
 Miami Copper Company.
- Shapman, R. B., Los Angeles, Calif.
 Yellow Pine Mining Company.
- Sharles, W. W., 572 Bullitt Building, Philadelphia, Pa.
 Eden Mining Company.
- Shipman, Jas. Jr., American Fork, Utah.
 Pacific Gold Mining & Milling Company.
- Shoate, John W., First National Bank Building, Oklahoma City, Okla.
 Mascot Mining & Milling Company, Limited, of Idaho.
- Shrisman, C. H., Los Angeles, Calif.
 Aurora Mines Company.
- Shurch, A. W., Portchester, N. Y.
 El Orito Mining & Milling Company.
- Shark, W. L., Jerome, Ariz.
 Cleopatra Copper Company.
- Shokefair, Victor, 735 N. Virginia St., Reno, Nev.
 Reno-Yerington Copper Company.
- Shollins, W. G., % Pacific Fir Company, Seattle, Wash.
 Red Monarch Consolidated Mining Company.
 United Copper Mining Company.
- Shonduitt, A. W., 1227 State Life Building, Indianapolis, Ind.
 Stratton Copper Company.
- Shoolidge, L. A., 55 Congress St., Boston, Mass.
 American Zinc, Lead & Smelting Company.
- Shooper, L. F., Winchester, Va.
 Gooney Manor Copper Company.
- Shopen, J. B., Corona, Cal.
 Barney Copper Company.
- Shornell, Fred H., Great Barrington, Mass.
 Steckner Gold Mining Company.
- Shornell, I. H., 61 Broadway, New York, N. Y.
 St. Joseph Lead Company.
- Shornish, E. J., 111 Broadway, New York, N. Y.
 National Lead Company.
- Shotton, Jos. B., 120 Broadway, New York City.
 Consolidated Copper Mines Company.
 North Butte Mining Company.
- Shoyle, P. E., 55 Congress Street, Boston, Mass.
 American Zinc, Lead & Smelting Company.
- Shrane, T. I., Real Estate Trust Building, Philadelphia, Pa.
 Northern Ore Company.
- Shrego, Herbert, Missoula, Mont.
 Advance Mining Company.
- Shritchlow, E. B., McCornick Building, Salt Lake City, Utah.
 % Utah Metal and Tunnel Company.
- Shrome, Walter, 27 Latimer Block, Salt Lake City, Utah.
 Gold Bond Mining & Milling Company.
- Shunningham, C. L., Anamosa, Colo.
 Tepee Mining & Development Company.
- Shunningham, G. C., Philadelphia, Pa.
 Florence-Goldfield Mining Company.
- Shurtis, Geo. M., Clinton, Iowa.
 Trojan Mining Company.

- Curtis, L. H.**, 222 Southwest Temple Street, Salt Lake City, Utah.
Nevada-Douglas Consolidated Copper Company.
- Curtis, W. H.**, Osseo, Minn.
Norseman Exploration Company.
- Darling, Elmer A.**, 23 East Twenty-first Street, New York, N. Y.
Augusta Metal Mining Company.
- Darling, Richard, Jr.**, Bouse, Ariz.
Copper Chief Mines Company.
- Davis, A. B.**, Mills Building, San Francisco, Cal.
Alaska United Gold Mining Company.
Alaska Juneau Gold Mining Company.
Alaska Treadwell Gold Mining Company.
- Davis, A. J.**, First National Bank Building, Butte, Mont.
Barnes King Development Company.
- Davis, M. B.**, Montreal, Quebec.
Dominion Reduction Company, Limited.
- Day, Arthur**, 115 Broadway, New York, N. Y.
Kenefick Zinc Corporation.
- De Hart, J. M.**, 17 Battery Place, New York, N. Y.
New York and Honduras Rosario Company.
- Demeos, Leon**, St. Maries, Idaho.
Iron Mask Mining Company.
- Denton, F. W.**, Painesdale, Mich.
Chief Consolidated Mining Company.
- Dexter, Gordon** (chairman) State Mutual Building, Boston, Mass.
Alvarado Mining and Milling Company.
- Dickerman, W. B.**, 40 Wall Street, New York, N. Y.
Bluebird Company.
- Dickson, Chas. C.**, 63 Wall Street, New York, N. Y.
Porcupine Vipond Mines, Limited.
- Dickson, J. F.**, Portland, Ore.
Sierra-Alaska Mining Company.
- Dickson, W. B.**, 42 Broadway, New York, N. Y.
Hedley Gold Mining Company.
- Dieckman, J. H.**, 821 Security Building, St. Louis, Mo.
Philipsburg Mining Company.
- Dodge, C. H.**, 99 John Street, New York, N. Y.
Bunker Hill Mines Company.
- Douglas, Walter**, 99 John Street, New York, N. Y.
Phelps-Dodge & Company.
- Downing, W. M.**, Denver, Colo.
El Paso Consolidated Gold Mining Company.
- Duncan, Chas. A.**, 1400 Alworth Building, Duluth, Minn.
North Butte Mining Company.
- Drum, Frank G.**, 354 Pine Street, San Francisco, Cal.
Homestake Mining Company.
- Dwyer, W. F.**, Lexington, Mass.
Standard Amalgamated Expl'n Corp'n.
- Earl, B. B.**, 82 Devonshire Street, Boston, Mass.
Champion Copper Company.
- Eaton, W. H.**, Virginia, Minn.
Kamloops Copper Company.
- Eccles, S. W.**, 120 Broadway, New York, N. Y.
American Smelting and Refining Company.

- Eichelberger, Frank**, Helena, Mont.
Reliance Mining & Milling Company.
- Elliot, Samuel**, 135 William Street, New York, N. Y.
Batopilas Mining Company.
- Ennis, C. W.**, 309 South Spring Street, Los Angeles, Cal.
Duplex Mining Company.
- Erb, Newman**, 42 Broadway, New York, N. Y.
New Dominion Copper Company, Limited.
- Erickson, Edwin**, Gem, Shoshone County, Idaho.
Great Eastern Mining Company.
- Esser, W. T.**, Oatman, Ariz.
Oatman Crescent Mining Company.
- Evans, Edw.**, Spokane, Wash.
Intermountain Copper Mining Company.
- Evans, R. J.**, Mining Ech. Building, Salt Lake City, Utah.
Seven Troughs Mining Company.
- Everett, S. T.**, Houghton, Mich.
New Arcadian Copper Company.
- Ewings, C. R.**, Jerome, Arizona.
Boston and Jerome Copper Company.
- Ewings, J. A.**, Leadville, Colo.
Ibex Mining Company.
- Farrell, T. M.**, Blackfoot, Ida.
O. K. Extension Mining and Refining Company.
- Fay, J. S.**, 53 State Street, Boston, Mass.
Antimony Corporation.
- Fesing, H. W.**, Houghton, Mich.
New Baltic Copper Company.
- Filley, J. D.**, St. Louis, Mo.
Washington Land and Mining Company.
- Finlen, Jas. G.**, Butte, Mont.
Lost Packer Mining Company.
- Finn, David**, Merrill, Wisc.
Platinum Mining & Milling Company.
- Finucane, Thos. W.**, Rochester, N. Y.
McKinley-Darragh-Savage Mines, Limited.
- Fisher, J. J.**, 421 Wood Street, Pittsburgh, Pa.
Stanley Mines Company.
- Fitzgerald, T. H.**, Kingman, Ariz.
Silver Keystone Mining Company.
- Flaig, A. L.**, 1398 Twenty-first Street, Milwaukee, Wisc.
Boston-Colby Copper Mining Company.
- Fletcher, H. N.**, Los Angeles, Cal.
Lexington Arizona Mining Company.
- Forbes, H. D.**, 96 Elm Hill Avenue, Boston, Mass.
Franklin Mining Company.
- Force, F. W.**, 109 West Twenty-sixth Street, New York, N. Y.
Precious Metals, Corporation.
- Ford, G. A.**, 5941 Christian Street, Philadelphia, Pa.
Kimberly Consolidated Mines Company.
- Forman, J. H.**, Oakland, Nev.
Union Amalgamated Mining Company.
- Forsling, Guy W.**, Cheyenne, Wyoming.
Kimball Mining Company.
- Foster, E. G.**, 25 Madison Avenue, New York, N. Y.
% Rawley Mining Company.

- Foucar**, Theo. M., Cincinnati, Ohio.
Transvaal Copper Mining Company.
- Fox**, Moylan C., Kearns Building, Salt Lake City, Utah.
Judge Mining and Smelting Company.
- Frank**, Max, Chicago, Ill.
Square Deal Gold Mining Company.
- Franklin**, Harris, Savoy Hotel, New York, N. Y.
Golden Reward Gold Mining & Milling Company.
- Franks**, J. W., Stevensville, Mont.
Mount Thompson Gold Mining and Milling Company.
- Frankenstein**, S. I., 115 Broadway, New York, N. Y.
Alaska Industrial Company.
- Fraser**, A. W., 53 Eden Street, Ottawa, Ont.
Right of Way Mines, Limited.
- Fredrick**, C. E., E 604 Twenty-second Street, Spokane, Wash.
Merger Mining Company, Limited.
- Frost**, W. M., 1117 Fifth Street, Spokane, Wash.
Florence Silver Mining Company.
- Fugal**, Louis, Starr, Juab Company, Utah.
Lowland Tunnel and Transportation Company.
- Fulton**, W. T., Winslow, Ark.
La Luz Copper Company.
- Gallacher**, Jno., 661 South Fifth E. Street, Salt Lake City, Utah.
Rexall Silver & Copper Mining Company.
- Gamm**, H. F. E., 25 Broad Street, New York, N. Y.
Arizona Copper Belt Mining Company.
- Ganty**, Dr. F. M., Deadwood, S. Dak.
New Puritan Mining Company.
- Gardner**, G. P., 40 State Street, Boston, Mass.
Winona Copper Company.
Mayflower Mining Company.
Douglas Copper Company.
- Gear**, W. I., % The Robert Redford Company, Montreal, Quebec.
Crown Reserve Mining Company, Limited.
Porcupine Crown Mines, Limited.
- Geber**, W. F., Provo, Utah.
Tintic Delmar Mining Company.
- Germolgez**, Paul, 13 North Wyoming Street, Butte, Mont.
Balkan Butte Copper Mining Company.
- Gerry**, M. H., Jr., Helena, Mont.
Helena Mining Bureau, Inc.
- Giegerich**, Henry, Kaslo, B. C.
Cork-Province Mines, Limited.
- Gilbert**, F. E., Jacksonville, Fla.
Camp Bird Mining, Leasing and Power Company.
- Gleason**, C. E., 10 Wall Street, New York, N. Y.
% Tri-Bullion Smelting & Development Company.
- Glead**, C. S., 723 Title Insurance Building, Los Angeles, Cal.
% London Arizona Copper Company.
- Goldsworthy**, J. R., Oatman, Ariz.
Paramount Mines Company.
- Goodwin**, J. T., Lovelock, Nev.
Willard Mines Company.
- Gordon**, L. D., 1011 First National Bank Building, San Francisco, Cal.
Round Mountain Mining Company.

- Gray, W. A.**, Winlock, Wash.
Cascadia Mining & Development Company.
- Greenough, J. W.**, 2705 Boone Street, Spokane, Wash.
Snowstorm Mining Company.
- Greenough, W. D.**, White Horse, Yukon Territory.
Yukon Copper Company, Limited.
- Gregg, Wellington, Jr.**, Crocker National Bank, San Francisco.
Alaska Juneau Gold Mining Company.
- Guggenheim, Morris**, 120 Broadway, New York, N. Y.
Chile Copper Company.
- Hahn, Max**, Chicago, Ill.
Luning-Idaho Mining Company.
- Hahne, Frank**, Du Bois, Pa.
Gilmore Mining Company.
- Hamilton, C. E.**, 4th Floor Odd Fellows Building, St. Louis, Mo.
Nevada Arizona Mines Company.
- Hamilton, Wm. Pierson**, % Kennecott Copper Corp., 120 Broadway, N. Y.
- Hanchette, Chas. D.**, Hancock, Mich.
Victoria Copper Mining Company.
- Hancock, G. A.**, 908 Merchants National Bank Building, Los Angeles, Cal.
Vivian Mining Company.
- Hanford, F. C.**, Pittsburg, Pa.
Cppte Consolidated Copper Company.
- Hanson, Edwin**, % Hanson Bros., Montreal, P. Q.
La Rose Consolidated Mines Company.
- Harkless, Jas. H.**, 1000 Grand Avenue Temple, Kansas City, Mo.
Wellington Mines Company.
- Harnischfeger, Henry**, % Rawling and Harnischfeger Co., Milwaukee, Wis.
McMillan Zinc Company.
- Harnish, E. E.**, Fargo, N. Dak.
British American Mining Company.
- Hastings, L. V.**, St. Johnsbury, Vt.
Arizona Gold and Copper Mining Company.
- Hawkins, J. J.**, Prescott, Ariz.
Oro Cobra Mining Company.
- Hawkins, Jno. T.**, Box 563 Colorado Springs, Colo.,
Gold Sovereign Mining and T. Company.
- Hayden, Chas.**, 25 Broad Street, New York, N. Y.
Chino Copper Company.
Utah Copper Company.
Ray Consolidated Copper Company.
- Hayes, J. A.**, Colorado Springs, Colo.
Doctor Jack Pot Mining Company.
- Heimrich, J. G.**, Portland, Ore.
North Mountain Mining Company.
- Henderson, W. M.**, Pitkin, Colo.
Day Star Mines Company.
- Henry, F. T.**, 204 Continental Building, Denver, Colo.
Black Prince Copper Company.
- Herber, S. R.**, Georgetown, Colo.
Gold Bond Consolidated Mines Company.
- Hessel, Fred**, Kearney, Mo.
Arizona Southwestern Copper Company.
- Hicks, T. M. B.**, Williamsport, Pa.
Summit Gold Mining Company.

- Higginson, H. L.**, 44 State Street, Boston, Mass.
Smuggler Union Mining Company.
- Hight, C. A.**, 1001 State Mutual Building, Boston, Mass.
American Zinc, Lead & Smelting Company.
- Hill, Emerson**, 608 Lonsdale Building, Duluth, Minn.
Copper Queen Mining & Smelting Company.
- Hill, Spencer R.**, Boston, Mass.
Keweenaw Copper Company.
- Hilton, G. F.**, 120 Broadway, New York, N. Y.
Braden Copper Mines Company.
- Hoatson, Jas.**, Calumet, Mich.
Calumet and Arizona Mining Company.
- Hoatson, Thos.**, Calumet, Mich.
Calumet and Arizona Mining Company.
Keweenaw Copper Company.
- Holmes, Frank W.**, 14 Wall Street, New York, N. Y.
Magma Copper Company.
- Holland, H. A.**, Hutton Building, Spokane, Wash.
Nabob Mining Company.
- Hooley, Edwin S.**, 15 Broad Street, New York, N. Y.
Consolidated Arizona Smelting Company.
- Holm, Gust.**, Rockford, Ill.
Antelope Spring Mining Company.
- Holt, G. A.**, Enterprise, Utah.
Goldstrike Consolidated Mines Company.
- Hopkins, J. Guthrie**, 25 Broad Street, New York, N. Y.
Ray Hercules Copper Company.
- Horsky, Dr. R.**, Helena, Mont.
Montana States Mining Company.
- Howell, E. M.**, 328 Foster Building, Denver, Colo.
American Mines Company.
- Humphrey, R. R.**, Chateaugay, N. Y.
Nacozari Consolidated Copper Company.
- Hunnewell, Walter**, 705 Sears Building, Boston, Mass.
St. Mary's Mineral Land Company.
- Hunter, M. C.**, Old National Bank Bldg., Spokane, Wash.
Security Copper Company.
- Hoyt, Colgate**, 14 Wall Street, New York, N. Y.
Canada Copper Corporation, Limited.
British Columbia Copper Company, Limited.
- Jackling, D. C.**, 25 Broad Street, New York, N. Y.
Chino Copper Company.
Utah Copper Company.
Ray Consolidated Copper Company.
Alaska Gold Mines Company.
Nevada Consolidated Copper Company.
B. & S. Mining Company.
- James, A. C.**, 99 John Street, New York, N. Y.
Phelps, Dodge & Company.
United Globe Mines.
Bunker Hill Mines Company.
- James, C. C.**, 810 Lumsden Building, Toronto, Ont.
Beaver Consolidated Mines, Limited.
- Jennings, S. J.**, 120 Broadway, New York, N. Y.
U. S. Smelting, Refining & Mining Company.
Indiana Mining Company.

- Jones, N. V.**, McIntyre Building, Salt Lake City, Utah.
Monetaire Mining Company.
- Johnson, M. M.**, Salt Lake City, Utah.
Cash Boy Consolidated Mining Company.
- Kearns, A. G.**, Wallace, Ida.
Hugo Gold & Copper Mining Company.
- Kearns, Thos.**, Kearns Building, Salt Lake City, Utah.
Halifax-Tonopah Mining Company.
- Keefer, H. D.**, Dayton, Ohio.
Ideal Copper Company.
- Kelley, C. F.**, 42 Broadway, New York, N. Y.
Anaconda Copper Mining Company.
- Kent, J. F.**, Los Angeles, Cal.
Boss Gold Mining Company.
- Kerr, Wm. A.**, 111 Broadway, New York, N. Y.
First National Copper Company.
- King, Dr. L. R.**, Junction City, Kansas.
Plata-Fina Mining & Developing Company.
- King, W. H.**, 671 E. S. Temple Street, Salt Lake City, Utah.
South Cardiff Mining Company.
- Kittle, Chas. A.**, 43 Exchange Place, New York, N. Y.
Consolidated Arizona Smelting Company.
- Klamp, F.**, 393 Mills Building, San Francisco, Calif.
Engels Copper Mining Company.
- Kleinschmidt, A. H.**, 630 Monroe Avenue, Helena, Mont.
American Mining Company.
- Kniffen, O. H.**, Denver, Colo.
Mid-Colorado Mines Company.
- Knight, J. Wm.**, Provo, Utah.
Dragon Consolidated Mining Company.
- Knights, T. D.**, Santa Ana, Cal.
Azurite Mining Company.
- Kober, W. D.**, Toledo, Ohio.
Buckeye Belmont Mines Company.
- Korthe, C. E.**, Box 236, Taft, Cal.
Nevada Standard Copper Company.
- Kraft, John**, 1311 Washington Avenue, N. Minneapolis, Minn.
Minneapolis and Texada Copperite Company, Limited.
- Kratzer, C. F.**, 706 Euclid Street, Spokane, Wash.
Caledonia Mining Company.
- Krog, F.**, Platteville, Wis.
Wisconsin Zinc Company.
- Kromer, J. W.**, Rochester, Nev.
Rochester Treasure Mining Company.
- Kurz, B. F.**, Brooklyn, N. Y.
Yerington Mines & Exploration Company.
- Landis, J. B.**, East Auburn, Cal.
Ora Fina Mine Company.
- Lang, C. H.**, Houghton, Mich.
Onondaga Copper Company.
- Langford, W. A.**, 408 State Street, Salt Lake City, Utah.
Silver Peak Mine Company.
- Larson, Joe**, Jerome, Ariz.
Calumet & Jerome Copper Company.

- Lawson, Arnold**, Boston, Mass.
Trinity Copper Company.
- Layne, E. A.**, Silver City, New Mex.
Pinos Altos Mining & Milling Company.
- Leavell, J. H.**, 805 Newhouse Building, Salt Lake City, Utah.
Big Four Exploration Company.
- Lefevre, H. J.**, Keller, Wash.
Northwest Mines Development Company.
- Leinke, H. A.**, Rochester, Vt.
Creole Mining Company.
- Lennox, Wm.**, Colorado Springs, Colo.
Ajax C. Mining Company.
- Lerch, F. H.**, Lockport, N. Y.
Sturdy Gold Mining Company.
- Lessing, I.**, Beaver, Utah.
Progressive Mining Company.
- Lewis, P.**, Spokane, Wash.
Vulcan Mining Company.
- Lewisohn, Adolph**, 61 Broadway, New York, N. Y.
Utah Consolidated Mining Company.
- Lewisohn, Samuel A.**, 61 Broadway, New York, N. Y.
Kerr Lake Mining Company.
Naumkeag Copper Company.
- Leibman, R.**, Dallas, Tex.
Las Animas Peak Gold Mines.
- Lipman, Chas. K.**, 120 Broadway, New York, N. Y.
Utah Copper Company.
- Little, R. B.**, 223 Fourth Avenue, Pittsburg, Pa.
Pittsburg Idaho Company, Limited.
- Livingston, Coe**, Youngstown, Ohio.
Western Reserve Mining Company.
- Locknam, Chas.**, Wetmore, Kan.
Kansas-Nevada Mining Company.
- Long, G. W.**, Oatman, Ariz.
Oatman Syndicate Mining Company.
- Longwell, Alex.**, Toronto, Ont.
The Coniagas Mines, Limited.
- Loper, F. M.**, 61 Broadway, New York.
Caribou Cobalt Mines Company.
- Lund, Chas. G.**, % Old Dominion Co., 50 Congress St., Boston, Mass.
Old Dominion Copper Mining & Smelting Company.
- Lynch, T. J.**, Tonopah, Nev.
Tonopah 76 Consolidated Mining Company.
- Lyne, Henry**, Box 1139, Denver, Colo.
Bachelor Khedive Mines Company.
- Lyon, Frederick**, 55 Congress Street, Boston, Mass.
Needles Mining & Smelting Company.
United States Smelting, Refining & Mining Company.
United States Smelting Company.
- Macdonald, Jas. A.**, 26 Exchange Place, New York.
United Verde Copper Company.
- Major, Geo.**, Helena, Mont.
Wickes-Corbin Copper Mining Company.
- Mallett, R. H.**, Elko, Nev.
Nevada Bunker Hill Mining Company.

- Mangante, J. P.**, Jamestown, Cal.
Jamestown Exploration Company.
- Margrave, Frank**, 407 Exchange Building, Denver, Colo.
Packard North Extension Mining Company.
- Marshall, B. F.**, Mills Building, San Francisco, Calif.
Pioneer Chief Gold Mining Company.
- Marshall, R. A.**, Wallace, Ida.
Bullion Mining Company, Limited.
- Martin, John**, 600 Call Building, San Francisco, Calif.
St. Johns Mines Company.
- Marty, A.**, Sacramento, Calif.
Ruby King Mineral Paint Company.
- Mason, J. L.**, Pasadena, Calif.
Tom Reed, Jr., Mining Company.
- Mason, P.**, Kellogg, Ida.
Wisconsin Mining Company.
- Mason, Wm. T.**, Montreal, Quebec, Canada.
Temiskaming Mining Company.
- Matthew, John**, 405 Mining Exchange Building, Colorado Springs, Colo.
Nevada Queen Copper Company.
- May, J. H.**, Las Cruces, N. Mex.
Organ Mountain Mining Company.
- McCall, L. D.**, Equitable Bldg., Denver, Colo.
Calhoun Consolidated Mines Company.
- McCallum, Alpheus**, 154 W. Randolph Street, Chicago, Ill.
Calumet-New Mexico Mining Company.
- McCarr, Geo. E.**, 702 Gas and Electric Building, Denver, Colo.
Rainbow Mountain Mining Company.
- McCarthy, A. H.**, 261 Broadway, New York.
Manhattan Exploration Company.
- McCarthy, E. E.**, 227 N. LaSalle Street, Chicago, Ill.
Copper State Mining Company.
- McConnell, E. H.**, Box 926, Burke, Ida.
Idaho-Montana Mining Company, Limited.
- McCune, A. W.**, 200 N. Main Street, Salt Lake City, Utah.
Victor Consolidated Mining Company.
- McCutcheon, E. J.**, 575 Mills Building, San Francisco, Calif.
Treasure Mining Company.
- McDonald, Duncan**, Ravalli, Mont.
Wisconsin Montana Mining Company.
- McEachren, W. L.**, Box 1123, Spokane, Wash.
Hobson Silver Lead Company.
- McElwain, J. H.**, 850 Equitable Building, Denver, Colo.
Marion Mines and Mills Company.
- McFall, J. W. P.**, Portland, Oregon.
Bunker Hill and Sullivan Mining and Concentrating Company.
- McIntyre, W. A.**, Arlington, Wyo.
Big Five Copper Company.
- McKelvie, A. A.**, New Liskeard, Ont., Canada.
Dome Lake Mining & Milling Company, Limited.
- McLean, Jas.**, 99 John St., New York.
Phelps, Dodge & Company.
- McMartin, John**, Cornwall, Ont., Canada.
Hollinger Gold Mines, Limited.
- McPhee, H. N.**, Peyton Building, Spokane, Wash.
Hecla Copper, Silver Mining Company, Limited.

- McRea, A. P.**, Mullan, Idaho.
Carney Copper Company, Limited.
- Medlyn, Wm.**, Calumet, Mich.
Calumet and California Mining Company.
- Meloy, Henry**, Butte, Mont.
Butte-Bullwhacker Mining Company.
- Meston, Geo. D.**, Pope Block, Pueblo, Colo.
Equity Creede Mining Company.
- Milan, Thos.**, P. O. Box 1656, Mexico City, D. F., Mex.
Pacific Copper Company, Limited.
- Millard, W. R.**, Valdez, Alaska.
Granite Gold Mining Company.
- Miller, J. H.**, Hawthorne, Nev.
Aurora Consolidated Mines Company.
Lucky Boy Consolidated Copper Company.
- Moll, E. O.**, Salem, Ore.
United Copper Gold Mines Company.
- Mooney, H. L.**, Chesaw, Wash.
Shipper Gold Mining Company.
- Moore, H. D.**, 696 Drexel Building, Philadelphia, Pa.
Montana-Tonopah Mines Company.
- Morrill, Geo. H.**, 155 Pearl Street, Boston, Mass.
Canyon Mines Corporation.
- Morris, Richard**, 966 S. 7 E. Street, Salt Lake City, Utah.
Silver King Consolidated Mining Company.
- Mundy, H. L.**, St. Paul, Minn.
Denn Arizona Copper Company.
- Murphy, John J.**, 45 Milk Street, Boston, Mass.
Utah Apex Mining Company.
- Neckermann, Irvan**, Annapolis, Md.
Pittsburg-Idaho Company, Limited.
- Nelson, John A.**, 939 Plymouth Building, Minneapolis, Minn.
Copper State Mining Company.
- Nelson, L. L.**, Provo City, Utah.
Utah Centennial Mining Company.
- Nelson, M. O.**, St. Paul, Minn.
Paragon Consolidated Mining Company.
- Newberger**, 20 Broad Street, New York.
Portland Consolidated Copper Company.
- Newcomer, O. A.**, 265 Russ Building, San Francisco, Calif.
Sunset Mining & Development Company.
- Newhouse, E. H.**, 120 Broadway, New York.
American Smelting & Refining Company.
Braden Copper Company.
- Newland, E. H.**, 620 I. W. Hellman Building, Los Angeles, Calif.
Big Jim Gold Mining Company, Limited.
- Nicholson, D. C.**, Spokane, Wash.
Belmont Mining Company, Limited.
- Nicholson, Theo. O.**, Brookline, Mass.
Massachusetts Consolidated Mining Company.
- Nieswanger, W. A.**, Topeka, Kansas.
Majestic Copper Company.
- Noyes, E. W.**, Haverhill, Mass.
Rilla Mining Company.

- Ogilvie, Shirley, 83 Craig Street, W., Montreal, Quebec, Canada.
La Rose Consolidated Mines Company.
- Olson, C. W., 218 Judge Bldg., Salt Lake City, Utah.
Paloma Gold & Silver Mining Company.
- Opdyke, L. A., 55 Clinton Avenue, Jersey City, N. J.
New Jersey Mines Company.
- Owen, John W., Racine, Wis.
Black Diamond Copper Mining Company.
- Paine, A. C., 60 Congress Street, Boston, Mass.
North Lake Mining Company.
- Paine, Chas. J., 82 Devonshire Street, Boston, Mass.
St. Mary's Mineral Land Company.
- Paine, Chas. J., Jr., 190 Washington Street, Boston, Mass.
Champion Copper Company.
Southwestern Miami Development Company.
- Paine, F. W., 82 Devonshire Street, Boston, Mass.
Copper Range Company.
Copper Range Railroad Company.
- Palmer, N. F., 40 Wall Street, New York.
Batopilas Mining Company.
- Partridge, N. H., Westport, Conn.
Lexington Gold Mining Company.
- Patrick, L. L., Goldfield, Nev.
Orizaba Mining & Development Company.
Diamondfield Black Butte Reorganized Mining Company.
- Patterson, Jas. A., % Schunemann Evans Co., St. Paul, Minn.
Calumet & Montana Consolidated Mining Company.
- Paul, G. T., Dillon, Mont.
Butte & Zenith City Mining Company.
- Pearson, Y., Gem, Idaho.
Tucker Mining & Milling Company, Limited.
- Peaslee, C. W., 346 St. Paul St., Denver, Colo.
Silvered Copper Mining Company.
- Peck, Geo. M., Elgin, Ill.
El Centro Mining & Milling Company.
- Peet, H. C., San Francisco, Calif.
Syncline Gold Silver Copper Mining Company.
- Pelham, J. M., North Yakima, Wash.
National Lead-Silver Company.
- Pellatt, Sir Henry M., 420 Traders Bank Bldg., Toronto, Ont., Canada.
McIntyre Porcupine Mines, Limited.
- Perkins, G. W., Yamhill, Ore.
West Side Gold & Silver Mining Company.
- Peters, Clay, Pacific Building, San Francisco, Calif.
Rochester Elda Fino Mining Company.
- Pickrell, Dr. W. B., Old National Bank Building, Spokane, Wash.
Norman Mines Company.
- Pohlman, Edward, Empire State Building, Spokane, Wash.
Marsh Mines Consolidated Company.
- Poillon, Howard, 63 Wall Street, New York.
Porcupine Vipond Mines, Limited.
- Pomeroy, Robt. W., Fidelity Building, Buffalo, N. Y.
Buffalo Mines, Limited.
- Pope, Chas. E., 15 Broad Street, New York.
Proprietary Mines Company of America.

- Pope, J. D., Butte, Mont.**
Butte & Ely Copper Company.
- Potts, Wm. M., Wyebrooke, Pa.**
Belmont Milling Company.
Tonopah Belmont Development Company.
- Powers, Samuel L., Newton, Mass.**
Corbin Copper Company.
Algomah Mining Company.
- Preston, A. W., Swampscott, Mass.**
Abangarez Gold Fields of Costa Rica.
- Price, R. R., Kellogg, Idaho.**
Big Creek Leasing Company.
- Putnam, G. H., Mt. Pleasant, Iowa.**
Bezant Gold Mining Company.
- Quentin, E. E., Box 506, Denver, Colo.**
Isabella Mines Company.
- Ramsay, C. C., 60 Congress Street, Boston, Mass.**
Terrible-Dunderberg Mining Group & Power Company.
- Rand, A. E., New Westminster, B. C.**
Kootenay Bonanza Mines, Limited.
- Raymond, Geo. R., 22 Continental Building, Salt Lake City, Utah.**
Beaver Mines Company.
- Reasor, F. D., % Fidelity Fuel Company, Muskogee, Okla.**
Ruby Copper Company.
Southern Arizona Mining Company.
- Reber, F. L., Winnemucca, Nev.**
Haystack Mines.
- Reed, Hon. Jas. H., 253 A. Street, Boston, Mass.**
East Butte Copper Mining Company.
- Reese, C. W., 1790 South Fifth East Street, Salt Lake City, Utah.**
Utah-Yerington Mining Company.
- Reis, W. E., 111 Broadway, New York.**
Mines Company of America.
- Reitsch, E. R., Rockford, Ill.**
Nevada Superior Mines Company.
- Requa, M. L., 1022 Crocker Bldg., San Francisco, Calif.**
Mercury Mining Company.
- Reynolds, G. F., Short Beach, Conn.**
Southern Zinc & Mining Company.
- Rice, C. G., 55 Congress St., Boston, Mass.**
Richmond-Eureka Mining Company.
United States Smelting Company.
United States Smelting Refining & Mining Company.
- Rice, D. H., Colorado Springs, Colorado.**
Portland Gold Mining Company.
- Rice, John H., Houghton, Mich.**
Lake Copper Company.
Superior & Boston Copper Company.
- Richardson, F. H., Burke, Ida.**
Oom Paul Consolidated Mining Company.
- Richardson, Hoffman, Boston, Mass.**
Calavada Copper Company.
- Riddle Chas. F., 355 W. Church St., Elmira, N. Y.**
Seven Devils Copper Company.

- Rinehart, J. E.**, 1215 First National Bank Building, Denver, Colo.
Crown Prince Consolidated Mines Company.
- Rippey, T. L.**, 2304 McKinney Avenue, Dallas, Texas.
Lucky Boy Gold Mining Company.
- Robertson, A. R.**, Wickes, Mont.
Dailey Copper Mining and Smelting Company.
- Robertson, F. Y.**, 120 Broadway, New York.
U. S. Metals Refining Co.
- Rockwell, F. W.**, Albany, N. Y.
Vulture Mines Company.
- Rodearmel, M. G.**, 500 Commercial Building, Minneapolis, Minn.
Consolidated Interstate Callahan Mining Company.
- Rogers, F. W.**, Milwaukee, Wis.
Wisconsin Zinc Company.
- Ronaghan, Arthur J.**, 25 Broad Street, New York.
British Columbia Copper Company, Limited.
Canada Copper Corporation, Limited.
- Rorem, E. E.**, St. Paul, Minn.
Minneapolis & Texada Copperite Company, Limited.
- Rosengarten, F. P.**, Montezuma, Colo.
Philadelphia Mines Company.
- Ross, J. G.**, % P. S. Ross & Sons, Montreal, Quebec, Canada.
Crown Reserve Mining Company, Limited.
Porcupine Crown Mines, Limited.
- Rothwell, Jas. E.**, 24 Milk Street, Boston, Mass.
Utah Metal and Tunnel Company.
- Rowe, R. P.**, 111 Broadway, New York.
National Lead Company.
- Rowland, Thos.**, 299 Madison Ave., New York.
Tortillita Copper Company.
- Rowley, Fred E.**, Dooly Block, Salt Lake City, Utah.
Big Cottonwood Consolidated Mining Company.
- Rudman, Siebert**, Cripple Creek, Colo.
Kishman Leasing Company.
- Rupert, J. C.**, 423 Caswell Block, Milwaukee, Wis.
Imperial Copper and Gold Mining Company.
- Russell, F. W.**, 27 Kilby Street, Boston, Mass.
Silver Comet Mining Company.
- Ryan, J. D.**, 42 Broadway, New York City.
Greene Cananea Copper Company.
- Saul, W. A.**, Douglas, Wyo.
North Laramie Peak Copper Mining Company.
- Saunders, J. F.**, Wellington, Nev.
Smith Valley Mines Company.
- Scharenbroich, Peter**, Helena, Mont.
Madden Scratch Gravel Mines Company.
- Schofield, W. H.**, Washington, D. C.
Almoloya Mining Company.
- Scott, J. B.**, 522 Postal Telegraph Building, Chicago, Ill.
Montana Oreway Mining Company.
- Scott, R. F.**, Paris, Texas.
Copper Queen Gold Mining Company.
- Selden, S. L.**, First National Bank Building, Denver, Colo., and 43 Exchange Place, New York.
Seoul Mining Company.
Collbran-Bostwick Development Company.

- Sellars**, Dr. Wm., Paulsen Building, Spokane, Wash.
Mineral Farm Mining Company, Limited.
- Sellwood**, A. M., Duluth, Minn.
Alaska Consolidated Mining and Smelting Company.
- Sexton**, Chas. W., 907 Metropolitan Life Building, Minneapolis, Minn.
Helvetia Copper Company.
- Shea**, D. J., Jerome, Ariz.
Jerome-Oatman Mining Company.
- Sherer**, Del, Oatman, Ariz.
Black Range Mining Company.
- Sherwood**, F. B., 515 Newhouse Building, Salt Lake City, Utah.
Cedar Talisman Consolidated Mines Company.
- Shetterley**, J. L. M., 1387 Oak Street, San Francisco, Calif.
Willow Valley Mining Company.
- Show**, H. L., Salt Lake City, Utah.
Blue Ribbon Gold Mining Company.
- Siderfin**, W. C., Miner Block, Butte, Mont.
Boston and Montana Development Company.
- Sinclair**, M. J., Kellogg, Ida.
Highland Surprise Consolidated Mining Company.
- Slack**, Chas. W., Alaska Commercial Building, San Francisco, Calif.
Butters Divisadero Company.
- Slaughter**, B. G., Copperhill, Tenn.
Tennessee Copper Company.
- Small**, W. W., El Paso, Texas.
Memphis Mining Company.
- Smith**, Angus, Dime Bank Building, Detroit, Mich.
White Pine Extension Copper Company.
- Smith**, A. Y., Pearce, Ariz.
Commonwealth Mining and Milling Company.
- Smith**, E. C., St. Albans, Vt.
St. Joseph Lead Company.
- Smith**, F. D., Ithaca, New York.
Snow Creek Mining Company.
- Snamiska**, H. S., Room 8, Fall City Bank, Spokane, Wash.
New Crystal Mining Company.
- Snow**, E. S., 40 Cedar Street, New York.
Amalgamated Pioche Mining and Smelting Corporation.
- Snow**, F. R., 503 McIntyre Building, Salt Lake City, Utah.
Grand Gulch Mining Company.
- Sooy**, E. C., 1012 Baltimore Avenue, Kansas City, Mo.
Lucky-Tiger-Combination Gold Mining Company.
- Spencer**, C. A., Waupaca, Wis.
Hahns Peak Gold Mining and Milling Company.
- Spiece**, S., Vineland, Ont., Canada.
Ore Extension Mining Company, Limited.
- Spilman**, C. L., Reno, Nev.
Eastern Star Mining Company.
- Spurr**, J. E., Bullitt Building, Philadelphia, Pa.
Tonopah Mining Company of Nevada.
- Starbuck**, C. A., 165 Broadway, New York.
New Dominion Copper Company, Limited.
- Steifer**, S. M., Coutolenc, Butte County, Calif.
P. B. Steifer Mining Company.
- Steindler**, D. M., 42 Broadway, New York.
Wettlaufer Lorrain Silver Mines, Ltd.

- Stenson, R. P.**, Tonopah, Nev.
Tonopah Midway Consolidated Mining Company.
- Stevens, Chas. E.**, Rochester, New York.
Nenzel Crown Point Mining Company.
- Stevens, Henry G.**, 615 Stevens Building, Detroit, Mich.
Iron Silver Mining Company.
- Stevenson, D. S.**, Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Stonemetz, Harry M.**, 25 Exchange Building, Boston, Mass.
Shannon Copper Co.
- Sullivan, Mike**, Whitefish, Mont.
Lupfer Mining Company.
- Sumner, Geo.**, 1202 Canadian Pacific Railway Building, Toronto, Ont.
Consolidated Mining and Smelting Company of Canada.
- Sutermeister, H. A.**, 2018 Troost Avenue, Kansas City, Mo.
Mansfield Mining and Smelting Company.
- Sweeny, Robt.**, 120 Broadway, New York.
Rex Consolidated Mining Company.
- Sweet, H. N.**, 60 Congress Street, Boston, Mass.
Eagle and Blue Bell Mining Company.
- Sweetser, E. H.**, Santa Monica, Calif.
Estelle Mining Company.
- Talmage, Geo. W.**, 60 East Lake Street, Chicago, Ill.
Georgetown Tunnel and Transportation Company.
- Thatcher, Daniel**, Colorado Springs, Colo.
Mary McKinney Mining Company.
- Thatcher, J. A.**, Pueblo, Colo.
Manhattan Big Four Mining Company.
- Thayer, B. B.**, 42 Broadway, New York.
Anaconda Copper Mining Company.
- Theobald, Chas.**, Cripple Creek, Colo.
Tungsten Exploration Company.
- Thompson, P. F.**, 411 Felt Building, Salt Lake City, Utah.
Old Susan Mining Company.
- Thornton, Wm. D.**, 42 Broadway, New York.
Inspiration Consolidated Copper Company.
- Tietjen, Jos.**, Santaquin, Utah.
Granite Mining and Milling Company.
- Tobin, R. F.**, Denver, Colo.
Pioneer Consolidated Mines Company.
- Todd, W. Parsons**, 32 Broadway, New York.
Quincy Mining Company.
- Tomlinson, G. Ashley**, 1400 Alworth Building, Duluth, Minn.
Sierra Consolidated Mines Company.
- Tool, Hugh**, Wallace, Ida.
Amazon-Dixie Mining Company.
- Tracie, Charles**, Redding, Calif.
Delta Consolidated Gold Mines Company.
- Traub, W. G.**, Spokane, Wash.
Methow Gold and Copper Mining Company.
- Travis, L. L.**, Gisborn, Utah.
Dry Canyon Consolidated Mining Company.
- Treber, John**, Deadwood, S. D.
Deadwood-Heidelberg Mining Company.

- Turner, J. K.**, Goldfield, Nev.
 Grandma Mining Company.
 Jumbo Extension Mining Company.
- Turner, R. C.**, 2577 Sutter St., San Francisco, Calif.
 Brunswick Consolidated Gold Mining Company.
- Turney, W. W.**, 264 Russ Building, San Francisco, Calif.
 Union Consolidated Mining Company.
- Tuttle, B. B.**, Andover, Mass.
 Brooklyn-Arizona Mining Company.
- Underhill, H. B., Jr.**, Merchants Exchange, San Francisco, Calif.
 Dairy Farm Mining Company.
- Upman, Frank**, Los Angeles, Calif.
 Hecla Mining Company.
- Vaile, W. N.**, 420 Equitable Building, Denver, Colo.
 Druid Gold Mining Company.
- Vanderford, R. C.**, Spokane, Wash.
 Copper King Mining and Smelting Company.
- Vignos, A.**, Canton, Ohio.
 Pittsburg-Dolores Mining Company.
- Vogelstein, L.**, 42 Broadway, New York.
 United States Metals Refining Company of New York.
- Vorce, L. D.**, 2 Rector Street, New York.
 Tennessee Copper Company.
- Waldeck, J. C. C.**, St. Louis, Mo.
 Down Town Mines Company.
- Waltman, W. D.**, Casper, Wyo.
 Jumper California Gold Mines Company.
- Waltz, J. B.**, Nicholson, Pa.
 Cuprite Copper Company.
- Ward, D. A.**, El Paso, Ill.
 Boston-American Mining Company.
- Warinner, W. H.**, Box 1374, Denver, Colo.
 Gilt Edge Mines and Smelting Company.
- Watriss, F. N.**, 32 Nassau St., New York.
 Humboldt Mines Company.
- Watterson, M. Q.**, Bishop, Calif.
 Lone Star Consolidated Mining Company.
- Welsh, Henry**, % West, Dunah & Bach, Park City, Utah.
 Reed Peak Mining Company.
- Welsh, Jas. B.**, Lathrop Building, Kansas City, Mo.
 Kansas City-Nevada Consolidated Mines Company.
- Wells, Alex T.**, 290 Broadway, New York.
 Peabody Consolidated Copper Company.
- Wenstrom, Olaf**, Room 1209, 71 Broadway, New York.
 Antimony Corporation.
 Cortez Associated Mines.
- West, C. P.**, Bloomingbury, Ohio.
 Hermosillo Copper Company.
- White, R. J.**, Wallace, Idaho.
 Northern Light Mining and Milling Company.
- Whitelock, Jas. S.**, 67 Milk Street, Boston, Mass.
 Safford Copper Company.

- Whiteman, J. H.**, 572 Bullitt Building, Philadelphia, Pa.
Eden Mining Company.
Nevada Wonder Mining Company.
Tonopah Mining Company of Nevada.
- Wickett, S. R.**, 6 Cypress Street, Toronto, Ont.
Trethewey Silver-Cobalt Mines, Limited.
- Wilbourne, J. R.**, R. F. D. 2, Boston, Va.
Kay Mine Smelting Company.
- Wilson, B. W.**, Butte, Mont.
Montana-Illinois Copper Mining Company.
- Wilson, R. C.**, Colorado Springs, Colo.
Nellie Mining Company.
- Wilson, R. R.**, Frankfort, Ky.
Johnson Copper Development Company.
- Wingfield, Geo.**, Goldfield, Nev.
Reorganized Booth Mining Company of Goldfield.
- Winterhalter, L.**, 101 West Park Street, Butte, Mont.
Butte & Anaconda Consolidated Mining and Milling Company.
- Wiseman, Philip**, 1210 Hollingsworth Building, Los Angeles, Calif.
Good Springs Anchor Company.
- Wittenberg, Chas.**, Tonopah, Nev.
New Empire Goldfield Mines Company.
- Wooden, W. T.**, Portland, Ore.
Oregon and B. C. Mining and Development Company, Limited.
- Woods, P. E.**, 510 Bradbury Street, Los Angeles, Calif.
Empire Copper Gold Mining Company.
- Wright, F. W.**, American Fork, Utah.
Plentiful Mining and Milling Company.
- Wulfsohn, Mark**, 565 Mills Building, San Francisco, Calif.
MacNamara Mining and Milling Company.
- Wyman, Abe**, Wallace, Ida.
Rainbow Mining and Milling Company, Limited.
- Zadig, Herman**, 265 Russ Building, San Francisco, Calif.
Mexican Gold and Silver Mining Company.
- Zollner, Chas. H.**, 10 North New Jersey St., Indianapolis, Ind.
German Copper Company.

MINING COMPANY SECRETARIES

- Abbott, G. D.**, 1024 Crocker Bldg., San Francisco, Calif.
Alaska Juneau Gold Mining Company (treas.).
Mercury Mining Company (treas.).
- Adams, Thos. B.**, 60 Broadway, New York.
Consolidated Copper Mines Company (treas.).
- Agee, Jackson**, Silver City, N. Mex.
C. & O. Mining and Milling Company (treas.).
- Allen, J. W.**, 42 Broadway, New York.
Inspiration Consolidated Copper Company (treas.).
Greene Cananea Copper Company (treas.).
- Allendorf, E.**, Joplin, Mo.
Oronogo Circle Mining Company.
- Alsdorf, Percy R.**, Central City, Colo.
Calhoun Consolidated Mines Company.
- Altmiller, C. H.**, 50 Congress St., Boston, Mass.
Old Dominion Copper Mining & Smelting Company.

- Anderson, A.**, 115 Broadway, New York.
Kenefick Zinc Corporation.
- Anderson, J. H.**, 20 Exch. Pl., New York.
United Verde Copper Company.
- Arscott, S. G.**, P. O. Box 456, Denver, Colo.
Florence-Goldfield Mining Company.
- Avery, George H.**, Jerome, Ariz.
Calumet & Jerome Copper Company (treas.).
- Babbitt, K. R.**, 25 Broad St., New York.
Alaska Gold Mines Company.
- Baglin, George**, 881 Second Ave., Salt Lake City, Utah.
Cedar Talisman Consolidated Mines Company.
- Bancroft, W. A.**, 79 Milk St., Boston, Mass.
Mass Consolidated Mining Company.
- Bardsley, W. J.**, Box 902, Park City, Utah.
Reed's Peak Mining Company.
- Barker, A. E.**, 1311 Washington Ave. N., Minneapolis, Minn.
Minneapolis & Texada Copperite Company, Limited.
- Barnard, E. W.**, Cripple Creek, Colo.
El Paso Consolidated Gold Mining Company (treas.).
- Barnes, A. P.**, Duluth, Minn.
Keating Gold Mining Company.
- Barnett, M.**, 644 E. So. Temple St., Salt Lake City, Utah.
Mascot Mining & Milling Company (asst. sec.).
- Basse, C. A.**, 608 So. Dearborn St., Chicago, Ill.
Georgetown Tunnel & Transportation Company.
- Batchelder, F. W.**, 55 Congress St., Boston, Mass.
American Zinc Lead Smelting Company.
Richmond-Eureka Mining Company (treas.).
United States Smelting Company (treas.).
United States Smelting Refining & Mining Company (treas.).
Centennial Eureka Mining Company (treas.).
- Bauer, M.**, 178 Main Ave., Passaic, N. J.
Madera Mining Company (treas.).
- Baxter, Chas. I.**, Pasadena, Calif.
Tom Reed Junior Mining Company (treas.).
- Beaty, J. B.**, 61 Broadway, New York.
Consolidated Interstate-Callahan Mining Company.
- Bell, L. A.**, 393 Mills Bldg., San Francisco, Calif.
Engels Copper Mining Company.
- Bell, T. A.**, 52 Broadway, New York.
Manhattan Exploration Company.
- Benedict, L. P.**, Daly Bank Bldg., Butte, Mont.
Boston & Montana Development Company.
- Bent, Geo. B.**, Tularosa, N. Mex.
Tularosa Copper Company.
- Berson, L. H.**, 61 Broadway, New York.
St. Joseph Lead Company.
- Best, Jacob**, 423 Caswell Blk., Milwaukee, Wis.
Imperial Copper & Gold Mining Company (treas.).
- Bickmore, P. S.**, 572 Bullitt Bldg., Philadelphia, Pa.
Eden Mining Company.
Nevada Wonder Mining Company.
- Bissell, C. H.**, 12 Ashburton Place, Boston, Mass.
Ahmeek Mining Company.

- Blackshaw, W. W.**, 609 First Natl. Bank Bldg., Duluth, Minn.
Kamloops Copper Company.
- Blaine, A. C.**, Chesaw, Wash.
Shipper Gold Mining Company.
- Blanchard, H. B.**, 42 Broadway, New York.
New Dominion Copper Company, Limited.
- Booth, P. S.**, Tonopah, Nev.
Yerington Mountain Copper Company.
- Bovier, Chas. B.**, 904-15th St., Denver, Colo.
Pine Martin Mining Company.
- Boyd, E. E.**, Calumet, Mich.
Calumet-California Mining Company.
- Boyle, John**, % Crocker Chair Co., Minneapolis, Minn.
Calumet & Montana Consolidated Mining Company (treas.).
- Bradlee, H. H.**, Merchants Bank Bldg., Boston, Mass.
Boston Mine Leasing Company.
- Bright, John**, 915 Union Bank Bldg., Pittsburgh, Pa.
Arizona-Idaho Copper Extraction Company.
- Bristow, J. T.**, Wetmore, Kansas.
Kansas-Nevada Mining Company (treas.).
- Brown, M. C.**, 944 W. 6th St., Reno, Nev.
Reno-Yerington Copper Company.
- Browning, G. W.**, Newhouse Bldg., Salt Lake City, Utah.
Silver King Consolidated Mining Company of Utah.
- Bruner, R. E.**, 411 Commerce Bldg., Kansas City, Mo.
Kansas City-Nevada Consolidated Mines Company.
- Bruning, E. T.**, Bennett Bldg., Colorado Springs, Colo.
Hardscrabble Mining Company.
- Bryant, F. L.**, Pearce, Ariz.
Commonwealth Mining & Milling Company (treas.).
- Bryson, John A.**, Goldstrike, Utah.
Bull Valley Hassiampie Gold Mining Company.
- Buckley, C. W.**, 39 Board of Trade Bldg., Chicago, Ill.
National Mines Company.
- Burgess, W. H.**, Kaslo, B. C.
Cork-Province Mines, Limited (treas.)
- Burns, Thos. F.**, Colorado Springs, Colo.
Portland Gold Mining Company (treas.)
- Burton, Vina**, Murray, Ida.
Idaho Northern Mineral Company (treas.).
- Camp, R. A.**, 25 Broad St., New York.
Arizona Copper Belt Mining Company.
- Campbell, E. B.**, Pasadena, Calif.
Syncline Gold Silver Mining Company.
- Campbell, G. R.**, Calumet, Mich.
Calumet & Arizona Mining Company.
- Campbell, F. W.**, Las Cruces, N. Mex.
Organ Mountain Mining Company (treas.)
- Campbell, J. D.**, Harrington Pk., N. J.
Bunker Hill Mining and Smelting Company.
- Campbell, L. G.**, Winnemucca, Nev.
Eastern Star Mining Company (treas.).
- Carson, C. C.**, Jefferson City, Mo.
Atlas Mining & Milling Company.
- Cavender, Chas.**, Leadville, Colo.
Ibex Mining Company.

- Charpiot, Chas.**, 1000 Grand Ave. Temple, Kansas City, Mo.
Wellington Mines Company (treas.)
- Chisholm, C. A.**, 420 Equitable Bldg., Denver, Colo.
Druid Gold Mining Company (treas.).
- Clark, Fred.**, 354 Pine St., San Francisco, Calif.
Homestake Mining Company.
- Clark, F. M.**, The Rookery, Chicago, Ill.
Trojan Mining Company.
- Clarke, J. D.**, 42 Broadway, New York.
Hedley Gold Mining Company.
- Clayton, C. J.**, Denver, Colo.
Pioneer Consolidated Mines Company.
- Cluff, Harvey**, Box 235, Provo, Utah.
Tintic Delmar Mining Company (treas.).
- Coakley, J. J.**, 100 Summer St., Boston, Mass.
Pike Hill Mines, Incorporated (treas.).
- Coe, Arthur E.**, 705 Sears Bldg., Boston, Mass.
Douglass Copper Company (treas.).
Houghton Copper Company (treas.).
Winona Copper Company (treas.).
Mayflower Mining Company (treas.).
- Cohen, Herbert**, 32 Broadway, New York.
Ontario Silver Mining Company.
- Colby, C. L.**, Rooms 8 and 9, Fall City Bank, Spokane, Wash.
New Crystal Mining Company.
- Collbran, H. E.**, First Natl. Bank Bldg., Denver, Colo.
Seoul Mining Company (treas.).
Collbran-Bostwick Development Company.
- Colmar, C. F.**, 600 Call Bldg., San Francisco, Calif.
St. Johns Mines Company.
- Colton, G. R.**, Searchlight, Nev.
Duplex Mining Company.
- Connelly, J. P.**, Jerome, Ariz.
Shea Copper Company (treas.).
- Cook, Herman**, 61 Broadway, New York.
New Planet Copper Mining Company (treas.).
Miami Copper Company.
- Coolidge, D. C.**, Downing, Wis.
Wisconsin Montana Mining Company.
- Cooney, F. H.**, Butte, Mont.
Butte & Elliston Gold & Copper Mining Company.
- Cooper, E. J.**, Yerington, Nev.
Smith Valley Mines Company (treas.).
- Cooper, James**, 603 Dominion Express Bldg., St. James St., Montreal, Que.,
Canada.
Crown Reserve Mining Company, Limited.
Porcupine Crown Mines Company, Limited (treas.).
- Corbett, W. C.**, Merchant Exch., San Francisco, Calif.
Dairy Farm Mining Company.
- Corette, J. E.**, Hennessy Blk., Butte, Mont.
Butte-Bullwhacker Mining Company.
Barnes-King Development Company.
- Costello, M. A.**, 40 Court St., Boston, Mass.
Boston Idaho Mining Company.
- Cowden, H. B.**, Bloomington, Ill.
Boston-American Mining Company.

- Cox, E. V.**, 25 Madison Ave., New York.
Rawley Mining Company.
- Cox, Jas. C.**, Kesner Bldg., Chicago, Ill.
Modoc Mines Company.
- Craig, A. W.**, Box 1374, Denver, Colo.
Gilt Edge Mines & Smelting Company (treas.).
- Crew, F. A.**, 20 Cophall Ave., London, E. C., England.
Plymouth Consolidated Gold Mines, Limited.
- Cripps, A. M.**, 1853 Commonwealth Ave., Boston, Mass.
Champion Copper Company (treas.).
- Crist, Judge W. F.**, Chronicle Bldg., San Francisco, Calif.
Pioneer Chief Gold Mining Company (treas.).
- Crome, Wm.**, 27 Latimer Blk., Salt Lake City, Utah.
American Mining Company, Limited, (treas.).
- Crook, O.**, Pike, Calif.
Alaska Mining Company.
- Cummings, B. F.**, Cor. 7th E. & Roosevelt Ave., Salt Lake City, Utah.
Monetaire Mining Company (treas.).
- Crosby, Geo. H.**, 610 Lonsdale Bldg., Duluth, Minn.
Sullivan Copper Development Company.
- Dailey, C. H.**, Wickes, Mont.
Dailey Copper Mining and Smelting Company (treas.).
- Darling, B. A.**, 925 W. 49th St., Los Angeles, Calif.
Copper Chief Mines Company.
- Darmer, J. E.**, 978 First Ave., Salt Lake City, Utah.
Dry Canyon Consolidated Mining Company.
- d'Autremont, C. M.**, Wickes, Mont.
Angelica Mining & Development Company (treas.).
- Davis, G. E.**, 60 Congress St., Boston, Mass.
Eagle & Blue Bell Mining Company.
- Davis, Jas. T.**, Carson City, Nev.
Shasta Belmont Mining Company (treas.).
- Davison, Chas.**, 1 Exchange Place, Jersey City, N. J.
National Lead Company.
- Delaney**, 20 Broad St., New York.
Portland Consolidated Copper Company (treas.).
- Denison, S. F.**, Jerome, Ariz.
Jerome-Oatman Mining Company.
Cleopatra Copper Company.
- Dern, G. H.**, Box 1418, Salt Lake City, Utah.
North Mountain Mining Company.
Seven Troughs Mining Company (treas.).
- Dillaway, W. E. L.**, 45 Milk St., Boston, Mass.
Utah Metal & Tunnel Company.
Bingham-New Haven Copper & Gold Mining Company.
- Dodge, H. E.**, 14 Wall St., New York.
Magma Copper Company.
- Dodge, O. V.**, 1012 Baltimore Ave., Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Donell, R. W. T.**, Rock River, Wyo.
Big Five Copper Company.
- Dornberger, A. L.**, San Jose, Calif.
Cerro Gordo Mines Company.

- Drucker, G. W.**, 15 William St., New York.
 Wolverine Copper Mining Company.
 Mohawk Mining Company.
 Michigan Copper Mining Company.
 White Pine Extension Copper Company.
- Duesing, H. F.**, Youngstown, Ohio.
 Western Reserve Mining Company (treas.).
- Duffney, Wm.**, Houghton, Mich.
 Onondaga Copper Company.
- Dunlap, D. A.**, 85 Bay St., Toronto, Ont., Canada.
 Hollinger Gold Mines, Limited (treas.).
- Dunn, C. R.**, Union Trust Bldg., Detroit, Mich.
 Saratoga Mining Company.
- Durand, V. B.**, Yerington, Nev.
 Yerington Mines & Exploration Company.
- Durbrow, C. J.**, Merchant Exch. Bldg., San Francisco, Calif.
 Selby Smelting & Lead Company.
- Ebaugh, W. C.**, 331 D. F. Walker Bldg., Salt Lake City, Utah.
 Bannack Gold Mining Company (treas.).
- Edler, G. K.**, Reno, Nev.
 Louisiana Consolidated Mining Company (treas.).
- Edwards, John**, Houghton, Mich.
 New Baltic Copper Company (treas.).
- Eggleston, R. H.**, 42 Broadway, New York.
 British Columbia Copper Company, Limited.
 Canada Copper Corporation, Limited.
- Elliott, E. H.**, Frankfort, Ky.
 Johnson Copper Development Company (treas.).
- Elliott, E. W.**, 565 Mills Bldg., San Francisco, Calif.
 MacNamara Mining & Milling Company (treas.).
- Elliott, L. C.**, Phoenix, Ariz.
 Sterling Copper Company.
- Emery, C. N.**, Paola, Kansas.
 Plata-Fina Mining & Development Company.
- Emmons, N. H.**, 2nd., 2 Rector St., New York.
 Tennessee Copper Company.
- Endicott, Geo.**, 12 Ashburton Place, Boston, Mass.
 Allouez Mining Company (asst. sec.-treas.).
 Lake Mining, Smelting & Refining Company.
 Centennial Copper Mining Company (asst. sec.-treas.).
- Erickson, E. J.**, Tonopah, Nev.
 Tonopah Midway Consolidated Mining Company (treas.).
- Everts, Wm. P.**, 57 Equitable Bldg., Boston Mass.
 East Butte Copper Mining Company.
- Farr, I. F.**, Ogden, Utah.
 Lakeview Mining Company (treas.).
- Farrington, J. S.**, 608 Newhouse Bldg., Salt Lake City, Utah.
 Goldstrike Consolidated Mining Company (treas.).
- Fasken, Alex.**, 58 Wellington St., Toronto, Ont., Canada.
 Dome Mines Company.
- Fisher, Jas. E.**, Calumet, Mich.
 Calumet & Arizona Mining Company (asst. sec.).

- Flagg, G. A.**, 12 Ashburton Place, Boston, Mass.
 Ahmeek Mining Company (treas.).
 Allouez Mining Company (treas.).
 Centennial Copper Mining Company (treas.).
 Superior Copper Company (treas.).
- Flieger, Andrew**, P. O. Box 138, Anaconda, Mont.
 Butte & Anaconda Consolidated, Mining & Milling Company.
- Foraker, F. R.**, 120 Broadway, New York.
 American Smelting & Refining Company.
- Fordyce, E. A.**, 50 Congress St., Boston, Mass.
 Royal Gold Mines Company.
- Fowler, Northrup**, 52 Broadway, New York.
 Granby Consolidated Mining, Smelting & Power Company, Limited.
- Frank, E. M.**, Daly Bank, Butte, Mont.
 Saginaw Copper Company.
- Frankenberger, Herbert**, Charleston, W. Va.
 West Virginia-Wyoming Copper Company.
- Freitas, L. T.**, Box 626, Stockton, Calif.
 Jamestown Exploration Company.
- Fuller, F. F.**, Salisbury House, London Wall, E. C., England.
 Avino Mines, Limited.
- Furst, John C.**, 1408 W. Nora Avenue, Spokane, Wash.
 Great Eastern Mining Company, Limited (treas.).
- Gaskill, H. I.**, 77 Franklin St., Boston, Mass, or Ajo, Ariz.
 Regal Mines Company.
 Ajo Consolidated Copper Company.
- Gauss, T. W.**, Colorado Springs, Colo.
 Elkton Consolidated Mining & Milling Company.
- Geiger, J. W.**, 625 Dooly Bldg., Salt Lake City, Utah.
 Antelope Springs Mining Company (supt. mgr.).
 Utah Arizona Gold & Copper Mining Company (treas.).
- Geiger, W. G. W.**, Tipton, Iowa.
 Hartwig Mining Company.
- Gelder, Wm.**, 45 Broadway, New York.
 Walker River Copper Company.
- Gemmill, J. R.**, 10 Wall St., New York.
 Tri-Bullion Smelting & Development Company.
- Genzberger, Sol**, Butte, Mont.
 Butte & Zenith City Mining Company.
- Gibson, J. W.**, Valdez, Alaska.
 Granite Gold Mining Company.
- Giddings, Hon. J. W.**, Santa Fe, N. Mex.
 Taos Mining Company.
- Giedlartx, Jos.**, 850 Equitable Bldg., Denver, Colo.
 Marion Mines & Mills Company (treas.).
- Gilbert, O. C.**, Jacksonville, Fla.
 Camp Bird Mining, Leasing & Power Co.
- Gill, Ben.**, Goldfield, Nev.
 Jumbo Extension Mining Company (treas.).
 Grandma Mining Company.
- Gill, W. F.**, Paris, Texas.
 Copper Queen Gold Mining Company.
- Goff, Herbert**, 96 Ames Bldg., Boston, Mass.
 Calaveras Copper Company (treas.).

- Good**, 812 Hippodrome Bldg., Cleveland, Ohio.
 Alvin Underwriters Land Company.
- Goodall**, Jas., Santaquin, Utah.
 Granite Mining & Milling Company.
- Gorich**, B. L., 416 E. Tenth Ave., Denver, Colo.
 Ajax Gold Mining Company (treas.).
- Gould**, W. C., St. Paul, Minn.
 Leviathan Mines Company.
- Graham**, R., 810 Lumsden Bldg., Toronto, Ont., Canada.
 Temiskaming Mining Company.
- Grantham**, George R., Kimball Bldg., Boston, Mass.
 Girard Copper Company.
- Gray**, J. W. T., 1023 First Natl. Bank Bldg., Denver, Colo.
 Stanley Mines Company.
- Greene**, R. T., 43 Exchange Place, New York.
 Ray Hercules Copper Company (treas.).
 Nipissing Mines Company.
- Gridley**, Haines, East Auburn, Calif.
 Oro Fina Mining Company (treas.).
- Groesbeck**, John A., 80 First Ave., Salt Lake City, Utah.
 Victor Consolidated Mining Company.
- Grondahl**, O. L., Fargo, N. Dak.
 British American Mining Company.
- Gross**, R. H., 85 Devonshire St., Boston, Mass.
 Bohemia Mining Company.
 Southwestern Miami Development Company.
 Lake Copper Company.
- Hackney**, Thos., Kansas City, Mo.
 Wisconsin Zinc Company.
- Hale**, F. A., Jr., Goodsprings, Nev.
 Boss Gold Mining Company (treas.).
- Hall**, Lorin, 218 Judge Bldg., Salt Lake City, Utah.
 Paloma Gold & Silver Mining Company.
- Hall**, Wm. J., 32 Broadway, New York.
 Federal Mining & Smelting Company (treas.).
- Halpin**, J. J., 136 Liberty St., New York.
 Brunswick Consolidated Gold Mining Company (asst. sec.-treas.).
- Hamill**, B. D., Progress Apt., Salt Lake City, Utah.
 Rexall Silver & Copper Mining Company.
- Hamm**, F. W., Globe, Ariz.
 Inspiration Needles Copper Company (treas.).
- Hammer**, F. O., St. Paul, Minn.
 Paragon Consolidated Mining Company (treas.).
- Hammersmith**, F. A., Mills Bldg., San Francisco, Calif.
 Alaska Mexican Gold Mining Company.
 Alaska Treadwell Gold Mining Company.
 Alaska United Gold Mining Company (treas.).
- Hancisen**, W. C., 413 Fletcher Bldg., Indianapolis, Ind.
 Frontier Mining Company (treas.).
- Hanley**, L. E., Wallace, Idaho.
 Hecla Mining Company.
 Oom Paul Consolidated Mining Company.
- Hansen**, C. E., Philipsburg, Mont.
 Swastika Mining Company.

- Harper, Albert**, Pacific Bldg., F. St., N. W., Washington, D. C.
 American Rutile Company (treas.).
- Harper, H. T.**, Standard Oil Bldg., San Francisco, Calif.
 Mountain King Mining Company.
- Hart, F. C.**, 5 Nassau St., New York.
 Calavada Copper Company.
- Hartman, H. W.**, 702 Mutual Bank Bldg., San Francisco, Calif.
 Nenzel Crown Point Mining Company (asst. sec.).
 Rochester Elda Fino Mining Company (asst. sec.).
- Hartnett, J. P.**, 821 Security Bldg., St. Louis, Mo.
 Philipsburg Mining Company.
- Harvey, C. H.**, Hutton Bldg., Spokane, Wash.
 Hobson Lead Company (asst. sec.-treas.).
- Hayes, J. M.**, 20 South 9th E. St., Salt Lake City, Utah.
 Whale Mining Company.
- Hearn, E. J.**, Belmont Bldg., Victoria, B. C.
 Portland Canal Tunnels, Limited.
- Henderson, J. S.**, Goldfield, Nev.
 Lone Star Consolidated Mining Company.
- Henry, L. C.**, Helena, Mont.
 Wickes Corbin Copper Mining Company (treas.).
- Herndon, C. W.**, Kingman, Arizona.
 Oatman Syndicate Mining Company (treas.).
- Hermann, T. L.**, 37 Wall St., New York.
 General Development Company.
- Hess, Frank P.**, Wallace, Idaho.
 Belmont Mining Company, Limited (treas.).
- Higbee, C. A.**, Buflitt Bldg., Philadelphia, Pa.
 Tonopah Mining Company (treas.).
- Hill, Ira B.**, Andover, Mass.
 Arizona Mining Company.
- Hiskey, U. U.**, 1471 Westminster Ave., Salt Lake City, Utah.
 Copper Shield Mining Company.
- Hoar, V. R.**, Kempis Apt., Spokane, Wash.
 Hecla Copper Mining Company, Limited (treas.).
- Hoffman, J. H.**, 715 Higgins Bldg., Los Angeles, Calif.
 Arizona Southwestern Copper Company (treas.).
- Hoffman, Pete**, Whitefish, Mont.
 Lupfer Mining Company.
- Hoit, H. A.**, 40 Exchange Place, New York.
 Iron Silver Mining Company.
- Holp, H. A.**, Butte, Mont.
 Butte & Ely Copper Company.
- Hollister, W. C.**, 409 Empire Bldg., Denver, Colo.
 Evergreen Mines Co. (treas.).
- Hoopes, Edw.**, Pittsburgh, Pa.
 San Toy Mining Company (treas.).
- Hooper, Leroy**, Wallace, Idaho.
 Northern Light, Mining & Milling Company (treas.).
- Hopson, C. R.**, Elgin, Ill.
 El Orito Mining & Milling Company.
- Horsky, Edw.**, Helena, Mont.
 Montana State Mining Corporation (treas.).
- Hothorn, E. G.**, 42 Broadway, New York.
 U. S. Metals Refining Company of New Jersey.

- Howe, A. H.**, Goldfield, Nevada.
Aurora Consolidated Mines Company (treas.)
Reorganized Booth Mining Company of Nevada.
La Rose Consolidated Mines Company (treas.).
- Hubbard, C. A.**, 741 Franklin St., Denver, Colo.
Silvered Copper Mining Company (treas.)
- Hubert, Henry**, 824 Vine St., Missoula, Mont.
Advance Mining Company (treas.).
- Hudson, S. H.**, Benson, Minn.
Copper State Mining Company.
- Hull, A. J.**, Kimball, Nevada.
Kimball Mining Company (treas.).
- Humphreys, W. E.**, 709 Colorado Bldg., Denver, Colo.
Lexington Gold Mining Company (treas.).
- Hutchinson, F. L.**, New Liskeard, Ont.
Dome Lake Mining & Milling Company, Limited (treas.).
Temiscaming & Hudson Bay Mining Company, Limited.
- Jeffers, Chas. R.**, 67 Milk St., Boston, Mass.
Shannon Copper Company (treas.).
- Jennings, T. F.**, Garfield, Utah.
Silver Peak Mining Company (treas.).
- Jex, H. C.**, Federal Bldg., Salt Lake City, Utah.
Utah-Yerington Mining Company (treas.).
- Johnson, C. L.**, 54 William St., New York.
Esperanza, Limited.
- Johnson, W. S.**, 475 Fifth Ave., New York.
Golden Reward Consolidated Gold Mining & Milling Company (treas.).
- Jorgensen, E. W. A.**, 50 Broad St., New York.
Batopilas Mining Company (asst. treas.).
- Joy, F. W.**, % Pope & Cheppu, 1 Wall St., New York.
Tommy Burns Gold Mining Company (treas.).
- Justice, M.**, Los Angeles, Calif.
Home Gold Mining Company.
- Karst, H. F.**, 63 Wall St., New York.
Porcupine Vipond Mines, Limited.
- Kaufman, A. C.**, Sacramento, Calif.
Ruby King Mineral Paint Company (treas.).
- Kay, Wm.**, Kingman, Arizona.
Silver Keystone Mining Company.
- Keith, J. W.**, Oatman, Arizona.
Good Springs Anchor Company.
- Kelsey, A. A.**, 1 London Wall Bldg., London, E. C., Eng.
Santa Gertrudis Company, Limited.
Camp Bird, Limited.
- Kennedy, F. R.**, Alworth Bldg., Duluth, Minn.
Sierra Consolidated Mines Co. (treas.).
North Butte Mining Company.
- Kerschner, W. H.**, Box 1116, Tucson, Ariz.
Stratton Copper Company (treas.).
- Kenny, P. H.**, Butte, Mont.
Reliance Mining & Milling Company.
- Kingaland, J. E.**, 65 Nassau St., New York.
Southern Zinc & Mining Company (treas.).
- Kitto, J.**, Room 1202, C. P. R. Bldg., Toronto, Ontario.
Consolidated Mining & Smelting Company, of Canada, Limited.

- Kitto, K.**, 500 Bullitt Bldg., Philadelphia, Pa.
Belmont Mining Company (treas.).
Tonopah Belmont Development Company.
- Knapp, J. C.**, Harris Trust Bldg., Chicago, Ill.
Mascot Copper Company.
- Kuphal, M.**, 630 Monroe Ave., Helena, Mont.
American Mining Company, Limited.
- Labouchere, F. A.**, Salisbury House, London, Wall, London, E. C.
Le Roi No. 2 Limited.
- Ladwig, Chas.**, East Helena Mont.
Economy Gold Mines Company (treas.).
- Lambourne, G. W.**, Kearns Bldg., Salt Lake City, Utah.
Daly-Judge Mining Company (treas.).
- Lang, L. A.**, Denver, Colo.
Mid-Colorado Mines Company.
- Langdon, F. C.**, Los Angeles, Calif.
Aurora Mines Company.
- Larmonth, E. A.**, 46 Elgin St., Ottawa, Ont.
Right of Way Mines, Limited (treas.).
- Larson, A. O.**, Kellogg, Idaho.
Big Creek Leasing Company (treas.).
- Lathrop, F. H.**, Oatman, Arizona.
Times Mining Company.
- Laws, Geo.**, 354 Hudson St., Buffalo, N. Y.
Ore Extension Mining Company, Limited (treas.).
- Leach, G. A.**, Morris, Ill.
Providence Extension Gold Mining Company (treas.).
- Le Huray, S. J.**, 201 Inspector St., Montreal, P. Q.
- La Rose Consolidated Mines Company** (treas.).
- Lee, F. M.**, 401 Mills Bldg. San Francisco, Calif.
Green Horn Mountain Copper Mining Company (treas.).
- Leonard, L. H.**, 61 Broadway, New York.
St. Joe Lead Company.
- Levinger, Alfred**, % Eugene Meyer, Jr., 14 Wall St., New York.
Mogollon Mines Company.
- Lipman, C. K.**, 120 Broadway, New York.
Braden Copper Mines Company.
Braden Copper Company.
- Lippincott, W. S.**, Box 1375, Denver, Colo.
Seeman Investment & Finance Company (treas.).
- Lockwood, F. M.**, Titusville, Pa.
Cashier G. M. & R. Company.
- Louis, A. E.**, 510 Caswell Blk., Milwaukee, Wis.
Nevada Arizona Mines Company.
- Lusk, Lewis**, Kingman, Ariz.
Arizona Eastern Mining Co.
- Lutkin, H. Carman**, 1502 Borland Blk., Chicago, Ill.
Kelvin Sultana Copper Company.
- Mackay, J. J.**, St. Cathrines, Ont., Canada.
Coniagas Mines, Limited (treas.).
- Mackay, H. A.**, 33 State St., Boston, Mass.
Canyon Mines Corporation (treas.).
- Macpherson, A. A.**, Jerome, Arizona.
Boston & Jerome Copper Company (treas.).

- Makeever, M. M.**, 262 Washington St., Boston, Mass.
Alaska Gold Belt Company.
- Mangum, W. L.**, Provo, Utah.
Dragon Consolidated Mining Company (treas.).
Rico Wellington Mining Company.
Iron Blossom Consolidated Mining Company.
- Mann, V. H.**, Cripple Creek, Colo.
Doctor Jack Pot Mining Company (treas.).
Findley Mines Company.
- Marsden, L. E.**, 30 Church St., New York.
Shoshone Polaris Mining Company (treas.).
Tonopah Extension Mining Company.
- Manaton, C. H.**, 420 Traders Bank Bldg., Toronto, Canada.
Peterson Lake Silver Cobalt Mining Company, Limited.
- Marsh, L. H.**, Box 24, Mina, Nevada.
Nevada Standard Copper Company (treas.).
- Martin, Myra B.**, 15 William St., New York.
Copete Consolidated Copper Company (treas.).
- Martin, P.**, St. Maries, Idaho.
Iron Mask Mining Company (treas.).
- Mathews, B. E.**, Helena, Mont.
Montana-Radersburg Mining Company (treas.).
- Maxwell, A.**, 22 Continental Bank Bldg., Salt Lake City, Utah.
Beaver Mines Company.
- McBride, W. S.**, American Forks, Utah.
Plentiful Mining & Milling Company.
- McCarthy, J.**, 601 Empire State Bldg., Spokane, Wash.
Marsh Mines Consolidated Company.
- McColloch, C. H.**, Baker, Oregon.
Seven Devils Copper Company.
Snow Creek Mining Company.
- McCrate, M. E.**, Tonopah, Nev.
Montana-Tonopah Mines Company (treas.).
- McCroskey, W. E.**, Palouse, Wash.
Merger Mining Company, Limited.
- McCurdy, E. S.**, 575 Mills Bldg., San Francisco, Calif.
Treasure Mining Company (treas.).
- McCutcheon, W. A.**, 223 4th Ave., Pittsburgh, Pa.
Pittsburg Idaho Company, Limited (treas.).
- McGovern, John E.**, Rochester, Nev.
Rochester Treasure Mining Company (treas.).
- McGuire, C. W.**, 706 Sears Bldg., Boston, Mass.
Bluebird Company (treas.).
- McIlvaine, W. D.**, Harris Trust Bldg., Chicago, Ill.
Pennsylvania Mining Company (treas.).
- McKee, W. E.**, 53 State St., Boston, Mass.
Mt. Champion Mining Company.
- McKinney, J. W.**, Salt Lake City, Utah.
Soffe Silver Mining Company (treas.).
- McKinnis, Chas.**, Barnard Blk., Wallace, Idaho.
Caledonia Mining Company (treas.).
- McKinzie, C. A.**, Duluth, Minn.
Norseman Exploration Company.
- McLennan, A. J.**, 608 Lonsdale Bldg., Duluth, Minn.
Copper Queen Mining & Smelting Company (treas.).

- Meeleus, E. E.**, 307 High St., Oshkosh, Wis.
Hahns Peak Gold Mining & Miffing Company (treas.).
- Melin, A. H.**, 42 Broadway, New York.
Utah Consolidated Mining Company (treas.).
Anaconda Copper Mining Company.
- Merriss, W. E.**, 120 Broadway, New York.
American Smelting & Refining Company.
- Metz, Chas. P.**, 302 Century Bldg., Denver, Colo.
Vulcan Mines & Smelter Company (treas.).
- Miller, C. D.**, Mullan, Idaho.
Carney Copper Company, Limited.
Mineral Farm Mining Company (treas.).
- Miller, Geo. C.**, Fidelity Bldg., Buffalo, N. Y.
Buffalo Mines, Limited (treas.).
- Miller, N. H.**, Austin, Ore.
Vincent Creek Gold & Copper Company (treas.).
- Miller, T. C.**, Newton, Kans.
Keystone Copper Company.
- Miller, W. F.**, Houghton, Mich.
New Arcadian Copper Company (treas.).
- Millett, S. S.**, 60 Congress St., Boston, Mass.
Bingham Mines Company (treas.).
Victoria Copper Mining Company.
- Milligan, Eugene**, Dewey, Ariz.
Black Chief Copper Company (treas.).
- Mixer, C. T.**, Box 56, Salt Lake City, Utah.
Progressive Mining Company (treas.).
- Moore, O. C.**, Peyton Bldg., Spokane, Wash.
Norman Mines Company.
- Moore, W. C.**, 1178 Broadway, New York.
Pioneer Mining & Smelting Company (treas.).
- Morel, L. P.**, Oatman, Ariz.
Black Range Mining Company.
- Morey, C. I.**, 46 Cedar St., New York.
Almoloya Mining Company (treas.).
- Morrissey, C. J.**, 70 State St., Boston, Mass.
Old Colony Copper Company (treas.).
- Morrow, H. B.**, Platteville, Wis.
McMillan Zinc Company (treas.).
- Morse, C. J.**, 4 P. O. Sq., Boston, Mass.
Utah Metal Mining Company.
- Moyer, H. G.**, 1011 First Nat'l Bank Bldg., San Francisco, Calif.
Round Mountain Mining Company.
- Mudgett, F. G.**, 502 Humboldt Bank Bldg., San Francisco, Calif.
Nyman Consolidated Mines Company (treas.).
- Muth, Wm.**, Helena, Mont.
Madden Scratch Gravel Mines Company (treas.).
- Nash, Percival**, Manhattan, Nev.
Union Amalgamated Mining Company.
- Neely, Harry J.**, S. 1628 Tacoma St., Spokane, Wash.
Northwest Mines Development Company.
- Nenzel, Rudolph**, Lovelock, Nev.
Willard Mines Company.
Nenzel Crown Point Mining Company.

- Neukom, J. W.**, 1500 Alworth Building, Duluth, Minn.
 Butte & Ely Copper Company (asst. treas.).
Nichols, J. L., Colorado Springs, Colo.
 Mary McKinney Mining Company.
Nicholson, A. L., Wallace, Idaho.
 Intermountain Copper Mining Company.
Niner, I., 111 Broadway, New York.
 Peabody Consolidated Copper Company.
Noble, Donald, Pleasant Grove, Utah.
 Utah Centennial Mining Company (treas.).
Notman, George, 99 John St., New York.
 Bunker Hill Mines Company.
 Phelps, Dodge & Company (treas.).
 United Globe Mines.
- Odiar, George**, 56 Rue de Provence, Paris, France.
 Compagnie du Roleo.
Ogilvie, R. C., Superior, Wis.
 Butte Ballaklava Copper Company.
Olney, C. D., 265 Russ Bldg., San Francisco, Calif.
 Mexican Gold & Silver Mining Company.
 Sunset Mining & Development Company.
 Tonopah North Star Transportation & Development Company.
Olson, E. A., 908 Mer. Natl. Bank, Los Angeles, Calif.
 Vivian Mining Company.
Ong, Eugene W., Brookline Mass.
 Abangarez Gold Fields of Costa Rica.
Orem, F. M., 222 S. W. Temple St., Salt Lake City, Utah.
 Nevada Douglas Consolidated Copper Co. (treas.).
Owen, Erwin W., Bakersfield, Calif.
 Weringer Mines Company (treas.).
- Packer, C. S.**, 211 American Bank Bldg., Seattle, Wash.
 Ellamar Mining Company.
Paine, A. C., 60 Congress St., Boston, Mass.
 South Lake Mining Company (treas.).
Paine, C. J., Jr., 190 Washington St., Boston, Mass.
 St. Mary's Mineral Land Company (treas.).
Palmer, R. J., Los Angeles, Calif.
 Pittsburg-Dolores Mining Company.
Paris, D. H., Brown Bldg., 4th & Chestnut St., Philadelphia, Pa.
 Warrior Copper Company.
Parker, R. F., 60 State St., Boston, Mass.
 Alvarado Mining & Milling Company (treas.).
Parks, Geo. W., Kearns Bldg., Salt Lake City, Utah.
 Daly Mining Company.
Pashler, L. J., 1428-32 Traders Bank Bldg., Toronto, Ont., Can.
 McIntyre Extension Mines, Limited (treas.).
 Trethewey Silver-Cobalt Mines, Limited (treas.).
Pattison, E. H., Hutton Bldg., Spokane, Wash.
 National Lead-Silver Company.
Paul, W. A. O., 32 Broadway, New York.
 Quincy Mining Company (treas.).
Peck, H. S., Burlington, Vt.
 Arizona Gold & Copper Mining Company.
Pierce, Gowan, Oatman, Ariz.
 Oatman Crescent Mining Company (treas.).

- Pement, J. A.**, 3146 Wentworth Ave., Chicago, Ill.
Calumet-New Mexico Mining Company.
- Penigo, Wm. S.**, Beloit, Wis.
Midland Lead & Zinc Company.
- Penrose, Spencer**, 25 Broad St., New York and Colorado Springs, Colo.
Granite Gold Mining Company.
Utah Copper Company (treas.).
- Percival, J. A.**, 61 Broadway, New York.
Alaska Consolidated Mining & Smelting Company (treas.).
- Perkins, J. F.**, Milton St., Boston, Mass.
Calumet & Hecla Mining Company (treas.).
- Peterson, A. V.**, 54 E. 4th South St., Salt Lake City, Utah.
Dugway Copper Mining & Smelting Company.
- Pierre, Allen**, Conrad Bank Bldg., Great Falls, Mont.
Butte & Great Falls Mining Company (treas.).
- Pillans, T. D.**, 24 Lombard St., London, E. C., England.
Tomboy Gold Mines Company.
- Pimlott, J. R.**, Houghton, Mich.
Superior & Boston Copper Company (treas.).
- Poole, M. E.**, 417 Hutton Bldg., Spokane, Wash.
United Copper Mining Company (treas.).
- Pingree, John**, % Merchants Bank, Salt Lake City, Utah.
Big Four Exploration Company (treas.).
- Platt, W. W.**, Alamosa, Colo.
Tepee Mining & Development Company.
- Pope, C. W.**, 15 Broad St., New York.
Proprietary Mines Company of America.
- Rabideau, A. O.**, Crosby, Minn.
Summit Gold Mining Company.
- Rager, W. H.**, Stevensville, Mont.
Mt. Thompson Gold Mining & Milling Company, Incorporated.
- Ramey, Geo. L.**, Salida, Colo.
Standard Gold, Copper Mining & Milling Company.
- Rand, H. L.**, 131 State St., Boston, Mass.
Liberty Bell Gold Mining Company.
- Ream, F. L.**, Salida, Colo.
Giant Eclipse Consolidated Mines Company.
- Reber, A. F. L.**, Lower Rochester, Nev.
Rochester Buck & Charlie Mines Company (treas.).
- Reeves, A.**, 852 First Ave., Salt Lake City, Utah.
May Day Mining & Milling Company.
- Regan, Thos. J.**, 120 Broadway, New York.
Humboldt Mines Company.
- Reith, C. E.**, 443 Holbrook Bldg., San Francisco, Calif.
Willow Valley Mining Company (treas.).
- Rheems, L. M.**, Helena, Mont.
Helena Mining Bureau, Incorporated (treas.).
- Riddett, R. G.**, 405 Exch. Bldg., Colorado Springs, Colo.
Nevada Queen Copper Company.
- Riechel, Henry**, 634 Bridge St., Grand Rapids, Mich.
Ideal Copper Company (treas.).
- Riedel, A. F.**, 161 Summer St., Boston, Mass.
Standard Amalgamated Expl. Corp.
- Rixon, F. P.**, Billings, Mont.
Cuprite Copper Mining Company (treas.).

- Robinson, H. G.**, 165 Broadway, New York.
 South Utah Mines & Smelter (treas.).
- Robinson, H. W.**, 419 Boston Bldg., Denver, Colo.
 Mary Murphy Gold Mining Company.
- Rogers, Burt**, Black Hills Trust & Savings Bank Bldg., Deadwood, S. D.
 Custer Peak Mining Company.
- Rogers, J. F.**, 3140 Outlook Bldg., Columbus, Ohio.
 Ohio Mines Company (treas.).
- Ronaghan, A. J.**, 25 Broad St., New York.
 Butte & Superior Mining Company.
 Chino Copper Company.
- Ross, J. S.**, Kellogg, Idaho.
 Wisconsin Mining Company.
- Rossi, H. J.**, Wallace, Idaho.
 Amazon-Dixie Mining Company (treas.).
- Rothschild, M. D.**, 14 Church St., New York (treas.).
 Azure Mining Company.
- Ruhl, H. B.**, Goldfield, Nev.
 Diamondfield Black Butte Reorganized Mining Company (treas.).
 Manhattan Big 4 Mines Company.
 Orizaba Mining and Development Company.
- Russell, B. R.**, Box 64, Douglas, Ariz.
 Nacozari Consolidated Copper Company.
- Russell, Judge John R.**, Deadwood, S. Dak.
 New Puritan Mining Company.
- Salmon, L. N.**, Supreme Court, Brooklyn, N. Y.
 Tortillita Copper Company.
- Sames, Albert**, Douglas, Ariz.
 Washington Mines Development Company.
- Sanders, D. E.**, Hutton Bldg., Spokane, Wash.
 Florence Silver Mining Company (treas.).
- Sanford, Allen T.**, 1270 E. 2nd St., Salt Lake City, Utah.
 South Cardiff Mining Company.
- Sanger, E. M.**, 31 State St., Boston, Mass.
 New Era Mines.
- Sarecky, L. A.**, 115 Broadway, New York.
 Alaska Industrial Company.
- Saul, L. V.**, Douglas, Wyo.
 North Laramie Peak Copper Mining Company.
- Scattergood, H. W.**, 530 Land Title Bldg., Philadelphia, Pa.
 Happy Jack Mining & Refining Company (treas.).
- Schilleman, E. A.**, Hill City, So. Dak.
 Hill City Mining & Development Company (treas.).
- Schirmer, C. G.**, 79 Milk St., Boston, Mass.
 Utah-Apex Mining Company.
 Davis Daly Copper Company.
- Scott, F. W.**, 522 Postal Tel. Bldg., Chicago, Ill.
 Montana Oreway Mining Company.
- Seager, W. P.**, Houghton, Mich.
 Chief Consolidated Mining Company (treas.).
- Searle, H. A.**, 65 London Wall, London, E. C., Eng.
 San Francisco Mines of Mexico, Limited.
- Seideman, A. G.**, Saltsee, Mont.
 Hugo Gold & Copper Mining Company (treas.).

- Sewall, R. T.**, 35 Congress St., Boston, Mass.
Vulture Mines Company.
- Sherwin, T. E.**, 14 Ashburton Place, Boston, Mass.
Smuggler Union Mining Company (treas.).
- Shirley, D. D.**, 517 Mining Exch. Bldg., Denver, Colo.
Bezant Gold Mining Company (treas.).
- Shopleigh, R. W.**, St. Louis, Mo.
Washington Land & Mining Company.
- Shove, E. P.**, 25 Broad St., New York.
Ray Consolidated Copper Company (treas.).
- Sigel, Chas., Jr.**, 603 Symes Bldg., Denver, Colo.
Vindicator Consolidated Gold Mining Company.
- Simpson, R. J.**, 723 Title Insurance Bldg., Los Angeles, Calif.
London Arizona Copper Company (treas.).
- Sinnicks, F. S.**, 50 Congress St., Boston, Mass.
Rilla Mining Company (treas.).
- Skea, D. H.**, Lovelock, Nev.
Packard Extension Mines Company.
- Small, A. J.**, Oatman, Ariz.
Paramount Mines Company.
- Small, J. A.**, Oldtrails, Ariz.
Lexington Arizona Mining Company.
- Smilley, Jas.**, Ottawa, Ont., Canada.
Yukon Copper Company, Limited.
- Smily, M. J.**, 27 Kilby St., Boston, Mass.
Silver Comet Mining Company.
- Smith, Borlam**, Winnemucca, Nev.
Haystack Mines.
- Smith, Chas. F.**, Room 1209, 71 Broadway, New York.
Antimony Corporation (treas.).
- Smith, Gale**, 416 Hutton Bldg., Spokane, Wash.
Red Monarch Consolidated Mining Company (treas.).
- Smith, Dr. W. A.**, White & Bender Bldg., Wallace, Idaho.
Sonora Mining and Milling Company.
- Sneddon, J. J.**, Finsbury Pavement House, London, E. C., Eng.
Kirkland Lake Prop., Limited.
- Snyder, G. H.**, 346 Carroll St., Brooklyn, N. Y.
New Jersey Mines Company.
- Soto, M. F.**, 17 Battery Place, New York.
New York & Honduras Rosario Mining Company.
- Sparkman, Hugh**, Fresno, Calif.
Cone Mining & Milling Company (treas.).
- Spence, J. H.**, 58 Canada Life Bldg., Toronto, Ont., Canada.
McKinley-Darragh-Savage Mines.
- Stadtfeld, J.**, Grass Valley, Calif.
Brunswick Consolidated Gold Mining Company (treas.).
- Stahl, Geo. A.**, 603 Symes Bldg., Denver, Colo.
Vindicator Consolidated Gold Mining Company.
- Stanwood, Frederic**, 82 Devonshire St., Boston, Mass.
Champion Copper Company.
Copper Range Company (treas.).
Trimountain Mining Company (treas.).
Copper Range Railroad Company.
Atlantic Mining Company.
Baltic Mining Company.

- Stauber, I. J.**, Pinos Altos, N. Mex.
Pinos Altos Mining & Milling Company.
- Steffes, J. B.**, Kellogg, Idaho.
Florence Mining & Milling Company, Limited (treas.).
- Steifer, M. V.**, Coutolenc, Calif.
P. B. Steifer Mining Company.
- Steindler, E. L.**, 42 Broadway, New York.
Dominion Reduction Company, Limited.
- Stevens, C. F.**, Goldfield, Nev.
Southwestern Mines Company (treas.).
- Stevens, J. M.**, Pocatello, Idaho.
Mascot Mining & Milling Company of Idaho, Limited (treas.).
- Stewart, S. H.**, Phoenix, Ariz.
Young Mines Company, Limited.
- Stone, S. M.**, 625 Market St., San Francisco, Calif.
Butters Divisadero Company (treas.).
- Storer, E.**, 49 So. Main St., Salt Lake City, Utah.
South Hecla Mining Company (treas.).
- Strock, C. R.**, 465 E. 12th St., Salt Lake City, Utah.
Copper Shield Mining Company (treas.).
- Stuberg, A. O.**, 1604 Spoffow Ave., Spokane, Wash.
Vulcan Mining Company.
- Sullivan, G. M.**, 420 Boston Bldg., Salt Lake City, Utah.
Mason Valley Extension Mining Company (treas.).
- Sutton, I. M.**, 223 Security Bldg., Los Angeles, Calif.
Jerome Verde Copper Company (treas.).
- Swain, A. P.**, 381 Bush St., San Francisco, Calif.
Union Consolidated Mining Company.
- Sweet C. E.**, 303 Midland Bldg., Kansas City, Mo.
Ruby Copper Company.
Southern Arizona Mining Company.
- Syverson, A. H.**, Peyton Bldg., Spokane, Wash.
Security Copper Company (treas.).
- Tanzev, Elmer**, Tonopah, Nev.
Tonopah, 76 Consolidated Mining Company.
- Taylor, B. F.**, 120 Broadway, New York.
Rex Consolidated Mining Company.
- Taylor, Donald**, 48 E. 4th St., St. Paul, Minn.
St. Paul Montana Mining Company.
- Taylor, Gordon**, 7 Melinda St., Toronto, Ont., Can.
Preston East Dome Mines.
- Taylor, Jas. H.**, Wallace, Idaho.
Bullion Mining Company, Limited (treas.).
- Taylor, Jas. P.**, P. O. Box 1656, Mexico City, D. F.
Pacific Copper Company, Limited.
- Tewinkel, J. N.**, Spokane, Wash.
Methow Gold & Copper Mining Company (treas.).
- Thatcher, Daniel**, Colorado Springs, Colo.
Isabella Mines Company (treas.).
- Thielman, Robt. C.**, Tomahawk, Wis.
Platinum Mining & Milling Company (treas.).
- Thompson, F. W.**, 15 Broad St., New York.
Consolidated Arizona Smelting Company (treas.).
- Tilton, J. L.**, 32 Broadway, New York.
Ontario Silver Mining Company (asst. sec.).

- Tinker, F. V.**, Empire Bldg., Boise, Idaho.
Lucky Boy Gold Mining Company (treas.).
- Todd, S. W.**, Los Angeles, Calif.
Luning-Idaho Mining Company (treas.).
- Tooker, J. D.**, 111 Broadway, New York.
Mines Company of America (asst. treas.).
- Topie, W. H.**, Fourth National Bank Bldg., Cincinnati, Ohio.
Democrata Cananea Sonora Copper Company.
- Treber, Wm. L.**, Deadwood, S. Dak.
Deadwood-Heidelberg Mining Company.
- Tremain, H. E.**, 810 Lumsden Bldg., Toronto, Ont., Canada.
Beaver Consolidated Mines, Limited (treas.).
- Trotter, C. H.**, 10 N. New Jersey St., Indianapolis, Ind.
German Copper Company.
- Turner, W.**, Gem, Idaho.
Tucker Mining & Milling Company, Limited (treas.).
- Ulrich, C. T.**, 120 Broadway, New York.
Kennecott Copper Corporation.
- Van Bokkelen, W. A.**, 254 Russ Bldg., San Francisco, Calif.
Central Eureka Mining Company (treas.).
- Van Der Voort, M. P.**, Royal Bank Bldg., Toronto, Ont., Canada.
McIntyre Porcupine Mines, Limited.
- Van Norman, Dr. H. C.**, 517 Commonwealth Bldg., Denver, Colo.
West Mexico Mines Company.
- Van Tilburgh, Chas. R.**, 1116 Hudson Ave., Los Angeles, Calif.
Empire Copper & Gold Mining Company (treas.).
- Van Tillborg, L. A.**, Denver, Colo.
Tungsten Exploration Company.
- Vogeler, Alfred**, 433 Dayton St., Cincinnati, Ohio.
Transvaal Copper Mining Company (treas.).
- Voorhees, W. B.**, 1055 Spitzer Bldg., Toledo, Ohio.
Buckeye Belmont Mines Company.
- Wagner, W. F.**, 16th and Indiana Streets, Philadelphia, Pa.
Philadelphia Mines Company.
- Walden, F. S.**, 222 D. F. Walker Block, Salt Lake City, Utah.
Beaver Copper Company (treas.).
- Walker, C. J.**, St. Louis, Mo.
Down Town Mines Company (treas.).
- Walker, E. H.**, 85 Devonshire Street, Boston, Mass.
Crystal Copper Company.
- Wallace, J. S.**, 1024 Crocker Building, San Francisco, Calif.
Alaska Juneau Gold Mining Company (asst. sec.).
- Waller, S. G.**, Front Royal, Va.
Gooney Manor Copper Company.
- Walmsley, E. T.**, Colorado Springs, Colo.
Nellie Mining Company (treas.).
- Walters, R. E.**, Larson, Idaho.
Snowstorn Mining Company (treas.).
- Ward, W. B., Jr.**, Fort Worth, Texas.
Hobson Silver Lead Company (treas.).
- Warmbath, S. M.**, 561 I. W. Hellman Building, Los Angeles, Calif.
Big Jim Gold Mining Company (mgr.).

- Warnock**, Clarence, 222 Kearns Building, Salt Lake City, Utah.
Gilmore Mining Company (asst. sec.).
Wilbert Mining Company, Limited.
- Watkins**, B. E., 107 W. 3rd Street, Pueblo, Colo.
Equity Creede Mining Company.
- Weatherhead**, J. C., Box 170, Wallace, Idaho.
Pandora Copper Mining Company, Limited (treas.).
- Weaver**, C. A., 634 S. W. Temple Street, Salt Lake City, Utah.
O. K. Extension Mining & Refining Company (treas.).
Utah-United Copper Company (treas.).
- Webster**, Daniel, Salem, Ore.
United Copper-Gold Mines Company.
- Weigand**, Chas., Kellogg, Idaho.
Highland Surprise Consolidated Mining Company (treas.).
- Wellington**, B. F., Jr., Stockton, Calif.
Lightner Mining Company (treas.).
- Westcott**, F. J., Kearns Building, Salt Lake City, Utah.
Halifax Tonopah Mining Company.
- Westlake**, E. H., 61 Broadway, New York.
Caribou Cobalt Mines Company (treas.).
Kerr Lake Mining Company (treas.).
Naumkeag Copper Company (treas.).
Wettlaufer Lorraine Mines, Limited (treas.).
- Whelan**, Jos., Wallace, Idaho.
Phoenix Mining & Milling Company.
- White**, Jas. C., El Paso, Texas.
Memphis Mining Company (treas.).
- Whitney**, C. L., 101 City and County Building, Salt Lake City, Utah.
Lowland Tunnel & Transportation Company.
- Wilder**, E. T., First National Bank Building, Kansas City, Mo.
Majestic Copper Company (treas.).
- Wilder**, H. P., Cambridge, Md.
Kay Mine Smelting Company (treas.).
- Wilkinson**, S. M., Burlington, Ia.
Oro Cobra Mining Company (treas.).
- Williams**, B. F., 702 Gas and Electric Building, Denver, Colo.
Rainbow Mountain Mining Company.
- Williams**, J. G., Duluth, Minn.
Denn-Arizona Copper Company.
- Williams**, J. S., Box 1139, Denver, Colo.
Bachelor-Khediye Mines Company.
- Williams**, Thos., 954 Gas and Electric Building, Denver, Colo.
Crown Prince Consolidated Mines Company.
- Wilson**, A. W., Peoria, Ill.
Ophir Range Gold Mining Company.
- Wilson**, Robt. G., 500 Bullitt Building, Philadelphia, Pa.
Belmont Milling Company (treas.).
- Wixom**, J. H., Box 32, Wallace, Idaho.
Idaho-Montana Mining Company, Limited.
- Wood**, G. S., 603 Symes Building, Denver, Colo.
Vindicator Consolidated Gold Mining Company (treas.).
- Wood**, R. D., Oklahoma City, Okla.
Hermosillo Copper Company.
- Wright**, C. A., Calumet, Mich.
Keweenaw Copper Company (treas.).

- Wright, J. B., 440 Gas and Electric Building, Denver, Colo.
Black Prince Copper Company.
- Wyman, A. L., 60 Congress Street, Boston, Mass.
Algolah Mining Company.
Corbin Copper Company.
North Lake Mining Company.
Franklin Mining Company.
Indiana Mining Company.
Rhode Island Copper Company.
- Yates, T. C., Negaunee, Mich.
North Homestake Mining Company (treas.).
- Young, E. A., Clinton, Iowa.
Great Western Copper Company.
- Zang, A. F., Denver, Colo.
Cresson Consolidated Mining & Milling Company.

MINING COMPANY TREASURERS

- Ames, Chas. L., % West Publishing Company, St. Paul, Minn.
St. Paul Montana Mining Company.
- Arnold, Allen, 85 Devonshire Street, Boston, Mass.
Trinity Copper Company.
- Baker, J. W., 27 Kilby Street, Boston, Mass.
Silver Comet Mining Company (sec.).
- Batchelder, F. W., 55 Congress Street, Boston, Mass.
United States Metals Refining Company of New Jersey.
- Bailey, Dr. R. W., Denver, Colo.
Tungsten Exploration Company.
- Beebe, Dr. P. A., Glenwood City, Wis.
Wisconsin Montana Mining Company.
- Bendelari, F. W., 812 Hippodrome Street, Cleveland, Ohio.
Underwriters Land Company.
- Black, H. S., 111 Broadway, New York.
Mines Company of America.
- Bofferding, Wm., 1311 Washington Avenue North, Minneapolis, Minn.
Minneapolis & Texada Copperite Company, Limited.
- Born, J., 111 Broadway, New York.
Peabody Consolidated Copper Company.
- Boston, Fred W., Bloomington, Ill.
Boston-American Mining Company.
- Bowman, G. H., Front Royal, Va.
Gooney Manor Copper Company.
- Briggs, W. M., 77 Franklin Street, Boston, Mass.
Ajo Consolidated Copper Company.
- Browne, E. H., 915 Union Bank Building, Pittsburgh, Pa.
Arizona-Idaho Copper Extraction Company.
- Brown, H. H., 161 Summer Street, Boston, Mass.
Standard Amalgamated Exploration Corporation.
- Busbee, W. G., Yamhill, Ore.
West Side Gold & Silver Mining Company.

- Bystle**, Adolph, Redding, Calif.
Delta Consolidated Gold Mines Company.
- Calhoun**, G. R., Pitkin, Colo.
Camp Bird Mining, Leasing & Power Company.
- Camp**, H. N., 61 Broadway, New York.
St. Joseph Lead Company.
- Chapin**, L. A., 120 Broadway, New York.
American Smelting & Refining Company (asst. treas.).
- Childs**, H. M., Kellogg, Idaho.
Intermountain Copper Mining Company.
- Clark**, J. Dudley, 60 State Street, Boston, Mass.
Alvarado Mining & Milling Company.
Southern Arizona Mining Company.
- Coble**, D. H., Pittsburgh, Pa.
Calhoun Consolidated Mines Company.
- Colton**, G. F., 5133 Pasadena Avenue, Los Angeles, Calif.
Duplex Mining Company.
- Cookson**, C. L., % Admiral Hay Press Company, Kansas City, Mo.
Ruby Copper Company.
Southern Arizona Mining Company.
- Cunningham**, J. P. H., 306 N. Jefferson Street, New Castle, Pa.
Stanley Mines Company.
- D'Arcy**, N. A., 1843 W. 50th Street, Los Angeles, Calif.
Big Jim Gold Mining Company.
- Davison**, R. J., Bath, N. Y.
Snow Creek Mining Company.
- Dick**, Neil, Calumet, Mich.
Calumet & California Mining Company.
- Dickson**, C. C., 63 Wall Street, New York.
Porcupine Vipond Mines, Limited.
- Dillaway**, W. E. L., 45 Milk Street, Boston, Mass.
Bingham-New Haven Copper & Gold Mining Company.
Utah Metal Mining Company.
- Durbrow**, C. J., Merchant Exchange, San Francisco, Calif.
Dairy Farm Mining Company.
- Durkee**, C., South Pasadena, Calif.
Lexington Arizona Mining Company.
- Eakin**, Dr. A. C., Rockford, Ill.
Antelope Springs Mining Company.
Nevada Superior Mines Company.
- Eggleston**, R. H., 42 Broadway, New York.
New Dominion Copper Company, Limited.
- Farwell**, S. E., 55 Congress Street, Boston, Mass.
Wisconsin Zinc Company.
American Zinc, Lead & Smelting Company.
- Featherstone**, A. H., Wallace, Idaho.
National Lead & Silver Company.
- Fortmeyer**, Fred R., East Orange, N. J.
National Lead Company.
- Franks**, C. L., Stevensville, Mont.
Mount Thompson Gold Mining & Milling Company.
- Fraser**, C. D., 42 Broadway, New York.
Hedley Gold Mining Company.

- Frederick**, Leopold, 120 Broadway, New York.
Braden Copper Mines Company.
Braden Copper Company.
Chile Copper Company.
- Fusz**, F. D., 821 Security Building, St. Paul, Minn.
Philipsburg Mining Company.
- Gallagher**, R. A., 96 Franklin Street, Allston, Mass.
Butte-Central Mining & Milling Company.
- Gelder**, Wm., 45 Broadway, New York.
Walker River Copper Company.
- Goldberg**, Jacob, Deadwood, S. Dak.
Deadwood-Heidelberg Mining Company.
- Goldman**, A., Paris, Texas.
Copper Queen Gold Mining Company.
- Goldsmith**, Owen, 67 Milk Street, Boston, Mass.
Safford Copper Company.
- Graves**, Jas. P., 60 Congress Street, Boston, Mass.
Victoria Copper Mining Company.
- Gross**, R. H., 85 Devonshire Street, Boston, Mass.
Helvetia Copper Company.
- Guggenheim**, Isaac, 120 Broadway, New York.
American Smelting & Refining Company.
- Hagenbarth**, F. J., 551 E. So. Temple Street, Salt Lake City, Utah.
Cerro Gordo Mines Company.
- Haggin**, Louis T., 441 Madison Avenue, New York.
Homestake Mining Company.
- Harper**, W. S., 42 Broadway, New York.
Greene Cananea Copper Company (asst. treas.).
- Harris**, Henry, Morning Hotel, Mullan, Idaho.
Idaho-Montana Mining Company.
- Henderson**, John, % Henderson Banking Company, Elko, Nev.
Nevada Bunker Hill Mining Company.
- Hendrie**, C. C., First National Bank Building, Denver, Colo.
Bezant Gold Mining Company.
- Hiatt**, Roy, Box 64, Douglas, Ariz.
Nacozari Consolidated Copper Company.
- Higbee**, C. A., 572 Bullitt Building, Philadelphia, Pa.
Eden Mining Company.
- Hoban**, J. W., % Eugene Meyer, Jr., 14 Wall Street, New York.
Mogollon Mines Company.
- Hoffman**, C., Enterprise, Kans.
Arizona-Southwestern Copper Company.
- Hook**, John A., 10 No. New Jersey St., Indianapolis, Ind.
German Copper Company.
- Hopfer**, H. S., 28 So. 3rd Street, Philadelphia, Pa.
Warrior Copper Company.
- Hudston**, J. W., % Denver National Bank, Denver, Colo.
Mary Murphy Gold Mining Company.
- Hunn**, Jos. S., Sibley Block, Rochester, N. Y.
McKinley-Darragh-Savage Mines (asst. treas.).
- Hurt**, Arthur C., Los Angeles, Calif.
Calavada Copper Company.
- Hyde**, Harry R., Ridgway, Pa.
Gilmore Mining Company.

- Johnston, W. A., Box 1139, Denver, Colo.
Bachelor Khedive Mines Company.
- Kamprath, Otto, Bakersfield, Calif.
Weringer Mines Company.
- Keating, W. H., Wallace, Idaho.
Artic Mining & Milling Company, Limited.
- Keith, Henry M., 17 Battery Place, New York.
Abangarez Gold Fields of Costa Rica.
- Kent, C. W., 431 Security Building, Los Angeles, Calif.
Yellow Pine Mining Company.
- Kilbourn, W. E., 22 Continental Bank Building, Salt Lake City, Utah.
Beaver Mines Company.
- Killorin, J. F., % I. Freimuth, Duluth, Minn.
Butte & Zenith City Mining Company.
- Kroger, W. W., Philipsburg, Mont.
Swastika Mining Company.
- Larson, P., 1612 Sixth Avenue, Spokane, Wash.
Vulcan Mining Company.
- Lawall, E. H., Scranton, Pa.
Square Deal Gold Mining Company.
- Lebold, C. E., Salem, Ore.
United Copper Gold Mines Company.
- Lewis, H. W., Jerome, Ariz.
Jerome-Oatman Mining Company.
- Lewisohn, S. A., 61 Broadway, New York.
General Development Company.
Miami Copper Company.
- Lindstrom, C. A., Santaquin, Utah.
Granite Mining & Milling Company.
- Lipman, Chas. K., 120 Broadway, New York.
Nevada Consolidated Copper Company.
- Loeb, C. M., 61 Broadway, New York.
Consolidated Interstate Callahan Mining Company.
- Lusk, Lewis, Kingman, Ariz.
Arizona-Eastern Mining Company (mgr.-sec.).
- MacGregor, F. S., 60 India St., Boston, Mass.
Mt. Champion Mining Company.
- Makeever, J., 176 Broadway, New York.
Alaska Gold Belt Company.
- Maney, E. J., 1500 Alworth Building, Duluth, Minn.
Butte & Ely Copper Company.
- Mangans, J. C., 25 Broad Street, New York.
Arizona Copper Belt Mining Company.
- Mawson, F. M., Reno, Nev.
New Empire Goldfield Mines Company.
- May, E. A., Ottawa, Kans.
Plata-Fina Mining & Development Company.
- May, Jas. S., Andover, Mass.
Brooklyn Arizona Mining Company.
- Maycroft, G. L., 520 Lyceum Building, Duluth, Minn.
Summit Gold Mining Company.
- McCormack, W. G., Traer, Iowa.
Montana Illinois Copper Mining Company.

- McCornick, W. S.**, 205 Center St., Salt Lake City, Utah.
 May Day Mining & Milling Company.
 Victor Consolidated Mining Company.
- McGarvey, B. H.**, % State Bank of Kansas City, Kansas City, Mo.
 Kansas City-Nevada Consolidated Mines Company.
- McIntosh, H. W.**, Pittsburgh, Pa.
 Pittsburgh-Dolores Mining Company.
- McLaughlin, Robt. H.**, Bangor, Me.
 New Era Mines.
- McLean, A.**, Montreal, Quebec, Canada.
 Vulture Mines Company.
- Michel, J. E.**, 565 Columbus Avenue, New York.
 Tortillita Copper Company.
- Middleton, Ben F.**, Alamosa, Colo.
 Tepee Mining & Development Company.
- Millett, 60 Congress Street, Boston, Mass.**
 Eagle & Blue Bell Mining Company.
- Moore, W. J.**, Tipton, Iowa.
 Hartwig Mining Company.
- Morden, H. J.**, P. O. Box 1656, Mexico City, D. F.
 Pacific Copper Company, Limited.
- Nason, W. A.**, Dallas, Texas.
 Las Animas Peak Gold Mines Company.
- Nelson, D. E.**, Los Angeles, Calif.
 Sterling Copper Company.
- Nenzel, Rudolph**, Rochester, Nev.
 Nenzel Crown Point Mining Company.
- Newberger, Geo.**, Los Angeles, Calif.
 West Virginia-Wyoming Copper Company.
- Nye, Jas. W.**, Windermere Hotel, Chicago, Ill.
 Kelvin Sultana Copper Company.
- O'Hail, I. E.**, Wooster, Ohio.
 Mid-Colorado Mines Company.
- Olsen, L. M.**, Warren, Minn.
 British-American Mining Company.
- Peck, John H. F.**, Los Angeles, Calif.
 Aurora Mines Company.
- Pegram, E. S.**, 120 Broadway, New York.
 Kennecott Copper Corporation.
- Pendleton, E. W.**, Dime Bank Building, Detroit, Mich.
 Saratoga Mining Company.
- Perham, Arthur**, Butte, Mont.
 Boston & Montana Development Company.
- Peters, C. W.**, 25 Broad Street, New York.
 Chino Copper Company.
 Alaska Gold Mines Company.
 Butte & Superior Mining Company.
- Pfeiffer, P. C.**, 165 Broadway, New York.
 Nipissing Mines Company.
- Pilling, W. S.**, Real Estate Tr. Building, Philadelphia, Pa.
 Northern Ore Company.
- Pischel, Wm.**, 1150 E. 1 South Street, Salt Lake City, Utah.
 Silver King Consolidated Mining Company.

- Poole, M. E.**, 417 Hutton Building, Spokane, Wash.
United Copper Mining Company (sec.).
- Probert, H. F.**, Jackson, Mich.
Taos Mining Company.
- Prudden, G. H.**, St. Paul, Minn.
Leviathan Mines Company.
- Ramey, J. S.**, Salida, Colo.
Standard Gold-Copper Mining & Milling Company.
- Ramish, A.**, 310 S. Grand Avenue, Los Angeles, Calif.
Estelle Mining Company.
- Ramstad, Louis**, 609 First National Bank Building, Duluth, Minn.
Kamloops Copper Company.
- Rand, C. F.**, 71 Broadway, New York.
Ponupo Manganese Company.
- Rankin, J. D.**, 522 Postal Telegraph Building, Chicago, Ill.
Montana Oreway Mining Company.
- Rogers, R. I.**, National Bank of California, Los Angeles, Calif.
Good Springs Anchor Mining Company.
- Rowley, E. F.**, 1055 Spitzer Building, Toledo, O.
Buckeye Belmont Mines Company.
- Rude, F. H.**, 2 Rector Street, New York.
Tennessee Copper Company.
- Ruppe, Peter**, Calumet, Mich.
Calumet & Arizona Mining Company.
- St. Clair, H. H.**, 20 Exchange Place, New York.
United Verde Copper Company.
- Schernikow, Ernest**, 17 Battery Place, New York.
New York & Honduras Rosario Mining Company.
- Schirmer, C. G.**, 79 Milk Street, Boston, Mass.
Davis-Daly Copper Company.
- Schwarzenberg, E. M.**, 40 Court Street, Boston, Mass.
Boston-Idaho Mining Company.
- Scott, L. H.**, 50 Broad Street, New York.
Batopilas Mining Company.
- Scotten, S. C.**, 39 Board of Trade Building, Chicago, Ill.
National Mines Company.
- Seargent, Otto**, Combs, Ark.
La Luz Copper Company.
- Searle, Chas. J.**, Lead City, S. D.
New Puritan Mining Company.
- Seastrand, E. J.**, American Forks, Utah.
Plentiful Mining & Milling Company.
- Seller, J. Wm.**, 547 Pierce Building, St. Louis, Mo.
Nevada-Arizona Mines Company.
- Shattuck, L. C.**, Bisbee, Ariz.
Denn Arizona Copper Company.
- Sherman, Le Roy B.**, 325 W. 14th Street, New York.
Bunker Hill Mining & Smelting Company.
- Shipman, A. B.**, De Kalb, Ill.
Atlas Mining & Milling Company.
- Shove, E. P.**, Colorado Springs, Colo.
Cresson Consolidated Mining & Milling Company.
- Sibley, Harper**, Sibley Building, Rochester, N. Y.
McKinley-Darragh-Savage Mines.

- Smith, A. G.**, Clinton, Ia.
Trojan Mining Company.
- Smith, W. T.**, Sellwood Block, Duluth, Minn.
Marsh Consolidated Mines Company.
- Son, F. P.**, 85 Devonshire Street, Boston, Mass.
East Butte Copper Mining Company.
- Stegman, J. H.**, 925 Bloomfield Street, Hoboken, N. J.
New Jersey Mines Company.
- Steifer, S. M.**, Coutelenc, Butte Co., Calif.
P. B. Steifer Mining Company.
- Stevenson, D. S.**, Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Swinborne, C. C.**, Daly Bank, Butte, Mont.
Barnes-King Development Company.
- Thomas, S. B.**, 115 Broadway, New York.
Alaska Industrial Company.
- Thompson, J. D.**, 10 Wall Street, New York.
Tri-Bullion Smelting & Development Company.
- Thompson, Wm. D.**, Racine, Wis.
Black Diamond Copper Mining Company.
- Tobin, R. F.**, Denver, Colo.
Pioneer Consolidated Mines Company.
- Tolman, Henry**, Newton, Mass.
Algomah Mining Company.
Corbin Copper Company.
Franklin Mining Company.
Indiana Mining Company.
Rhode Island Copper Company.
North Lake Mining Company.
- Tremain, H. E.**, 810 Lumsden Building, Toronto, Ont., Can.
Temiskaming Mining Company.
- Trousdale, W. J.**, Newton, Mass.
Keystone Copper Company.
- Twigg, V. A.**, Lovelock, Nev.
Willard Mines Company.
- Twight, E. H.**, Ontario, Calif.
Trinidad Mining & Smelting Company.
- Utt, J. H.**, 22 S. California Street, Stockton, Calif.
Jamestown Exploration Company.
- Vanderslice, H.**, 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Wallace, L. L.**, Oatman, Ariz.
Times Mining Company.
- Waterman, J. A.**, Elgin, Ill.
El Orito Mining & Milling Company.
- Watkins, H. J.**, So. Boston, Va.
Kay Mine Smelting Company.
- Weed, W. H.**, Columbia Building, 29 Broadway, New York.
Crystal Copper Company.
- Wegener, J. J.**, 322 W. Park Street, Anaconda, Mont.
Butte & Anaconda Consolidated Mining & Milling Company.
- Weldon, G. A.**, Palouse, Wash.
Merger Mining Company, Limited.

- Wentworth, H. A.**, 60 India Street, Boston, Mass.
 Mt. Champion Mining Company.
Williams, Lombard, 40 Central Street, Boston, Mass.
 Boston Mine Leasing Company.
Williams, Thos., 952 S. & E. Building, Denver, Colo.
 West Mexico Mines Company.
Willis, G. F., Yerington, Nev.
 Yerington Mines & Exploration Company.
Wilson, C., Los Angeles, Calif.
 Manhattan Big Four Mining Company.
Withers, E. E., 122 W. 2nd Street, Pueblo, Colo.
 Equity Creede Mining Company.

Young, E. M., Phoenix, Ariz.
 Young Mines Company, Limited.
Young, C. H., Clinton, Ia.
 Great Western Copper Company.

Zabriskie, C. B., 100 William Street, New York.
 Halifax Tonopah Mining Company.

DIRECTORS OF MINING COMPANIES

- Abbott, Wm. W.**, 430 Washington Street, Philadelphia, Pa.
 San Toy Mining Company.
Adams, J. H., El Paso, Ill.
 Boston-American Mining Company.
Agassiz, R. L., 14 Ashburton Place, Boston, Mass.
 Smuggler Union Mining Company.
Aldrich, Sherwood, 25 Broad Street, New York, N. Y.
 Alaska Gold Mines Company.
 Chino Copper Company.
Alexander, J. S., 223 4th Avenue, Pittsburgh, Pa.
 Pittsburg-Idaho Company, Limited.
Alger, J. Z., Enterprise, Utah.
 Bull Valley-Hassiampie Gold Mining Company.
Allan, A. A., Allan Steamship Company, Montreal, Canada.
 Dominion Reduction Company.
Allen, J. E., 85 Devonshire Street, Boston, Mass.
 Crystal Copper Company.
Allen, R. E., Provo, Utah.
 Dragon Consolidated Mining Company.
 Iron Blossom Consolidated Mining Company.
Allen, W. R., 35 Congress Street, Boston, Mass., and Butte, Mont.
 Butte & Anaconda Consolidated Mining & Milling Company.
Alsop, J. D., Goldstrike, Utah.
 Bull Valley-Hassiampie Gold Mining Company.
Altmiller, Chas. H., 50 Congress Street, Boston, Mass.
 Old Dominion Company (treas.).
 Old Dominion Mining & Smelting Company.
Ames, F. Lathrop, 96 Ames Building, Boston, Mass.
 Alaska Gold Mines Company.
 Butte & Superior Mining Company.

- Ames, J. L., 96 Ames Building, Boston, Mass.
Calaveras Copper Company.
- Ames, J. S., 96 Ames Building, Boston, Mass.
Calaveras Copper Company.
- Ames, Oliver, 96 Ames Building, Boston, Mass.
Calaveras Copper Company.
- Ames, Ward, Jr., Duluth, Minn.
Keating Gold Mining Company.
- Anderson, A. M., Hawick, Minn.
Copper State Mining Company.
- Anderson, J. H., 20 Exchange Place, New York.
United Verde Copper Company.
- Anderson, V. C., Brewster, Minn.
Dry Canyon Consolidated Mining Company.
- Anderson, W. B., Houghton, Mich.
New Arcadian Copper Company.
- Andrews, Chas. A., 100 Summer Street, Boston, Mass.
Pike Hill Mines, Incorporated.
- Archibald, W. M., Trail, B. C.
Cork-Province Mines, Limited.
- Armstrong, H. W., East Pittsburgh, Pa.
Alaska Consolidated Mining & Smelting Company.
- Argall, J. C., Peyton Building, Spokane, Wash.
Hecla Copper-Silver Mining Company, Limited.
- Atwater, A. B., Helena, Mont.
Hugo Gold & Copper Mining Company.
- Atwell, D. R., 607 Hudson Street, Hoboken, N. J.
New Jersey Mines Company.
- Aubury, Lewis E., Rialto Building, San Francisco, Calif.
R. B. Todd Mining Company.
- Avery, Amos W., 1123 Broadway, New York, N. Y.
Bunker Hill Mining & Smelting Company.
- Avery, Chas. F., Berkeley, Calif.
Calumet & Jerome Copper Company.
- Avery, J. W., Jerome, Ariz.
Calumet & Jerome Copper Company.
- Ayer, Fred, 171 Milk Street, Boston, Mass.
U. S. Smelting, Refining & Mining Company.
- Ayer, Harry L., 8 Hawley Street, Boston, Mass.
Utah Metal Mining Company.
- Babcock, H. H., 223 Broadway, New York, N. Y.
New York & Honduras Rosario Mining Company.
- Babbitt, K. R., 25 Broad Street, New York, N. Y.
Chino Copper Company.
Utah Copper Company.
- Bacon, Elliot C., 56 Park Avenue, New York, N. Y.
Kennecott Copper Corporation.
- Bahnsen, J. P., Helena, Mont.
Helena Mining Bureau, Incorporated.
- Bailey, A. H., Winthrop, Me.
Boston Idaho Mining Company.
- Bailey, F. W., Denver, Colo.
El Paso Consolidated Gold Mining Company.
- Baillie, C. M., Mullan, Ida.
Pandora Copper Mining Company, Limited.

- Baldwin, A. J.**, Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Baldwin, Dudley**, 814 Williams Building, Cleveland, O.
Montana Tonopah Mines Company.
- Baldwin, C. O.**, Duluth, Minn.
Butte & Zenith City Mining Company.
- Baldwin, N. O.**, Pomeroy, Wash.
Methow Gold & Copper Mining Company.
- Bamberger, J. E.**
Braden Copper Company.
Braden Copper Mines Company.
- Banks, J. H.**, 61 Broadway, New York, N. Y.
Southern Zinc & Mining Company (cons. engr.).
- Banning, A. T., Jr.**, Duluth, Minn.
Keating Gold Mining Company.
- Barbee, R. S.**, Chillicothe, O.
Ohio Mines Company.
- Bard, D. C.**, Juneau, Alaska.
Alaska Gold Belt Mining Company.
- Bardon, Thos.**, Ashland, Wis.
Denn-Arizona Copper Company.
- Barker, Dr. O. M.**, Morris, Ill.
Providence Extension Gold Mining Company.
- Barnes, Howell H.**, 66 Broadway, New York, N. Y.
Tri-Bullion Smelting & Development Company.
- Barnett, B. N.**, Mullan, Ida.
Northern Light Mining & Milling Company.
- Barnhart, W. H.**, Johnstown, Pa.
Camp Bird Mining, Light & Power Company.
- Barre, J. W.**, Louisiana, Mo.
Evergreen Mines Company.
- Barrett, Jas.**, 229 S. W. Temple Street, Salt Lake City, Utah.
Progressive Mining Company.
- Barry, Edmund W.**, Boise, Ida.
Lucky Boy Gold Mining Company.
- Barry, John**, 20 Copthall Ave., London, E. C., England.
Plymouth Consolidated Gold Mines, Limited.
- Barstow, R. L.**, 70 State Street, Boston, Mass.
Old Colony Copper Company.
- Bartlett, A. M.**, 82 Devonshire Street, Boston, Mass.
Champion Copper Company.
- Bartlett, Stephen L.**, 68 India Street, Boston, Mass.
United States Smelting, Refining & Mining Company.
- Bartholomew, W. F.**, 50 Congress Street, Boston, Mass.
Ray Hercules Copper Company.
- Batchelder, F. W.**, Weston, Mass.
Richmond-Eureka Mining Company.
Wisconsin Zinc Company.
- Bayley, Edw. B.**, 134 Marlboro Street, Boston, Mass.
United States Smelting, Refining & Mining Company.
- Beach, S. H.**, 405 Cheyenne Road, Colorado Springs, Colo.
Hardscrabble Mining Company.
- Beale, Edw. F.**, Lafayette Building, Philadelphia, Pa.
National Lead Company.

- Beatty, A. C.**, 25 Broad Street, New York, N. Y.
Chino Copper Company.
Ray Consolidated Copper Company.
- Beck, L. M.**, Fort. Wayne, Ind.
American Mines Company.
- Beck, O. G.**, Helena, Mont.
Helena Mining Bureau, Incorporated.
- Beckstead, Alex.**, Midvale, Utah.
Beaver Mines Company.
- Beckwith, J. W.**, Farmer City, Ill.
Butte & Zenith Falls Mining Company.
- Beebe, Junius**, 96 Bay State Road, Boston, Mass.
Alvarado Mining & Milling Company.
- Beers, F. H.**, Middletown, N. Y.
Gold Bonds Consolidated Mines Company.
- Behe, S. D.**, Lockport, N. Y.
New Jersey Mines Company.
- Belcher, Wm. M.**, 32 Broadway, New York, N. Y.
% Quincy Mining Company.
- Bell, Samuel, Jr.**, 572 Bullitt Building, Philadelphia, Pa.
Eden Mining Company.
Tonopah Mining Company of Nevada.
- Bendelari, A. E.**, 812 Hippodrome Building, Cleveland, Ohio.
Underwriters Land Company.
- Benedict, Edw.**, 131 W. 35th Street, New York, N. Y.
Pioneer Mining & Smelting Company.
- Bennett, R. M.**, 907 Metropolitan Life Building, Minneapolis, Minn.
Helvetia Copper Company.
- Bennett, W. E.**, 32 Broadway, New York, N. Y.
% Federal Mining & Smelting Company.
- Bennett, W. H.**, Chattanooga, Tenn.
Cascadia Mining & Development Company.
- Bensinger, F. L.**, Franklin, Pa.
Cashier Gold Mining & Reduction Company.
- Bermont, Geo. E.**, Lafayette, Colo.
Vulcan Mines & Smelter.
- Bernard, Geo.**, Rocky Ford, Colo.
Elkton Consolidated Mining & Milling Company.
- Berry, H. W.**, 84 State Street, Boston, Mass.
Druid Gold Mining Company.
- Berryhill, Jas. G., Jr.**, Des Moines, Ia.
Nevada-Douglas Consolidated Copper Company.
- Best, C. M.**, Perkins, Calif.
Ruby King Mineral Paint Company.
- Bettes, H. S.**, Paris, Tex.
Copper Queen Gold Mining Company.
- Bickell, J. P.**, 1428 Traders Bank Building, Toronto, Canada.
% McIntyre Extension Mines, Limited.
McIntyre Porcupine Mines, Limited.
- Bigelow, Albert S.**, 309 Sears Building, Boston, Mass.
St. Mary's Mineral Land Company.
- Billberg, Henry**, Mullan, Ida.
Carney Copper Co., Ltd.
Copper King Mining & Smelting Company.
- Bishop, F. J.**, Brantford, Canada.
Coniagas Mines, Limited.

- Bishop, Jas. L.**, 14 Wall Street, New York, N. Y.
Quincy Mining Company.
- Black, W. A.**, Montreal, Canada.
La Rose Consolidated Mines Company.
- Blakeslee, L. A.**, Reno, Nev.
Cash Boy Consolidated Mining Company.
- Blevin, S.**, 25 Broad Street, New York, N. Y.
Arizona Copper Belt Mining Company.
- Blewett, Ben.**, St. Louis, Mo.
St. Joseph Lead Company.
- Bliss, M. A.**, Jamestown, Pa.
Cashier Gold Mining & Reduction Company.
- Bliss, Walter P.**, 71 Broadway, New York, N. Y.
Quincy Mining Company.
- Blodgett, John H.**, 390 Commonwealth Avenue, Boston, Mass.
Atlantic Mining Company.
- Bloodidge, E.**, Maiden, Mont.
St. Paul Montana Mining Company.
- Blumenthal, L. L.**, Tonopah, Nev.
Tonopah 76 Consolidated Mining Company.
- Boettcher, Gust**, Kalispell, Mont.
Lupfer Mining Company.
- Bolam, R. S.**, Winnemucca, Nev.
Eastern Star Mining Company.
- Bole, B. P.**, Cleveland, O.
American Zinc, Lead & Smelting Company.
- Booher, W. W.**, Elko, Nev.
Nevada-Bunker Hill Mining Company.
- Booth, A. L.**, Provo, Utah.
Tintic Delmar Mining Company.
- Booth, C. J.**, Bridge Street, Ottawa, Ont.
Right of Way Mines, Limited.
- Booth, Chas.**, Minneapolis, Minn.
Hill City Mining & Development Company.
- Booth, Ralph**, Baggs, Wyo.
Big Five Copper Company.
- Borden, Sir Fred'k W.**, Ottawa, Canada.
Boston & Montana Development Company.
- Bouchard, J. J.**, St. Maries, Ida.
Iron Mask Mining Company.
- Boutin, Frank**, Duluth, Minn.
Butte Ballaklava Copper Company.
- Bowley, Jno. H.**, Bath, N. Y.
Snow Creek Mining Company.
- Bowman, J. E.**, 1123 Broadway, New York, N. Y.
% Bunker Hill Mining & Smelting Company.
- Braden, William**, Santiago, Chile.
Braden Copper Company.
Braden Copper Mines Company.
- Bradley, Robert S.**, 411 Commonwealth Avenue, Boston, Mass.
United States Smelting, Refining & Mining Company.
- Bradley, Wm. M.**, 105 S. E. Temple Street, Salt Lake City, Utah.
Daly Judge Mining Company.
- Brady, Nicholas F.**, 54 Wall Street, New York, N. Y.
Anaconda Copper Mining Company.

- Brandegge, E. N.**, Helena, Mont.
Helena Mining Bureau, Incorporated.
- Brandenburg, Clarence A.**, 850 Equitable Building, Denver, Colo.
Marion Mines & Mills Company.
- Brassman, W. G.**, Columbus, Ohio.
Ohio Mines Company.
- Breuer, Clifford M.**, Medford, Mass.
Utah Apex Mining Company.
- Brinkman, Christ**, Clarence, Iowa.
Hartwig Mining Company.
- Broad, J. C.**, 2620 College Avenue, Spokane, Wash.
Snowstorm Mining Company.
- Broderick, Hugh**, Townsend, Mont.
Montana-Radersburg Mining Company.
- Brodie, W. M.**, 50 Broad Street, New York, N. Y.
Batopilas Mining Company.
- Bronson, A. E.**, Wallace, Idaho.
Rainbow Mining & Milling Company, Limited.
- Brooker, Chas. F.**, 195 Broadway, New York, N. Y.
United States Smelting, Refining & Mining Company.
- Brooks, E. W.**, 723 Title Insurance Building, Los Angeles, Calif.
London Arizona Copper Company.
- Brougher, H. C.**, 6150 Harwood Avenue, Oakland, Calif.
Belmont Milling Company.
- Brougher, W.**, 6145 Harwood Avenue, Oakland, Calif.
Tonopah Midway Consolidated Mining Company.
- Bronzell, E. M.**, Rockford, Ill.
Antelope Springs Mining Company.
- Brouse, W. H.**, Toronto, Ont.
Nipissing Mines Company.
- Brown, C. B.**, 141 Broadway, New York, N. Y.
Tri-Bullion Smelting & Development Company.
- Brown, E. P.**, Newton, Mass.
American Zinc, Lead & Smelting Company.
- Brown, Geo. S.**, Reno, Nev.
Nevada Bunker Hill Mining Company.
- Brown, H. H.**, Tonopah, Nev.
Montana-Tonopah Mines Company.
- Brown, Jas. E.**, Pittsburgh, Pa.
San Toy Mining Company.
- Brown, John G.**, Helena, Mont.
Boston & Montana Development Company.
- Brown, J. H.**, Box 1228, Salt Lake City, Utah.
% Victor Consolidated Mining Company.
- Brown, J. J.**, Denver, Colo.
Ibex Mining Company.
- Brown, R. R.**, Pittsburgh, Pa.
San Toy Mining Company.
- Brown, W. E.**, Rhinelander, Wis.
Hahns Peak Gold Mining & Milling Company.
- Brownell, F. H.**, Seattle, Wash.
Federal Mining & Smelting Company.
- Browning, M. S.**, 40 Cedar Street, New York, N. Y.
% Amalgamated Pioche Mining & Smelting Corporation.
- Bruining, H. E.**, Garfield, N. J.
Madera Mining Company.

- Brundage, M. J.**, Bath, N. Y.
Seven Devils Copper Company.
- Brush, Edw.**, 120 Broadway, New York; N. Y.
Federal Mining & Smelting Company.
- Bryson, S. C.**, St. George, Utah.
Bull Valley-Hassiampie Gold Mining Company.
- Buchanan, J. C.**, Fort Worth, Tex.
Hobson Silver Lead Company.
- Buchanan, W. A.**, Ymir, B. C.
Hobson Silver Lead Company.
- Buck, C. S.**, Colorado Springs, Colo.
Nellie Mining Company.
- Bucknam, C.**, 115 Broadway, New York, N. Y.
% Kenefick Zinc Corporation.
- Bulkley, F. H.**, 850 Equitable Building, Denver, Colo.
Marion Mines & Mills Company.
- Bunnell, Milie**, Duluth News-Tribune, Duluth, Minn.
Butte Ballaklava Copper Company.
- Bunnell, T. W.**, 1416 Madison Avenue, Toledo, Ohio.
Philadelphia Mines Company.
- Burbridge, T. B.**, Denver, Colo.
Cresson Consolidated Mining & Milling Company.
- Burch, Albert**, 1022 Crocker Building, San Francisco, Calif.
Mercury Mining Company.
- Burch, H. Kenyon**, Sierra Madre Club, Los Angeles, Calif.
United Verde Extension Copper Company.
- Burdick, Arthur Charlton**, Victoria, B. C.
Slocan Star Mines, Limited.
- Burg, Frank**, Platteville, Wis.
Wisconsin Zinc Company.
- Burke, Chas. H.**, 20 Broad Street, New York, N. Y.
New Dominion Copper Company.
Canada Copper Corporation, Limited.
- Burke, W. A.**, Denver, Colo.
American Mines Company.
- Burmeister, Wm.**, 510 Odd Fellows Building, St. Louis, Mo.
% Nevada Arizona Mines Company.
- Burnett, Wm.**, 10 No. New Jersey Street, Indianapolis, Ind.
German Copper Company.
- Burnett, W. A.**, 27 Kilby St., Boston, Mass.
Silver Comet Mining Company.
- Burns, E. Z.**, 25 Madison Avenue, New York, N. Y.
Rawley Mining Company.
- Burns, Geo. J.**, Youngstown, Ohio.
Western Reserve Mining Company.
- Burt, A.**, Finsbury Pavement House, London, E. C., England.
Kirkland Lake Prop., Limited.
- Burton, Hiram M.**, 19 Milk Street, Boston, Mass.
Utah Apex Mining Company.
- Burton, W. J.**, 31 S. 7 E Street, Salt Lake City, Utah.
Utah Arizona Gold & Copper Mining Company.
- Bushnell, Clarence M.**, Buffalo, N. Y.
McIntyre Extension Mines, Limited.
- Bylin, A. G.**, Norton, N. Dak.
British American Mining Company.

- Byrne, H. B.**, Butte, Mont.
 Corbin Copper Company.
- Bywaters, J. K.**, Paris, Tex.
 Copper Queen Gold Mining Company.
- Cabanis, E. M.**, 104 1st Street W., Jersey City, N. J.
 New Jersey Mines Company.
- Caddel, Arthur**, Mangum, Okla.
 C. & O. Mining & Milling Company.
- Caldwell, C. R.**, Paris, Tex.
 Copper Queen Gold Mining Company.
- Calhoun, D. A.**, Portland, Me.
 Boston Idaho Mining Company.
- Callahan, Jas. F.**, Wallace, Idaho.
 Consolidated Interstate Callahan Mining Company.
- Calverley, W. D.**, Houghton, Mich.
 Copper Range Railroad Company.
- Calvert, W. R.**, Kesler Apartments, Salt Lake City, Utah.
 Mascot Mining & Milling Company, Limited, of Idaho.
- Campbell, B. H.**, Elizabeth, N. J.
 Tonopah Extension Mining Company.
- Campbell, H. E.**, Flagstaff, Ariz.
 Jerome Oatman Mining Company.
- Campbell, Kenneth**, Jackson, Mont.
 % Saginaw Copper Company.
- Cardow, J. H.**, Providence, R. I.
 Crystal Copper Company.
- Carey, T. A.**, Washington, D. C.
 Porcupine Vipond Mines, Limited.
- Carlson, Gust.**, Duluth, Minn.
 Consolidated Interstate Callahan Mining Company.
- Carlton, A. E.**, Cripple Creek, Colo.
 El Paso Consolidated Gold Mining Company.
 Elkton Consolidated Mining & Milling Company.
- Carpenter, S. S.**, 80 Berkeley Street, Boston, Mass.
 Butte-Central Mining & Milling Company.
- Carr, Saml.**, 96 Ames Building, Boston, Mass.
 Calaveras Copper Company.
- Carrick, D. A.**, 44 Cummings Road, Brookline, Mass.
 Massachusetts Consolidated Mining Company.
- Carroll, Fred**, Denver, Colo.
 Atlas Mining & Milling Company.
- Carson, J. I.**, Washington, Pa.
 German Copper Company.
- Carson, J. W.**, 603 Dominion Express Building, Montreal, Ont.
 Porcupine Crown Mines, Limited.
- Carter, Fred M.**, 900 W. 18th Street, Chicago, Ill.
 National Lead Company.
- Catlin, D. K.**, St. Louis, Mo.
 St. Joseph Lead Company.
- Cavell, W. H.**, Carson City, Nev.
 Shasta Belmont Mining Company.
- Chadbourne, T. L., Jr.**, 14 Wall Street, New York City.
 Ahmeek Mining Company.
- Chamberlain, C. W.**, St. Louis, Mo.
 Down Town Mines Company.

- Chamberlain, H. M.**, Mecklenburg Apartments, Salt Lake City, Utah.
Cedar Talisman Consolidated Mines Company.
- Chaney, H. E.**, Missoula, Mont.
Snowstorm Mining Company.
- Channing, J. Parke**, 61 Broadway, New York, N. Y.
Kerr Lake Mining Company.
- Chapman, R. B.**, Los Angeles, Calif.
Boss Gold Mining Company.
- Chase, Sidney**, 42 Broadway, New York, N. Y.
Utah Consolidated Mining Company.
- Cheney, B. P.**, 723 Title Insurance Building, Los Angeles, Calif.
London Arizona Copper Company.
- Chesterton, A. W.**, 64 India Street, Boston, Mass.
Bingham Mines Company.
Victoria Copper Mining Company.
- Childs, G. H.**, Pittsburgh, Pa.
Hussey Howe Mining Company.
- Chipman, Jas., Jr.**, American Fork, Utah.
Pacific Gold Mining & Milling Company.
- Chisholm, J. D.**, Wardner, Idaho.
Florence Mining & Milling Company, Limited.
- Christensen, E. T.**, 1123 Broadway, New York, N. Y.
Bunker Hill Mining & Smelting Company.
- Church, G. H.**, 55 Wall Street, New York, N. Y.
Anaconda Copper Mining Company.
- Churchill, J. W.**, Osawatomie, Kans.
Plata-Fina Mining & Development Company.
- Clapp, Gilmer**, 94 Ames Building, Boston, Mass.
Calaveras Copper Company.
- Clapp, R. E.**, 608 Newhouse Building, Salt Lake City, Utah.
Goldstrike Consolidated Mining Company.
- Clark, B. P.**, 55 Kilby Street, Boston, Mass., and Cohasset, Mass.
United States Smelting, Refining & Mining Company.
Centennial-Eureka Mining Company.
United States Smelting Company.
- Clark, E. A.**, Marion, Mass.
Alaska Gold Mines Company.
Wisconsin Zinc Company.
American Zinc, Lead & Smelting Company.
- Clark, Geo.**, 161 Summer Street, Boston, Mass.
Standard Amalgamated Exploration Corporation.
- Clark, L. A.**, Columbus, Ohio.
Hermosillo Copper Company.
- Clark, P. W.**, Spokane, Wash.
Butte Bullwhacker Mining Company.
- Clark, Richard A.**, % Hearst Estate, Hearst Building, San Francisco, Calif.
Homestake Mining Company.
- Clark, W. A.**, 20 Exchange Place, New York.
United Verde Copper Company.
- Clark, W. Y.**, 203½ S. Howard Street, Spokane, Wash.
Nabob Mining Company.
- Clarke, Samuel J.**, 120 Broadway, New York, N. Y.
% Kennecott Copper Corporation.
- Clarkson, Geo. E.**, 156 Ruthven Street, Boston, Mass.
Mayflower Mining Company.

- Clarkson, Gen. Jas. S., Tarrytown, N. Y.
Manhattan Exploration Company.
- Clement, G. W., 275 Warren Street, Roxbury, Mass.
Crystal Copper Company.
- Clendenin, Jos., 120 Broadway, New York, N. Y.
% American Smelting & Refining Company.
- Cleveland, R. A., Glenwood City, Wis.
Wisconsin Montana Mining Company.
- Clipsham, W. H., Excelsior Life Building, Toronto, Ont.
Wettlaufer Lorrain Silver Mines, Limited.
- Cloman, S. A., % Bankers Trust Company, 14 Wall Street, New York, N. Y.
Butters Divisadero Company.
- Cochran, Thos., 120 Broadway, New York, N. Y.
Kennecott Copper Corporation.
- Cohan, Jesse, Butte, Mont.
Butte & Great Falls Mining Company.
- Cole, Thos. F., Duluth, Minn., and 120 Broadway, New York.
Inspiration Consolidated Copper Company.
Consolidated Coppermines Company.
Sierra Consolidated Mines Company.
Calumet Arizona Mining Company.
- Colgate, R. R., 111 Broadway, New York, N. Y.
National Lead Company.
- Collins, C. H., % Toledo Scale Company, Toronto, Ont.
Calumet & Montana Consolidated Mining Company.
- Collins, G. E., 420 Boston Building, Denver, Colo.
Druid Gold Mining Company.
- Collom, F. L., Lawson, Colo.
% Little Giant Gold Mining & Milling Company.
- Conant, D. S., Bradford, Vt.
Pike Hill Mines, Incorporated.
- Congdon, C. A., Alworth Building, Duluth, Minn.
Hedley Gold Mining Company.
North Butte Mining Company.
Greene Cananea Copper Company.
Calumet & Arizona Mining Company.
- Congdon, E. A., Tucson, Ariz.
Sterling Copper Company.
- Connell, J. A., Colorado Springs, Colo.
Elkton Consolidated Mining & Milling Company.
- Connolly, T. L., Alamosa, Colo.
Tepee Mining & Development Company.
- Constable, C. A., Erie, Pa.
Calhoun Consolidated Mines Company.
- Converse, Edmund C., 14 Wall Street, New York, N. Y.
Inspiration Consolidated Copper Company.
- Cookson, C. L., 3639 Harrison Boulevard, Kansas City, Mo.
Mansfield Mining & Smelting Company.
- Coolidge, William H., Manchester, Mass.
Wisconsin Zinc Company.
Alaska Gold Mines Company.
- Coors, A., Golden, Colo.
Seoul Mining Company.
- Corbiere, J. K., 25 Broad Street, New York, N. Y.
% El Paso Consolidated Gold Mining Company.

- Corey, William E.**, 14 Wall Street, New York, N. Y.
Greene Cananea Copper Company.
Calumet & Arizona Mining Company.
Hedley Gold Mining Company.
Inspiration Consolidated Copper Company.
- Corliss, Chas. A.**, 131 Hudson Street, New York, N. Y.
Inspiration Consolidated Copper Company.
Magma Copper Company.
- Corry, W. H.**, 408 State Street, Salt Lake City, Utah.
Silver Peak Mining Company.
- Corwin, G. H.**, Greenport, L. I.
Pioneer Mining & Smelting Company.
- Cotton, Jos. B.**, Alworth Bldg., Duluth, Minn., & 120 Broadway, New York
Greene-Cananea Copper Company.
- Coulson, Duncan**, Toronto, Ont.
La Rose Consolidated Mines Company.
- Cowles, Russel**, 115 Broadway, New York, N. Y.
Kenefick Zinc Corporation.
- Cox, F. A.**, Yerington, Nev.
Smith Valley Mines Company.
- Cox, John L.**, % Rawley Mining Company, 1235 Spruce St., Philadelphia, Pa
Kimberly Consolidated Mines Company.
- Cox, W. S.**, Silver City, N. Mex.
Pinos Altos Mining & Milling Company.
- Crafts, J. M.**, 111 Commonwealth Avenue, Boston, Mass.
Smuggler Union Mining Company.
- Craig, C. W.**, 413 Fletcher Trust Building, Indianapolis, Ind.
Frontier Mining Company.
- Craig, Daniel**, Pasadena, Calif.
Eastern Star Mining Company.
- Craig, J. L.**, % O. S. L. Railroad, Salt Lake City, Utah.
Pacific Gold Mining & Milling Company.
- Cramer, William**, Dunlap, Ill.
Yerington Mines & Exploration Company.
- Crawford, J. W.**, Los Angeles, Calif.
Paramount Mines Company.
- Crismon, C. C.**, 229 S. W. Temple Street, Salt Lake City, Utah.
Progressive Mining Company.
- Critchlow, E. B.**, McCornick Building, Salt Lake City, Utah.
Big Four Exploration Company.
- Critchlow, J. S.**, 32 Broadway, New York, N. Y.
Ontario Silver Mining Company.
- Crompton, George**, Worcester, Mass.
New Planet Copper Mining Company.
- Crundall, H. B.**, 14 Wall Street, New York, N. Y.
Buffalo Mines, Limited.
- Cummings, D. W.**, 2131 So. 9th East Street, Salt Lake City, Utah.
Monetaire Mining Company.
- Cunningham, Alex.**, American Forks, Utah.
Plentiful Mining & Milling Company.
- Currier, R. M.**, 79 Milk Street, Boston, Mass.
Batopilas Mining Company.
- Curtis, Dr. Foster J.**, 222 W. Temple Street, Salt Lake City, Utah.
Nevada-Douglas Consolidated Copper Company.
- Curtis, L. H.**, 977 1st Avenue, Salt Lake City, Utah.
Nevada-Douglas Consolidated Copper Company.

- Curtis, S. P.**, W. Washington Square, Philadelphia, Pa.
Kimberly Consolidated Mines Company.
- Curtis, W. H.**, Osseo, Minn.
Minneapolis & Texada Copperite Company, Limited.
- Cutler, H. C.**, Reno, Nev.
Louisiana Consolidated Mining Company.
- Cutter, M. B.**, 512 Bullitt Building, Philadelphia, Pa.
Tonopah Belmont Development Company.
Belmont Milling Company.
- Dailey, A. E.**, Wickes, Mont.
Dailey Copper Mining & Smelting Company.
- Dailey, A. J.**, Wickes, Mont.
Dailey Copper Mining & Smelting Company.
- Dalton, C. E.**, Helena, Mont.
Helena Mining Bureau, Incorporated.
- Daly, Marcus**, 61 Broadway, N. Y.
Hedley Gold Mining Company.
- Damshey, T. C.**, Goldfield, Nev.
Diamondfield Black Butte Reorganized Mining Company.
- Daniel, C. A.**, 629 Market Street, Philadelphia, Pa.
Nevada Wonder Mining Company.
Eden Mining Company.
Tonopah Mining Company of Nevada.
- D'Arcy, A. I.**, Goldfield, Nev.
Jumbo Extension Mining Company.
- Daughtrey, W. L.**, Johnstown, Pa.
Camp Bird Mining, Leasing & Power Company.
- D'Autremont, Jr.**, Chas., 1400 Alworth Building, Duluth, Minn.
Calumet & Arizona Mining Company.
Sierra Consolidated Mines Company.
North Butte Mining Company.
- Davidson, C. L.**, Wichita, Kan.
Arizona-Southwestern Copper Company.
- Davies, R. J.**, Idaho Springs, Colo.
Old Town Mining, Milling & Transportation Company.
- Davis, Geo. E.**, 80 Walnut Street, Boston, Mass.
South Lake Mining Company.
- Davis, H. W.**, Wilmington, Del.
Taos Mining Company.
Butte-Central Mining & Milling Company.
General Development Company.
- Davis, W. W.**, Marbridge Bldg., 34th St. & Broad'y., N. Y., & Leadville, Colo.
Ibex Mining Company.
- Day, H. L.**, Wallace National Bank Building, Wallace, Idaho.
Federal Mining & Smelting Company.
- Day, W. P.**, Peoria, Ill.
Ophir Range Gold Mining Company.
- Dear, R. L.**, Lawson, Colo.
Little Giant Gold Mining & Milling Company.
- DeCor, C. A.**, Sacramento, Calif.
Ruby King Mineral Paint Company.
- Dee, Thos. S.**, 82 Devonshire Street, Boston, Mass.
Baltic Mining Company.
Copper Range Railroad Company.

- DeForest, H. W., 30 Broad Street, New York, N. Y.
Golden Reward Consolidated Gold Mining & Milling Company.
- Deitch, G. A., Indianapolis, Ind.
San Toy Mining Company.
- De La Hunt, Walter, Willmar, Minn.
Copper State Mining Company.
- Dennis, H. V. M., Jr., 140 Nassau Street, New York, N. Y.
Tri-Bullion Smelting & Development Company.
- Denton, F. W., Painesdale, Mich.
Champion Copper Company.
Trimountain Mining Company.
Copper Range Railroad Company.
Mohawk Mining Company.
- Deachler, S. C., 413 Fletcher Trust Building, Indianapolis, Ind.
Frontier Mining Company.
- Dealge, F., St. Louis, Mo.
St. Joseph Lead Company.
- DeSteigure, Chas., 211 American Bank Building, Seattle, Wash.
Ellamar Mining Company.
- D'Esterre, Wm. H., 292 St. Johns Place, Brooklyn, N. Y.
Portland Consolidated Copper Company.
- DeValley, J. A., 90 P Street, Salt Lake City, Utah.
Copper Shield Mining Company.
- Devereaux, Chas. J., 32 Broadway, New York, N. Y.
Quincy Mining Company.
- Devereux, W. B., 60 Broadway, New York, N. Y.
Golden Reward Consolidated Gold Mining & Milling Company.
- Devine, Robert, San Fernando Road, Los Angeles, Calif.
Vivian Mining Company.
- DeWitt, Edw., 88 Nassau Street, New York, N. Y.
Golden Reward Consolidated Gold Mining & Milling Company.
- Dick, J. C., P. O. Box 1418, Salt Lake City, Utah.
North Mountain Mining Company.
- Dickerman, A. L., 708 Sears Building, Boston, Mass.
Mayflower Mining Company.
- Diehl, Geo., Denver, Colo.
Calhoun Consolidated Mines Company.
- Diehl, L. G., Butte, Mont.
Butte & Great Falls Mining Company.
- Dillingham, Frank A., 62 Cedar Street, New York, N. Y.
Consolidated Arizona Smelting Company.
- Dillworth, Jos., Pittsburgh, Pa.
San Toy Mining Company.
- Dixon, R. V., Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Dobell, W. M., Quebec, P. Q.
La Rose Consolidated Mines Company.
- Dodds, H. G., Palo Alto, Calif.
Union Consolidated Mining Company.
- Dodge, C. H., 99 John Street, New York, N. Y.
United Globe Mines.
Old Dominion Company.
- Dorman, Orris, Fidelity National Bank, Spokane, Wash.
Red Monarch Copper Mining Company.
- Dorsey, G. D., Montclair, N. J.
National Lead Company.

- Doughten, W. W., **Provident Building, Philadelphia, Pa.**
Warrior Copper Company.
- Douglas, George P., **827 1st Nat. Soc-Line Bldg., Minneapolis, Minn.**
Copper State Mining Company.
- Douglass, C. C., **705 Sears Building, Boston, Mass.**
Douglass Copper Company.
- Downing, W. M. (V. P.), **25 Broad Street, New York, N. Y.**
El Paso Consolidated Gold Mining Company.
- Druding, F. C., **32 Broadway, New York, N. Y.**
Federal Mining & Smelting Company.
- Druehl, F. A., **411 Felt Building, Salt Lake City, Utah**
Old Susan Mining Company.
- Drury, F. A., **Worcester, Mass.**
Batopilas Mining Company.
- Dudley, C. H., **Colorado Springs, Colo.**
Ajax Gold Mining Company.
- Dumaresq, Herbert, **327 Commonwealth Avenue, Boston, Mass.**
Alvarado Mining & Milling Company.
- Duncanson, O. H., **1405 Chronicle Building, San Francisco, Calif.**
Nyman Consolidated Mines Company.
- Dunlop, Robert W., **Los Angeles, Calif.**
R. B. Todd Mining Company.
- Dunn, W. W., **St. Paul, Minn.**
Paragon Consolidated Mining Company.
- Dunstan, Jas. S., **42 Broadway, New York, N. Y.**
White Pine Extension Copper Company.
Michigan Copper Mining Company.
Mohawk Mining Company.
Wolverine Copper Mining Company.
- DuVal, H. C., **74 Broadway, New York, N. Y.**
Iron Silver Mining Company.
- Earl, Chas., **120 Broadway, New York, N. Y.**
American Smelting & Refining Company.
- Earle, E. P., **25 Broad Street, New York, N. Y.**
Granby Consolidated Mining, Smelting & Power Company, Limited.
Ray Hercules Copper Company.
- Earnest, H. J., **29 S. La Salle Street, Chicago, Ill.**
Northwest Mines Development Company.
- Easby, P. H., **115 Broadway, New York, N. Y.**
% Kenefick Zinc Corporation.
- Eaton, P. R., **Fitchburg, Mass.**
Terrible Dunderberg Mining Group & Power Company.
- Eccles, L. R., **Ogden, Utah.**
Big Four Exploration Company.
- Eccles, S. W., **120 Broadway, New York, N. Y.**
Kennecott Copper Corporation.
Utah Copper Company.
- Echols, C. M., **Milwaukee, Wis.**
McMillan Zinc Company.
- Edmunds, Jas. E., **222 D. F. Walker Building, Salt Lake City, Utah.**
% Utah-United Copper Company.
- Edwans, J. S., **Austin, Ore.**
Vincent Creek Gold & Copper Company.
- Edwards, Eugene, **Helena, Mont.**
Madden Scratch Gravel Mines Company.

- Edwards, H. C.**, McCornick Block, Salt Lake City, Utah.
South Hecla Mining Company.
- Edwards, Robert J.**, 60 Congress Street, Boston, Mass.
United States Smelting, Refining & Mining Company.
- Eggleston, S. M.**, 423 Caswell Block, Milwaukee, Wis.
Imperial Copper & Gold Mining Company.
- Ehrenberg, J.**, 909 Webster Ave., Chicago, Ill.
Calumet-New Mexico Mining Company.
- Eilers, Karl**, 120 Broadway, New York, N. Y.
American Smelting & Refining Company.
- Eisenmann, Carlos**, P. O. Box 1656, Mexico City, D. F., Mex.
Pacific Copper Company, Limited.
- Eklund, J. J.**, 609 First National Bank Building, Duluth, Minn.
Kamloops Copper Company.
- Elder, A. P.**, Ottawa, Kan.
Plata-Fina Mining & Development Company.
- Elkins, Luther**, 401 Mills Building, San Francisco, Calif.
Green Horn Mountain Copper Company.
- Ellenburger, A. W.**, % Warden Tool Co., Cleveland, O.
Amazon-Dixie Mining Company.
- Elliot, John**, 10 N. New Jersey Street, Vancouver, B. C.
Slocan Star Mines Company.
- Ellis, David A.**, 60 State Street, Boston, Mass.
Shannon Copper Company.
- Ellwood, W. L.**, 111 Broadway, New York, N. Y.
Mines Company of America.
- Elwarner, William**, 10 N. New Jersey Street, Indianapolis, Ind.
German Copper Company.
- Emerson, L. M.**, England, Ark.
Delta Consolidated Gold Mines Company.
- Engquist, A.**, Spokane, Wash.
Idaho Northern Mineral Company.
- Ennis, C. W.**, 309 S. Spring Street, Los Angeles, Calif.
Duplex Mining Company.
- Eppich, L. F.**, Ideal Building, Denver, Colo.
Mary Murphy Gold Mining Company.
- Erb, Newman** (Chairman), 42 Broadway, New York, N. Y.
British Columbia Copper Company, Limited.
Canada Copper Corporation, Limited.
- Erickson, Daniel**, St. Francis Hotel, Denver, Colo.
Crown Prince Consolidated Mines Company.
- Erwin, M. P.**, Lake Charles, La.
Azurite Mining Company.
- Estabrook, F. W.**, 201 Devonshire Street, Boston, Mass.
General Development Company.
Miami Copper Company.
- Evans, H. H.**, Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Evens, C. E.**, 609 First National Bank Building, Duluth, Minn.
Kamloops Copper Company.
- Everett, S. T.**, Houghton, Mich.
New Arcadian Copper Company.
- Ezekiel, James**, Kellogg, Ida.
Florence Mining & Milling Company.
- Fair, David**, 10 N. New Jersey Street, Indianapolis, Ind.
German Copper Company.

- Fairbanks, F. W.**, Tampa, Fla.
Smith Valley Mines Company.
- Fairbrother, James**, 26 Suffolk Place, Toronto.
Tommy Burns Gold Mining Company.
- Fant, John**, Lovelock, Nev.
Rochester Buck & Charley Mines Company.
- Fargo, Sherman**, 555 First Avenue, Salt Lake City, Utah.
Silver King Copper Mining Company.
- Farmer, W. B.**, Brookline, Mass.
Bingham-New Haven Copper & Gold Mining Company.
Utah Metal & Tunnel Company.
- Farnum, C. S.**, 77 Franklin Street, Boston, Mass.
Regal Mines Company.
- Farrington, J. S.**, 749 Elizabeth Street, Salt Lake City, Utah.
Creole Mining Company.
- Fasken, Alex**, 1428 Traders Bank Building, Toronto, Ont.
McIntyre Extension Mines, Limited.
Nipissing Mines Company.
- Fasken, David**, 1428 Traders Bank Building, Toronto, Ont., Can.
Nipissing Mines Company.
- Favier, F. C.**, Goldfield, Nev.
Reorganized Booth Mining Company of Goldfield.
- Fay, H. F.**, 70 State Street, Boston, Mass.
Mayflower Mining Company.
Lake Mining, Smelting & Refining Company.
- Fearing, George R., Jr.**, 168 Beacon Street, Boston, Mass.
Liberty Bell Smelting Company.
- Feeny, John L.**, 43 Exchange Place, New York, N. Y.
Nipissing Mines Company.
- Fehringer, Adolph**, P. O. Box 563, Colorado Springs, Colo.
Gold Sovereign Mining & Transportation Company.
- Ferry, E.** Hayward, % Phelps Dodge & Co., 99 John Street, New York, N. Y.
United Globe Mines.
- Fesing, H. W.**, Houghton, Mich.
New Arcadian Copper Company.
- Field, George E.**, 900 W. 18th Street, Chicago, Ill.
National Lead Company.
- Field, George W.**, 120 Broadway, New York, N. Y.
Batopilas Mining Company.
- Finkenstaedt, F. C.**, Bay City, Mich.
Temiskaming Mining Company.
Beaver Consolidated Mines, Limited.
- Finley, J. P.**, Portland, Ore.
Cascadia Mining & Development Company.
- Finnerty, Michael**, Denver, Colo.
Granite Gold Mining Company.
- Finney, A. C.**, 723 Title Insurance Building, Los Angeles, Calif.
London Arizona Copper Company.
- Finney, C. E., Jr.**, 723 Title Insurance Building, Los Angeles, Calif.
London Arizona Copper Company.
- Finney, R. J.**, 723 Title Insurance Building, Los Angeles, Calif.
London Arizona Copper Company.
- Fisher, Daniel**, Hancock, Mich.
Owosso Mining Company.
- Fisher, E. D.**, 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.

- Fisher, James, Jr., Hancock, Mich.
Owosso Mining Company.
- Fitzgerald, Wm. F., 95 Milk Street, Boston, Mass.
Lake Copper Company.
Massachusetts Consolidated Mining Company.
Old Colony Copper Company.
- Flagg, Geo. A., 190 Commonwealth Avenue, Boston, Mass.
Calumet & Hecla Mining Company.
- Flagler, John H., 200 Broadway, New York, N. Y.
Consolidated Arizona Smelting Company.
- Flynn, C. B., 58 Central Park West, New York, N. Y.
McIntyre Porcupine Mines, Limited.
- Forbes, H. D., 96 Elm Hill Avenue, Boston, Mass.
North Lake Mining Company.
- Forbes, W. Cameron, 82 Devonshire Street, Boston, Mass.
Champion Copper Company.
St. Mary's Mineral Land Company.
Winona Copper Company.
- Forbes, W. L., 522 Ballitt Building, Philadelphia, Pa.
Eden Mining Company.
- Foster, C. A., Haileybury, Ont.
Kirkland Lake Pamp., Limited.
- Foster, Philip L., 61 Broadway, New York, N. Y.
% Inspiration Consolidated Copper Company.
Greene Cananea Copper Company.
- Foster, Hon. W. W., 61 Broadway, New York, N. Y.
New Dominion Copper Company, Limited.
- Fox, Paul, Bakersfield, Calif.
Weringer Mines Company.
- Frale, Jos. C., Land Title Building, Philadelphia, Pa.
% Tonopah Belmont Development Company.
Belmont Milling Company.
- Frankenberger, Herbert, Charleston, W. Va.
Portland Consolidated Copper Company.
- Franklin, N. E., Deadwood, S. D.
Deadwood-Heidelberg Mining Company.
Golden Reward Consolidated Gold Mining & Milling Company.
- Fredrick, Leopold, 120 Broadway, New York, N. Y.
American Smelting & Refining Company.
- French, Arthur P., 89 State Street, Boston, Mass.
Trinity Copper Company.
- Fricke, A., 109 W. 26th Street, New York, N. Y.
Precious Metals Corporation.
- Friedman, L. A., Lovelock, Nev.
Willard Mines Company.
Seven Troughs Mining Company.
- Fries, Albert, Room 4000, 52 Broadway, New York, N. Y.
Richmond-Eureka Mining Company.
- Frost, W. L., 1065 Beacon Street, Boston, Mass.
Lake Milling, Smelting & Refining Company.
- Fry, H. D., gen. mgr.: Eastern Land, Coal, Mar. & Mer. Bldg., Philadelphia, Pa.
Southern Zinc & Mining Company, Incorporated.
- Fulkerson, S. V., Bristol, Va.-Tenn.
Southern Zinc & Mining Company, Incorporated.
- Furber, Caroles, Redding, Calif.
Delta Consolidated Gold Mines Company.

- Galbraith, J. N., P. O. Box 1656, Mexico City, D. F., Mex.
Pacific Copper Company, Limited.
- Gallagher, Z., 59 Victoria Street, Toronto, Ont.
Porcupine Crown Mines, Limited.
- Gallup, Geo., Detroit, Mich.
Boston & Montana Development Company.
- Gardner, A. G., J. M. Douglas & Co., Montreal, Ont.
Porcupine Crown Mines, Limited.
- Gardner, G. P., 705 Sears Building, Boston, Mass.
Champion Copper Company.
Mayflower Mining Company.
Douglass Copper Company.
- Garner, Trigg, 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Garnett, C. B., Colorado Springs, Colo.
Granite Gold Mining Company.
- Gastman, M. J., Sacramento, Calif.
Ruby King Mineral Paint Company.
- Gatrell, A. B., 222 D. F. Walker Building, Salt Lake City, Utah.
Utah-United Copper Company.
- Gay, F. H., Colorado Springs, Colo.
Doctor Jack Pot Mining Company.
- Geisendorfer, H. A., Pioche, Nev.
Atlanta Home Gold Mining Company.
- Genzberger, Sol, Butte, Mont.
Montana-Radersburg Mining Company.
- Germolgas, Paul, 13 N. Wyoming Street, Butte, Mont.
Balkan Butte Copper Mining Company.
- Gibbons, Jno. W., 812 Hippodrome Building, Cleveland, O.
Underwriters Land Company.
- Gillespie, D. L., Pittsburgh, Pa.
San Toy Mining Company.
- Gist, H. C., Yamhill, Ore.
West Side Gold & Silver Mining Company.
- Glenn, Dr. J. A., Ashland, Ill.
Kelvin Sultana Copper Company.
- Godbe, E. L., 40 Cedar Street, New York, N. Y.
Amalgamated Pioche Mines & Smelting Corporation.
- Goddu, L. H., Winchester, Mass.
Crystal Copper Company.
- Godley, Philip, 34 Kenilworth Street, Philadelphia, Pa.
Warrior Copper Company.
- Golet, Robt., 9 W. 17th Street, New York, N. Y.
Golden Reward Consolidated Mining & Milling Company.
- Goff, F. H., Cleveland, O.
American Smelting & Refining Company.
- Golden, John, Rochester, Nev.
Rochester Treasure Mining Company.
- Goldman, J. H., 209 Webster Street, San Francisco, Calif.
Union Consolidated Mining Company.
- Goldsmith, Fred, Tipton, Ia.
Hartwig Mining Company.
- Gooch, J. H., Paris, Tex.
Copper Queen Gold Mining Company.
- Good, D. W., Conemaugh, Pa.
Camp Bird Mining, Leasing & Power Company.

- Goodrich, C. S.**, Alaska Commercial Building, San Francisco, Calif.
Butters Divisadero Company.
- Gordon, Gurney**, Reno, Nev.
Louisiana Consolidated Mining Company.
- Goshorn, E. C. (Mgr.)**, Freeman Avenue, corner 7th Street, Cincinnati, O.
National Lead Company.
- Govan, R. B.**, Tonopah, Nev.
Tonopah Midway Consolidated Mining Company.
- Gow, Paul A.**, Butte, Mont.
Crystal Copper Company.
- Graham, A. N.**, Phoenix, Ariz.
Red Rover Copper Company.
- Graham, J. W.**, Denver, Colo.
Elkton Consolidated Mining & Milling Company.
Granite Gold Mining Company.
- Graves, J. P.**, 60 Congress Street, Boston, Mass.
Granby Consolidated Mining, Smelting & Power Company, Limited.
- Gray, John**, Room 8, Fall City Building, Spokane, Wash.
New Crystal Mining Company.
- Green, F. E.**, Oskaloosa, Ia.
Calhoun Consolidated Mines Company.
- Green, Henry**, 913 S. 2 W. Street, Salt Lake City, Utah.
Utah Arizona Gold & Copper Mining Company.
- Green, Robert Francis**, Victoria, B. C.
Slocan Star Mines, Limited.
- Greenhalgh, R. H.**, 222 D. F. Walker Block, Salt Lake City, Utah.
O. K. Extension Mining & Reduction Company.
- Greenough, W. Earl; Wallace**, Ida.
Marsh Consolidated Mines Company.
- Greenwald, L. J.**, 302 Century Building, Denver, Colo.
Vulcan Mines & Smelters Company.
- Greenwood, F. P.**, 23 Ferry Street, Everett, Mass.
Southern Arizona Mining Company.
Ruby Copper Company.
- Greiner, J. H.**, E. 28-8th Street, Spokane, Wash.
Mineral Farm Mining Company.
- Gress, M. J.**, 587 S. Broadway, Los Angeles, Calif.
Empire Copper & Gold Mining Company.
- Griffith, J. H.**, 1107 14th St., Spokane, Wash.
United Copper Mining Company.
- Griffith, J. K.**, West Pittston, Pa.
Square Deal Gold Mining Company.
- Grimes, J. D.**, Orient, Wash.
Vulcan Mining Company.
- Grotefend, Fred**, Redding, Calif.
Delta Consolidated Gold Mines Company.
- Grover, Alfred**, 161 Summer Street, Boston, Mass.
Standard Amalgamated Exploration Corporation.
- Grunough, J. B.**, Lander, Wyo.
Snowstorm Mining Company.
- Guggenheim, Edmond A.**, 120 Broadway, New York, N. Y.
Braden Copper Company.
- Guggenheim, Harry F.**, 120 Broadway, New York, N. Y.
Braden Copper Company.

- Guggenheim, Murry**, 120 Broadway, New York, N. Y.
Nevada Consolidated Copper Company.
Braden Copper Mines Company.
Braden Copper Company.
American Smelting & Refining Company.
Utah Copper Company.
- Guggenheim, S.**, 120 Broadway, New York, N. Y.
Braden Copper Company.
- Guggenheim, S. R.**, 120 Broadway, New York, N. Y.
Nevada Consolidated Copper Company.
Utah Copper Company.
- Guthrie, Geo. W.**, Pittsburgh, Pa.
Hussey Howe Mining Company.
- Gyde, James E.**, 25 Bank Street, Wallace, Idaho.
Caledonia Mining Company.
- Haaland, John**, Kellogg, Idaho.
Florence Mining & Milling Company, Limited.
- Haff, D. J.**, 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Haffenreffer, R. F., Jr.**, Jamaica, Boston, Mass.
Utah Apex Mining Company.
- Haire, Norman W.**, 412 Dooly Block, Salt Lake City, Utah.
Superior & Boston Copper Company.
- Hakanson, Ola**, St. Paul, Minn.
Leviathan Mines Company.
- Hall, H. O.**, 25 Madison Avenue, New York, N. Y.
Rawley Mining Company.
- Hall, M. D.**, 1710 11th Street, Spokane, Wash.
Snowstorm Mining Company.
- Halstead, Jacob**, 25 Broad Street, New York, N. Y.
El Paso Consolidated Gold Mining Company.
- Hammond, John Hays**, 120 Broadway, New York, N. Y.
Utah Copper Company.
- Hanf, E. F.**, Merrill, Wis.
Platinum Mining & Milling Company.
- Hanson, G. T.**, 280 East 4th Street, Salt Lake City, Utah.
Walker Mining Company.
- Harding, J. H.**, 15 Broad Street, New York, N. Y.
Anaconda Copper Mining Company.
- Harerow, D. W.**, 349 So. Main Street, Salt Lake City, Utah.
South Hecla Mining Company.
- Harriman, Jos. W.**, 111 Broadway, New York, N. Y.
Greene Cananea Copper Company.
- Harriman, W. A.**, Harriman, N. Y.
Golden Reward Consolidated Gold Mining & Milling Company.
- Harrington, Jas. W.**, Houghton, Mich.
Superior & Boston Copper Company.
- Harris, Ira**, Colorado Springs, Colo.
Doctor Jack Pot Mining Company.
Portland Gold Mining Company.
- Harris, J. L.**, Hancock, Mich.
Owosso Mining Company.
- Harris, John M.**, Sandon, B. C.
Slocan Star Mines, Limited.

- Harris, J. W.**, 449 Main Street, Winnipeg, Manitoba.
Star Lake Gold Mines, Limited.
- Harris, Walter J.**, Reno, Nev.
Reno Yerington Copper Company.
Tonopah 76 Consolidated Mining Company.
- Hart, F. J.**, 332 S. Broadway, Los Angeles, Calif.
Duplex Mining Company.
- Hartley, G. G.**, Duluth, Minn.
Keweenaw Copper Company.
- Haub, Jno.**, Sacramento, Calif.
Ruby King Mineral Paint Company.
- Havemeyer, H. O.**, 120 Broadway, New York, N. Y.
Kennecott Copper Corporation.
- Hawkins, J. T.**, Colorado Springs, Colo.
Mary McKinney Mining Company.
Isabella Mines Company.
- Hayden, Chas.**, 87 Milk Street, Boston, Mass.
Nevada Consolidated Copper Company.
- Head, Chas. E.**, McAlester, Okla.
Memphis Mining Company.
- Heald, Prof. E. P.**, San Francisco, Calif.
Luning-Idaho Mining Company.
- Heckscher, August**, 576 Fifth Avenue, New York, N. Y.
New Jersey Zinc Company.
Nipissing Mines Company.
Ray Hercules Copper Company.
British Columbia Copper Company, Limited.
Canada Copper Corporation, Limited.
- Heelis, T. B.**, Santaquin, Utah.
Granite Mining & Milling Company.
- Heilbronner, I. A.**, Butte, Mont.
Barnes-King Development Company.
- Heller, Clyde A.**, Bullitt Building, Philadelphia, Pa.
Halifax Tonopah Mining Company.
- Hemenway, A. B.**, St. George, Utah.
Bull Valley Hassiampie Gold Mining Company.
- Henderson, Carroll**, Goldfield, Nev.
Lone Star Consolidated Mining Company.
- Henderson, J. M.**, % Robert Dixon & Company, 202 Franklin St., New York.
Tri-Bullion Smelting & Development Company.
- Henley, B. J.**, Goldfield, Nev.
Reorganized Booth Mining Company of Goldfield.
- Henshaw, F. V.**, 14 Wall Street, New York, N. Y.
Empire Copper & Gold Mining Company.
- Hernsheim, I.**, 130 Central Park West, New York, N. Y.
Jerome Verde Copper Company.
- Hermanson, Herman**, 336 S. Broadway, Los Angeles, Calif.
Consolidated Copper Mines Company.
- Herrmann, Theo. L.**, 37 Wall Street, New York, N. Y.
Naumkeag Copper Company.
Wettlaufer Lorrain Silver Mines, Limited.
Miami Copper Company.
- Hickey, James H.**, United States Hotel, Boston, Mass.
Boston-Idaho Mining Company.
- Hicks, J. H.**, 449 Main Street, Winnipeg, Manitoba.
Star Lake Gold Mines, Limited.

- Heublein, L. F.**, Hartford, Conn.
 Square Deal Gold Mining Company.
- Higginson, F. L.**, 12 Ashburton Place, Boston, Mass.
 Ahmeek Mining Company.
 Calumet & Hecla Mining Company.
 Superior Copper Company.
- Higginson, H. L.**, 44 State Street, Boston, Mass.
 Smuggler Union Mining Company.
- Hight, C. A.**, 1001 State Mutual Building, Boston, Mass.
 Franklin Mining Company.
 Indiana Mining Company.
 Rhode Island Copper Company.
 United States Metals Refining Company.
 Richmond Eureka Mining Company.
 United States Smelting, Refining & Mining Company.
- Hill, Chas. W.**, 60 Liberty Street, New York, N. Y.
 Consolidated Arizona Smelting Company.
- Hill, J. B.**, 79 Milk Street, Boston, Mass.
 Mass Consolidated Mining Company.
- Hillehecht, Louis**, % Union Mercantile Company, Helena, Mont.
 American Mining Company, Limited.
- Hills, F. W.**, 120 Broadway, New York, N. Y.
 American Smelting & Refining Company.
- Hinckley, Freeman**, 53 State Street, Boston, Mass.
 Antimony Corporation.
- Hine, Francis L.**, 38 West 53rd Street, New York, N. Y.
 Phelps Dodge & Company.
- Hinkle, C. R.**, Indianapolis, Ind.
 Frontier Mining Company.
- Hironemus, H.**, Yerington, Nev.
 Nevada Queen Copper Company.
- Hoag, M. A.**, 892 West Avenue, Buffalo, N. Y.
 Black Prince Copper Company.
- Hobbs, Frank G.**, 1336 Green Street, San Francisco, Calif.
 Canyon Mines Corporation.
- Hoch, Dan.**, 417 Hutton Block, Spokane, Wash.
 United Copper Mining Company.
- Hochschild, B.**, 52 Broadway, New York, N. Y.
 General Development Company.
 Granby Consolidated Mining, Smelting & Power Company, Limited.
 Miami Copper Company.
- Hock, Reiner**, 1st National Bank, Duluth, Minn.
 Kamloops Copper Company.
- Hodges, W. V.**, 25 Madison Avenue, New York, N. Y.
 % Rawley Mining Company.
- Hodgson, W. A.**, Houghton, Mich.
 Ahmeek Mining Company.
 Chief Consolidated Mining Company.
- Hofslund, Sig.**, Wallace, Idaho.
 Rainbow Mining & Milling Company, Limited.
- Hoge, A. W.**, Nevada City, Calif.
 Willow Valley Mining Company.
- Holden, John B.**, 85 Bay Street, Toronto, Ont.
 Hollinger Gold Mines, Limited.
- Holmes, Gilbert**, Hillsboro, Ohio.
 Hermosillo Copper Company.

- Holp, H. A.**, Butte, Mont.
Butte & Ely Copper Company.
- Holt, R. G.**, Denver, Colo.
Pioneer Consolidated Mines Company.
- Honnold, Ira N.**, Kansas, Ill.
Butte & Great Falls Mining Company.
- Hoopas, Barton, Jr.**, 572 Bullitt Building, Philadelphia, Pa.
New Wonder Mining Company.
- Hoover, W. L.**, England, Ark.
Delta Consolidated Gold Mines Company.
- Hopkins, E. W.**, Mills Building, San Francisco, Calif.
Alaska Mexican Gold Mining Company.
Alaska Treadwell Gold Mining Company.
Alaska United Gold Mining Company.
- Hopkins, G. D.**, Wilmington, Del.
Calaveras Copper Company.
- Hopkins, J. G.**, 25 Broad Street, New York, N. Y.
Ray Hercules Copper Company.
- Hoppe, F.**, Platteville, Wis.
Wisconsin Zinc Company.
- Hothorn, E. G.**, 42 Broadway, New York, N. Y.
American Zinc, Lead & Smelting Company.
- Howard, E. O.**, 331 D. F. Walker Building., Salt Lake City, Utah.
Bannack Gold Mining Company.
- Howard, E. P.**, 120 Broadway, New York, N. Y.
Rex Consolidated Mining Company.
- Howard, F. J.**, Lovelock, Nev.
Packard Extension Mines Company.
- Howard, G. S.**, Malone, N. Y.
Nacozari Consolidated Copper Company.
- Howard, H. M.**, Brookline, Mass.
Franklin Mining Company.
Rhode Island Copper Company.
- Howbert, Irving (Chairman)**, Colorado Springs, Colo.
Portland Gold Mining Company.
- Howe, Geo. W.**, Pittsburgh, Pa.
Hussey-Howe Mining Company.
- Howe, W. C.**, 27 Latimer Block, Salt Lake City, Utah.
Gold Bond Mining & Milling Company.
- Howell, Wm. M.**, Dooly Block, Salt Lake City, Utah.
Big Cottonwood Consolidated Mining Company.
- Hubbard, F. A.**, Chicago, Ill.
Antelope Spring Mining Company.
- Hubbard, Wm. E.**, 66 W. Broadway, Salt Lake City, Utah.
Utah Metal Mining Company.
- Huber, Jno. G.**, Muskogee, Okla.
Lucky Boy Gold Mining Company.
- Hudson, T. T.**, Duluth, Minn.
Angelica Mining & Development Company.
- Huhn, Geo. A.**, Lands Title Building, Philadelphia, Pa.
Ray Hercules Copper Company.
- Humburg, J. F.**, 393 Mills Building, San Francisco, Calif.
Engels Copper Mining Company.
- Hunnell, Walter**, 261 Commonwealth Avenue; Boston, Mass.
Winona Copper Company.
Calumet and Hecla Mining Company.

- Hunter, Jos., Stevensville, Mont.
Mt. Thompson Gold Mining & Milling Company.
- Hussey, C. G., Pittsburgh, Pa.
Hussey-Howe Mining Company.
- Hutchinson, J. H., 702 Mutual Bank Building, San Francisco, Calif.
Nenzel Crown Point Mining Company.
- Huttig, Wm., 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Hyland, T. J., Box 1139, Denver, Colo.
Bachelor Khedive Mines Company.
- Hyman, D. M., 32 Broadway, New York, N. Y.
General Development Company.
Ontario Silver Mining Company.
- Ingalls, B. M., Mullan, Ida.
Copper King Mining & Smelting Company.
- Ingman, Oscar, Calumet, Mich.
Calumet & California Mining Company.
- Jacobs, M. H., New York, N. Y.
R. B. Todd Mining Company.
- James, A. C., 50 Congress Street, Boston, Mass.
Old Dominion Company.
Old Dominion Copper Mining & Smelting Company.
- James, C. C., 810 Lumsden Building, Toronto, Ont.
Temiskaming Mining Company.
- James, John, Paris, Tex.
C. & O. Mining & Milling Company.
- Jeff, R. J., 179 N. W. Temple Street, Salt Lake City, Utah.
Creole Mining Company.
- Jeffrey, G. P., 299 Madison Avenue, New York, N. Y.
Tortillita Copper Company.
- Jennings, Jas. E., 503 McIntyre Building, Salt Lake City, Utah.
Grand Gulch Mining Company.
- Jennings, Jos. A., 503 McIntyre Building, Salt Lake City, Utah.
Grand Gulch Mining Company.
- Jennings, S. J., 2 Rector Street, New York.
Franklin Mining Company.
Rhode Island Copper Company.
Tennessee Copper Company.
- Jermyn, W. M., Scranton, Pa.
Almoloya Mining Company.
- Johnson, H. C., American Fork, Utah.
Pacific Gold Mining & Milling Company.
- Johnson, M. M., Salt Lake City, Utah.
Cash Boy Consolidated Mining Company.
- Johnson, Otto, 609 First National Bank Building, Duluth, Minn.
Kamloops Copper Company.
- Johnston, A. W., 14 Wall Street, New York, N. Y.
% Buffalo Mines, Limited.
- Johnston, W. D., % American Lumber & Manufacturing Co., Pittsburgh, Pa.
Tri-Bullion Smelting & Development Company.
- Jones, C. V., 115 Broadway, New York, N. Y.
Kenefick Zinc Corporation.
- Jones, Frank, Kellogg, Ida.
Wisconsin Mining Company.

- Jones, J. S., Chaparral, Ariz.
Ohio Mines Company.
- Jones, R. D., 55 John Street, New York, N. Y.
White Pine Extension Copper Company.
- Jones, Stephen H., 1400 Alvorah Building, Duluth, Minn.
Sierra Consolidated Mines Company.
- Joseph, Geo. W., Portland, Ore.
North Mountain Mining Company.
- Joy, Benj., 40 Water Street, Boston, Mass.
Superior Copper Company.
- Joy, Fred W., 1 Wall Street, New York, N. Y.
Tommy Burns Gold Mining Company.
- Joyce, Wm. B., 61 Broadway, New York, N. Y.
Kerr Lake Mining Company.
Tennessee Copper Company.
- Judge, J. F., Main St., Salt Lake City, Utah.
Lost Packer Mining Company.
- Kammerer, John, 1220 Sprague Street, Spokane, Wash.
Mineral Farm Mining Company.
- Keal, C. W., Quincy, Ill.
Evergreen Mines Company.
- Keane, Thos., Round Mountain, Nev.
Round Mountain Mining Company.
- Keller, J. I., Springfield, Ohio.
Ideal Copper Company.
- Kellogg, E. F., 60 Broadway, New York, N. Y.
Consolidated Coppermines Company.
- Kelly, A. F., 2215 Millford Place, Spokane, Wash.
Florence Silver Mining Company.
- Kelly, W. S., Stockton, Calif.
Jamestown Exploration Company.
- Kendall, Messmore (Counsel), Woolworth Bldg., New York, N. Y.
Braden Copper Mines Company.
Braden Copper Company.
- Kerscher, W. J., Box 1139, Denver, Colo.
Bachelor Khedive Mines Company.
- Kessler, E., Boston, Mass.
Standard Amalgamated Exploration Corporation.
- Kiesling, F. W., 409 Waverly Place, Spokane, Wash.
Security Copper Company.
- Kievel, Jacob, Little Falls, Minn.
Leviathan Mining Company.
- Kilborn, Horace M., 316 West Seventy-eighth Street, New York, N. Y.
Tennessee Copper Company.
- Killmar, L. W., Houghton, Mich.
New Arcadian Copper Company.
- Kimball, Frank, 522 Postal Telegraph Building, Chicago, Ill.
Montana Oreway Mining Company.
- Kimball, Fred M., 46 Cornhill, Boston, Mass.
Davis Daly Copper Company.
- Kimball, Robt., Park City, Utah.
Reeds Peak Mining Company.
- King, Charles N., Jersey City, N. J.
St. Mary's Mineral Land Company.

- King, Homer S.**, Mills Bldg., San Francisco, Calif.
 Alaska Treadwell Gold Mining Company.
 Alaska United Gold Mining Company.
 Alaska Mexican Gold Mining Company.
- King, M. W.**, Box 326, Taft, Calif.
 Nevada Standard Copper Company.
- King, W. H.**, McCormick Block, Salt Lake City, Utah.
 Monetaire Mining Company.
- King, W. S.**, 25 Broad Street, New York, N. Y.
 El Paso Consolidated Gold Mining Company.
- Kingsbury, C. G.**, Colorado Springs, Colo.
 Elkton Consolidated Mining and Milling Company.
- Kingsley, George**, Fargo, N. Dak.
 British American Mining Company.
- Kinney, W. A.**, Butte, Mont.
 Butte & Great Falls Mining Company.
- Kinsey, C. F.**, 463 Fourteenth Street, Oakland, Cal.
 Willow Valley Mining Company.
- Kipp, Frank J.**, Milwaukee, Wisc.
 Hecla Mining Company.
- Kirby, Thos.**, 120 Broadway, New York, N. Y.
 Southern Zinc & Mining Company, Incorporated.
- Kliner, Chas.**, Cheney, Wash.
 Hecla Consolidated Silver Mining Company, Limited.
- Knight, Amanda M.**, Provo, Utah.
 Iron Blossom Consolidated Mining Company.
- Knight, A. S.**, 705 Sears Building, Boston, Mass.
 Douglass Copper Company.
- Knight, H. S.**, 71 South Twelfth East Street, Salt Lake City, Utah.
 Cash Boy Consolidated Mining Company.
 Pittsburg-Idaho Company, Limited.
- Knight, J. Wm.**, Provo, Utah.
 Rico Wellington Mining Company.
- Knobloch, H. F. J.**, 14 Wall Street, New York, N. Y.
 Magma Copper Company.
- Koontz, F. P.**, Lawson, Colo.
 Little Giant Gold Mining & Milling Company.
- Kosany, Max**, 821 Security Building, St. Louis, Mo.
 Philipsburg Mining Company.
 St. Joseph Lead Company.
- Krevinghaus, E. F.**, 4522 St. Louis Avenue, St. Louis, Mo.
 Evergreen Mines Company.
- Kuhn, C. H.**, 77 Franklin Street, Boston, Mass.
 Regal Mines Company.
- Kuhns, J. W.**, Youngstown, Ohio.
 Western Reserve Mining Company.
- Lafin, B. F.**, Osseo, Minn.
 Minneapolis & Texada Copperite Company, Limited.
 Norseman Exploration Company.
- Laidley, W. C. L.**, Carmichaels, Pa.
 Arizona-Southwestern Copper Company.
- Laimbeer, F. E.**, % F. P. Abbot, 94 Madison Avenue, New York, N. Y.
 Augusta Metal Mining Company.
- Lambach, H. C.**, Paulsen Building, Spokane, Wash.
 Hecla Mining Company.

- Landen, A.**, South 1504 Perry Street, Spokane, Wash.
Idora Mining Company, Limited.
- Landsee, Carl**, Milwaukee, Wisc.
Hecla Mining Company.
- Lane, Marcus G.**, Los Angeles, Calif.
Calaveras Copper Company.
- Latilla, H. G.**, Finsbury Pavement House, London, E. C., Eng.
Kirkland Lake Prop., Limited.
- Laughlin, C. C.**, Yamhill, Ore.
West Side Gold & Silver Mining Company.
- Lauler, Jos.**, 110 North New Jersey Street, Indianapolis, Ind.
German Copper Company.
- Laurie, John**, Brookline, Mass.
Richmond-Eureka Mining Company.
- Lauritson, Louis**, Ellsworth, Ill.
Butte & Great Falls Mining Company.
- Lauzier, G. A.**, Lauzier-Wolcott Co., Butte, Mont.
Butte Bullwhacker Mining Company.
- Lavender, J. A.**, Hutton Building, Spokane, Wash.
% Florence Silver Mining Company.
- Lawrence, C. R.**, 131 State Street, Boston, Mass.
Empire Copper & Gold Mining Company.
- Lawson, F. B.**, 10-11 Austin Friars, London, E. C., Eng.
Seoul Mining Company.
- Leather, T. E.**, 341 James Street, South Hamilton, Ont.
Trethewey Silver-Cobalt Mines, Limited.
- Ledyard, Henry**, Union Trust Bldg., Detroit, Mich.
White Pine Extension Copper Company.
- Lée, Harry A.**, 411 East 3 South Street, Salt Lake City, Utah.
Silver King Consolidated Mining Company.
- Lee, S. L.**, Carson City, Nev.
Shasta Belmont Mining Company.
- Lehman, Arthur**, 22 William Street, New York, N. Y.
General Development Company.
- Lennie, Robt. E.**, Vancouver, B. C.
Slocan Star Mines, Limited.
- Lennox, Wm.**, Colorado Springs, Colo.
Ajax Gold Mining Company.
- Leonard, Carl, J. W.**, Hellman Building, Los Angeles, Calif.
Vivian Mining Company.
- Leonard, Chas. R.**, Daly Bank Building, Butte, Mont.
Barnes King Development Company.
- Lesser, E. J.**, Boulder, Colo.
Cashier Gold Mining & Red. Company.
- Levy, P. A.**, 155 Water Street, New York, N. Y.
New Jersey Mines Company.
- Lewis, R. V.**, Seventh Avenue and Forty-seventh Street, New York, N. Y.
Augusta Metal Mining Company.
- Lewis, Walter C.**, 24 Virginia Street, Salt Lake City, Utah.
Silver King Copper Mining Company.
- Lewisohn, Adolph**, 61 Broadway, New York, N. Y.
Naumkeag Copper Company.
- Lewisohn, S. A.**, 61 Broadway, New York, N. Y.
Caribou Cobalt Mines Company.
- Limburg, H. R.**, 160 Broadway, New York, N. Y.
Peabody Consolidated Copper Company.

- Lindeberg, Jafet**, San Francisco, Calif.
Granite Gold Mining Company.
- Linforth, W. H.**, 32 Broadway, New York, N. Y.
Ontario Silver Mining Company.
- Lippert, E. J.**, 12 Wall Street, Spokane, Wash.
Nabob Mining Company.
- Livermore, T. L.**, 14 Ashburton Place, Boston, Mass.
Smuggler Union Mining Company.
- Livingston, P. H.**, Salt Lake City, Utah.
Lowland Tunnel Transportation Company.
- Lloyd, T. M.**, 125 Pierrepont Street, Brooklyn, N. Y.
New Planet Copper Mining Company.
- Lodge, Edwin**, Detroit, Mich.
Saratoga Mining Company.
- Loeb, C. M.**, 61 Broadway, New York, N. Y.
Shannon Copper Company.
- Loeb, L. S.**, Duluth, Minn.
Butte & Zenith City Mining Company.
- Loeb, Jr., William**, 120 Broadway, New York, N. Y.
American Smelting & Refining Company.
Utah Copper Company.
- Lofer, Chas. D.**, Chicago, Ill.
Atlas Mining and Milling Company.
- Lomielle, Geo.**, Kellogg, Ida.
Highland Surprise Consolidated Mining Company.
- Longyear, John M.**, Marquette, Mich.
Quincy Mining Company.
- Loring, W. J.**, 62 London Wall, London, E. C., Eng.
Plymouth Consolidated Gold Mines, Limited.
- Lott, Geo. B.**, 709 Colorado Building, Denver, Colo.
Lexington Gold Mining Company.
- Lovelace, F. L.**, Niagara Falls, N. Y.
Beaver Gonsolidated Mines, Limited.
Temiskaming Mining Company.
- Lovell, J. N.**, Newton, Mass.
American Zinc, Lead & Smelting Company.
- Loven, Henry**, Kingman, Ariz.
Jerome-Oatman Mining Company.
- Low, Peter, E.**, Eureka, Ill.
Boston American Mining Company.
- Lowe, T. L.**, Silver City, New Mexico.
Pinos Altos Mining & Milling Company.
- Lund, Wm.**, 423 Caswell Block, Milwaukee, Wisc.
Imperial Copper & Gold Mining Company.
- Lunt, Judge H. G.**, Colorado Springs, Colo.
Isabella Mines Company.
- Luttgen, Walter**, 43 Exchange Place, New York, N. Y.
Golden Reward Consolidated Gold Mining & Milling Company.
- Lynch, Geo.**, 515 Newhouse Bldg., Salt Lake City, Utah.
Cedar Talisman Consolidated Mining Company.
- Lynch, P. M.**, Atlanta, Ga.
Tularosa Copper Company.
- Lynch, Thos. J.**, Tonopah, Nev.
Montana-Tonopah Mines Company.
- Lyne, Henry**, Leadville, Colo.
Bachelor Khedive Mines Company.

- Lyon, F.**, 55 Congress Street, Boston, Mass.
United States Metals Refining Company.
- Lyon, Fred'k**, Salt Lake City, Utah.
Richmond-Eureka Mining Company.
- Macdonald, Jas. A.**, 26 Exchange Place, New York.
United Verde Copper Company.
- Mace, W. W.**, Omaha, Nebr.
Vulcan Mines & Smelter Company.
- MacGowan, J. K.** (Gen. Purch. Agent), 120 Broadway, New York, N. Y.
American Smelting & Refining Company.
Braden Copper Mines Company.
Braden Copper Company.
- Mackay, Walter**, 723 S. Park Avenue, Portland, Ore.
Oom Paul Consolidated Mining Company.
- MacKelvie, N. B.**, 25 Broad Street, New York, N. Y.
American Zinc, Lead & Smelting Company.
- Mackenzie, J. H.**, 1024 Crocker Building, San Francisco, Calif.
Alaska Juneau Gold Mining Company.
Mercury Mining Company.
- MacNeill, Chas. M.**, 25 Broad Street, New York, N. Y.
Ray Consolidated Copper Company.
Alaska Gold Mines Company.
Nevada Consolidated Copper Company.
Cresson Consolidated Mining & Milling Company.
- MacVichie, Duncan**, Newhouse Block, Salt Lake City, Utah.
Eagle & Blue Bell Mining Company.
- Madden, Jas. Jr.**, Basin, Mont.
Madden Scratch Gravel Mines Company.
- Maddock, Sydney**, 158 South Oxford Street, Brooklyn, N. Y.
Augusta Metal Mining Company.
- Magavern, Wm. J.**, 101 Erie Co. Bank Building, Buffalo, N. Y.
Wettlaufer Lorrain Silver Mines, Limited.
- Maguire, F. L.**, 62 Devonshire Street, Boston, Mass.
Mass Consolidated Mining Company.
Old Colony Copper Company.
- Maloney, W. J.**, 42 Broadway, New York, N. Y.
Hedley Gold Mining Company.
- Maloney, Wm. J.**, Wilmington, Del.
Calaveras Copper Company.
- Mangum, W. L.**, Provo, Utah.
Iron Blossom Consolidated Mining Company.
Seven Troughs Mining Company.
- Manning, Robert A.**, Shawmut Bank Building, Boston, Mass.
Antimony Corporation.
- Mara, J. A.**, Union Club, Victoria, B. C.
Portland Canal Tunnels, Limited.
- Marionaux, Judge Thos.**, Kearns Building, Salt Lake City, Utah.
South Cardiff Mining Company.
Goldstrike Consolidated Mining Company.
- Marshall, G.**, Bradford, Vt.
Pike Hill Mines, Incorporated.
- Martin, Albt.**, Carnegie, Pa.
Sturdy Gold Mining Company.
- Martin, Arthur B.**, Chelsea, Mass.
Utah Metal Mining Company.
Utah Metal & Tunnel Company.

- Martin, C. D.**, % Granby Company, Phoenix, B. C.
Carney Copper Company, Limited.
- Martin, Mulford**, 60 Broadway, New York, N. Y.
Consolidated Copper Mines Company.
Regal Mines Company.
- Martin, W. S.**, 125 Prescott Street, E., Boston, Mass.
Victoria Copper Mining Company.
- Marvell, E. I.**, Fall River, Mass.
Vulture Mines Company.
- Marvin, Chas.**, Elmira, N. Y.
Seven Devils Copper Company.
- Marvin, L. E.**, Dallas, Tex.
Los Animas Peak Gold Mines Company.
- Marwick, Jas.**, 79 Wall Street, New York, N. Y.
Batopilas Mining Company.
- Mason, M. Clinton**, Rockville, Cona.
Walker River Copper Company.
- Mason, Wm. T.**, Montreal, Quebec.
Beaver Consolidated Mines, Limited.
- Mattson, P. A.**, Ogden, Utah.
Lakeview Mining Company.
- Mayer, H. P.**, Paris, Tex.
Copper Queen Gold Mining Company.
- Mayer, I.**, 229 S. W. Temple Street, Salt Lake City, Utah.
Progressive Mining Company.
- Mayer, Jos. B.**, 43 Exchange Place, New York, N. Y.
Peabody Consolidated Copper Company.
- McBride, V. C.**, American Fork, Utah.
Plentiful Mining & Milling Company.
- McCague, Geo. L.**, Pittsburgh, Pa.
San Toy Mining Company.
- McCamus, Thos.**, New Liskeard, Ont.
Dome Lake Mining & Milling Company.
- McCandless, S. A.**, Goldfield, Nev.
Grandma Mining Company.
- McCarty, A. L.**, Pinos Altos, N. Mex.
Pinos Altos Mining & Milling Company.
- McCarty, Jas. J.**, 509 Pemberton Building, Boston, Mass.
Canyon Mines Corporation.
- McCormick, L. B.**, Care Bingham Mines Co., 60 Congress St., Boston, Mass.
Bingham Mines Company.
- McCornick, H. A.**, McCornick Building, Salt Lake City, Utah.
Lost Packer Mining Company.
- McCornick, W. S.**, 205 Center Street, Salt Lake City, Utah.
American Smelting & Refining Company.
Bannack Gold Mining Company.
- McCoy, C. M.**, Butte, Mont.
Boston & Montana Development Company.
- McCrute, M. E.**, Tonopah, Nev.
Commonwealth Mining & Milling Company.
- McCrum, W. H.**, 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- McDonald, W. B.**, Leadville, Colo.
Bachelor Khedive Mines Company.
- McDonough, Will**, Yerington, Nev.
Reno Yerington Copper Company.

- McDougoll, Wm., Kellogg, Ida.**
Highland Surprise Consolidated Mining Company.
- McDuffie, G. T., Price Hill Incline, Cincinnati, Ohio.**
Augusta Metal Mining Company.
- McElwain, J. S., 850 Equitable Building, Denver, Colo.**
Marion Mines & Mills Company.
- McEnerney, G. W., 575 Mills Building, San Francisco, Calif.**
Treasure Mining Company.
- McFarland, Dr. S. B., Longmont, Colo.**
Standard Gold Copper Mining & Milling Company.
- McFarridge, M. M., 3861 So. Normandie Avenue, Los Angeles, Calif.**
Azurite Mining Company.
- McGarrah, Gates W., % Batopilas Mng. Co., 20 Nassau St., New York, N. Y.**
Batopilas Mining Company.
- McGarry, H., Colorado Springs, Colo.**
El Paso Consolidated Gold Mining Company.
- McGilvray, Chas. J., 60 State St., Boston, Mass.**
Shannon Copper Company.
- McHarg, H. K., 40 Wall Street, New York, N. Y.**
Bluebird Company.
- McKnight, Richard, 700 Edison Building, Chicago, Ill.**
Black Prince Copper Company.
- McLaren, Kenneth K., 37 Wall Street, New York, N. Y.**
Utah Copper Company.
- McLean, Jas., 99 John St., New York, N. Y.**
United Globe Mines.
Old Dominion Company.
- McLean, Jas. (Managing Director), 7 East 75th Street, New York, N. Y.**
Greene Cananea Copper Company.
- McLean, John H., 1400 Alworth Building, Duluth, Minn.**
North Butte Mining Company.
- McMillan, A., 244 Kearney Street, San Francisco, Calif.**
Mountain King Mining Company.
- McMillan, H. G., 649 E. S. Temple Street, Salt Lake City, Utah.**
Ontario Silver Mining Company.
- McMullen, A. D., 222 D. F. Walker Block, Salt Lake City, Utah.**
Beaver Copper Company.
- McMurray, J. B., Washington, Pa.**
German Copper Company.
- McNeal, T. A., Topeka, Kans.**
Arizona-Southwestern Copper Company.
- McNeil, Kenneth, Bridgeport, Conn.**
Shannon Copper Company.
- McOmie, J. H., Minersville, Utah.**
Blue Ribbon Gold Mining Company.
- McPhee, W. A., Luning, Nev.**
Luning-Idaho Mining Company.
- McPherson, Thos. S., Victoria, B. C.**
Slocan Star Mines, Limited.
- McSweeney, E. A., Dorchester, Mass.**
Trinity Copper Company.
- Meals, J. T., Oil City, Pa.**
Cashier Gold Mining & Tunnel Company.
- Meeleus, E. E., 307 High Street, Oshkosh, Wisc.**
Hahns Peak Gold Mining & Milling Company.

- Meighen, F. S.**, % Lake of the Woods Milling Company, Montreal, Ont.
Lake of the Woods Milling Company.
Porcupine Crown Mines, Limited.
- Melcer, R. H.**, Montville, Conn.
Copete Consolidated Copper Company.
- Mercereau, J. F.**, Los Angeles, Calif.
Aurora Mines Company.
- Merrill, A. J.**, Atlanta, Ga.
Tularosa Copper Company.
- Merriman, Lewis**, Eureka, Utah.
Beaver Copper Company.
- Merton, John**, Houghton, Mich.
New Arcadian Copper Company.
New Baltic Copper Company.
- Meserve, Isaac H.**, 32 Broadway, New York, N. Y.
Quincy Mining Company.
- Meyer, Eugene, Jr.**, 14 Wall Street, New York, N. Y.
Braden Copper Company.
Braden Copper Mines Company.
Inspiration Consolidated Copper Company.
Mogollon Mines Company.
Utah Copper Company.
- Meyer, Isaac J.**, 251 West 92nd Street, New York, N. Y.
Iron Silver Mining Company.
- Michel, Theodore**, St. Paul, Minn.
Kamloops Copper Company.
- Miller, Andrew J.**, 24 Broad Street, New York, N. Y.
Anaconda Copper Mining Company.
- Miller, C. E.**, Wisdom, Mont.
Boston & Montana Development Company.
- Miller, Chas. R.**, 115 South Fourth Street, Philadelphia, Pa.
Nevada Wonder Mining Company.
Tonopah Mining Company of Nevada.
Eden Mining Company.
- Miller, F. P.**, Burke, Idaho.
Idaho-Montana Mining Company, Limited.
- Miller, G. C.**, Buffalo, N. Y.
Dome Mines Company.
- Miller, Geo. N.**, % El Paso Gold Mining Co., 25 Broad St., New York, N. Y.
El Paso Consolidated Gold Mining Company.
- Miller, John**, Florence, Colo.
Standard Gold Copper Mining & Milling Company.
- Miller, L. L. Jr.**, 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Miller, W. O.**, Nelson, B. C.
Cork-Province Mines, Limited.
- Milliken, John Tait**, Colorado Springs, Colo.
Elkton Consolidated Mining & Milling Company.
- Milton, W. R.**, 449 Main Street, Winnipeg, Manitoba.
Star Lake Gold Mines, Limited.
- Minzesheimer, G. M.**, 66 Wooster Street, New York, N. Y.
Peabody Consolidated Copper Company.
- Mitchell, Clark G.**, Cripple Creek, Colo.
Tungsten Exploration Company.
- Mitchell, J. L.**, 56 King Street, West Toronto, Ont.
Wettlaufer Lorrain Silver Mines, Limited.

- Mitchell**, Thos. S., Newhouse Building, Salt Lake City, Utah.
Reed's Peak Mining Company.
- Mitchell**, V. E., 801 Royal Trust Building, Montreal, P. Q.
La Rose Consolidated Mines Company.
- Mock**, John, Portland, Ore.
Oregon & British Columbia Mining & Development Company, Limited.
- Moffitt**, E. H., Wallace, Idaho.
Oom Paul Consolidated Mining Company.
- Mondloch**, J. P., Butte, Mont.
Butte & Great Falls Mining Company.
- Monfort**, F. R., Old National Bank Bldg., Spokane, Wash.
Hobson Silver Lead Company.
- Moon**, R. C., Lovelock, Nev.
Mines Development Company of Nevada.
- Moore**, H. D., Haddonfield, N. J.
Eden Mining Company.
Tonopah Mining Company of Nevada.
- Moore**, H. I., 873 East Fourth Street, Salt Lake City, Utah.
Nevada-Douglas Consolidated Copper Company.
- Moore**, W. McCarty, Dallas, Texas.
Las Animas Peak Gold Mines Company.
- Moreing**, C. A., 62 London Wall, London, E. C., Eng.
Plymouth Consolidated Gold Mining Company.
- Morley**, C. D., 510 Odd Fellows Building, St. Louis, Mo.
Nevada Arizona Mines Company.
- Morris**, Sid., Rock River, Wyo.
Big Five Copper Company.
- Morris**, S. W., Los Angeles, Calif.
Florence-Goldfield Mining Company.
- Morris**, Wilbur, % Bunker Hill M. & S. Co., 1123 Broadway, New York, N. Y.
Bunker Hill Mining & Smelting Company.
- Morrison**, G. C., Calumet, Mich.
Calumet & California Mining Company.
- Morrison**, Willard N., Malden, Mass.
Butte Central Mining & Milling Company.
- Morrow**, Jno. C., 14 South William Street, New York, N. Y.
Copete Consolidated Copper Company.
- Morrow**, J. T., 60 Broadway, New York, N. Y.
Consolidated Copper Mines Company.
- Morse**, W. S., 1234 Citizens Bank Building, Los Angeles, Calif., and 120
Broadway, New York, N. Y.
American Smelting & Refining Company.
Tom Reed, Jr., Mining Company.
- Moses**, W. A., 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger-Combination Gold Mining Company.
- Mosier**, A. E., 1012 Baltimore Avenue, Kansas City, Mo.
Lucky-Tiger Combination Gold Mining Company.
- Mosman**, W. A., 70 State Street, Boston, Mass.
Old Colony Copper Company.
- Moss**, P. B., Billings, Mont.
Cuprite Copper Company.
- Mott**, F. K., Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Motz**, Geo., Douglas, Ariz.
Nacozari Consolidated Copper Company.
- Mouat**, John, Denver, Colo.
El Paso Consolidated Gold Mining Company.

- Mudd, S. W.**, 1208 Hollingsworth Building, Los Angeles, Calif.
 Good Springs Anchor Company.
 Ray Consolidated Copper Company.
- Muffey, Chas. S.**, Butte, Mont.
 Montana-States Mining Corporation.
- Muir, Jas.**, 375 West End Ave., New York, N. Y.
 Peabody Consolidated Copper Company.
- Munn, H. A.**, Cowan Avenue, Victoria, B. C.
 Portland Canal Tunnels, Limited.
- Munson, Geo. S.**, 572 Bullitt Building, Philadelphia, Pa.
 Eden Mining Company.
- Murphy, C. F.**, Butte, Mont.
 Butte & Great Falls Mining Company.
- Murphy, Denis**, Ottawa, Ont., Can.
 Nipissing Mines Company.
- Murphy, F. H.**, Wallace, Idaho.
 Advance Mining Company.
- Murphy, Thos.**, Chillicothe, Ohio.
 Ohio Mines Company.
- Murray, W. D.**, Silver City, Mo.
 Pinos Altos Mining & Milling Company.
- Murriah, Harry J.**, Lovelock, Nev.
 Rochester Treasure Mining Company.
- Muurling, I. J. R.**, Warrenton, Va.
 McIntyre Porcupine Mines, Limited.
- Muxen, C. D.**, Columbia Building, Spokane, Wash.
 Norman Mines Company.
- Myers, L. R.**, Oatman, Ariz.
 Times Mining Company.
- Myers, Louis W.**, 50 Broad Street, New York, N. Y.
 Tommy Burns Gold Mining Company.
- Nardin, W. T.**, St. Louis, Mo.
 Down Town Mines Company.
- Neecramer, W. A.**, 2 Rector Street, New York, N. Y.
 Tennessee Copper Company.
- Neff, J. H.**, 723 Title Insurance Building, Los Angeles, Calif.
 London Arizona Copper Company.
- Neill, C. P.**, Washington, D. C.
 American Smelting & Refining Company.
- Nesbitt, E. W.**, Woodstock, Ont.
 La Rose Consolidated Mines Company.
- Newhouse, E. L.**, 120 Broadway, New York, N. Y.
 Braden Copper Mines Company.
 Federal Mining & Smelting Company.
- Nichols, F. J.**, 229 S. W. Temple Street, Salt Lake City, Utah.
 Progressive Mining Company.
- Nichols, F. W.**, Houghton, Mich.
 Mayflower Mining Company.
- Nichols, Wm. H.**, 52 Broadway, New York, N. Y.
 Miami Copper Company.
- Nicholson, T. O.**, Boston, Mass.
 Mass Consolidated Mining Company.
- Nicol, M. B.**, 805 Woodward Bldg., Washington, D. C.
 West Mexico Mines Company.
- Nimick, F. B.**, Pittsburgh, Pa.
 Hussey-Howe Mining Company.

- Nolan, J. M.**, Paola, Kans.
Plata-Fina Mining and Development Company.
- Norcross, H. F.**, Los Angeles, Calif.
Robert B. Todd Mining Company.
- Nordquist, C. J.**, 531 Pattan Street, Los Angeles, Calif.
Empire Copper & Gold Mining Company.
- North, Elmer**, Jackson, Mont.
Saginaw Copper Company.
- Nystrom, A. A.**, St. Paul, Minn.
Leviathan Mines Company.
- O'Brien, Jr., Morgan J.**, 120 Broadway, New York, N. Y.
Peabody Consolidated Copper Company.
- O'Connell, J. P.**, 699 Adams Street, Boston, Mass.
Boston Mine Leasing Company.
- Oddie, T. L.**, Reno, Nev.
Tonopah Midway Consolidated Mining Company.
- Odell, S. W.**, 912 California Building, Los Angeles, Calif.
Arizona-Eastern Mining Company.
- Olcott, Wm. J.**, 1400 Alworth Building, Duluth, Minn.
North Butte Mining Company.
- Olney, Rich**, 82 Devonshire Street, Boston, Mass.
Champion Copper Company.
St. Mary's Mineral Land Company.
- Olson, Hilmer**, 1311 Washington Avenue, North Minneapolis, Minn.
Minneapolis & Texas Copperite Company, Limited.
- Ong, E. W.**, Brookline, Mass.
Abangarez Gold Fields of Costa Rica.
- Orem, W. C.**, 663 Third Avenue, Salt Lake City, Utah.
Nevada-Douglas Consolidated Copper Company.
- Orland, C. J.**, Moscow, Ida.
Idora Mining Company, Limited.
- Orr, E. S.**, 821 Security Building, St. Louis, Mo.
Philipsburg Mining Company.
- Orr, Jno. E.**, Hutton Building, Spokane, Wash.
National Lead-Silver Company.
- Osborne, Wm. C.**, 32 Broadway, New York, N. Y.
Ontario Silver Mining Company.
United Globe Mines.
Phelps, Dodge & Company.
- Osler, Sir Edmund B.**, Room 1202 C. P. R. Building, Toronto, Ont.
Consolidated Mining & Smelting Company of Canada.
- Osler, Sir S.**, Room 1202 C. P. R. Building, Toronto, Ont.
Consolidated Mining & Smelting Company of Canada.
- Osterman, Henry**, Walla Walla, Wash.
Northwest Mines Development Company.
- Otto, E. D.**, 27 Thomas Street, New York, N. Y.
Delta Consolidated Gold Mines Company.
- Page, Al.**, 1805 Tenth Street, Spokane, Wash.
Highland Surprise Consolidated Mining Company.
- Page, W. Byrd**, Denver, Colo.
Ibex Mining Company.
- Page, W. T.**, Omaha, Neb.
American Smelting & Refining Company.
- Paige, E. E.**, 634 E. 117th, Cleveland, Ohio.
Silvered-Copper Mining Company.

- Paine, Chas. J.**, 87 Mt. Vernon St., Boston, Mass.
Winona Copper Company.
- Paine, Chas. J., Jr.**, 190 Washington Street, or Box 5095, Boston, Mass.
Copper Range Company.
Naumkeag Copper Company.
Winona Copper Company.
- Paine, F. Ward**; 82 Devonshire Street, Boston, Mass.
Baltic Mining Company.
Copper Range Company.
Copper Range Railroad Company.
East Butte Copper Mining Company.
Lake Copper Company.
Trimountain Mining Company.
- Paine, Robert Treat 2nd**, 16 State Street, Boston, Mass.
United States Smelting, Refining & Mining Company.
- Paine, Wm. A.**, 82 Devonshire Street, Boston, Mass.
East Butte Copper Mining Company.
Granby Consolidated Mining Smelting & Power Company, Limited.
Helvetia Copper Company.
Mohawk Mining Company.
Shannon Copper Company.
Winona Copper Company.
- Palmer, B. W.**, 732 Exchange Building, Boston, Mass.
Abangarez Gold Fields of Costa Rica.
- Palmer, J. H.**, Pittsburgh, Pa.
Las Animas Peak Gold Mines Company.
- Park, R. G.**, Real Estate Trust Building, Philadelphia, Pa.
Belmont Milling Company.
Tonopah Belmont Development Company.
- Parker, Alton B.**, 111 Broadway, New York, N. Y.
Batopilas Mining Company.
- Parker, F. S.**, 17 Street and Willow Avenue, Hoboken, N. J.
New Jersey Mines Company.
- Parker, G. M.**, 84 Fleet Street, Jersey City, N. J.
New Jersey Mines Company.
- Parker, Horace E.**, 100 Broadway, New York, N. Y.
Proprietary Mines Company of America.
- Parker, Myron M.**, Washington, D. C.
Greene Cananea Copper Company.
- Parks, H. S.**, 4801 Harrison Street, Chicago, Ill.
Georgetown Tunnel & Transportation Company.
- Paschal, Howard**, 120 Broadway, New York, N. Y.
Tri-Bullion Smelting & Development Company.
- Paterson, J. H.**, Eureka, Utah.
Beaver Copper Company.
- Patterson, R. C.**, St. Paul, Minn.
Paragon Consolidated Mines Company.
- Pattison, Byron**, Los Angeles, Calif.
Denver-Arizona Copper Company.
- Paull, Henry B.**, 1400 Alworth Building, Duluth, Minn.
Sierra Consolidated Mines Company.
- Pavenstadt, Edmund**, 120 West 74th Street, New York, N. Y.
Consolidated Arizona Smelting Company.
- Payne, R. C.**, Ball Club, Minneapolis, Minn.
British American Mining Company.
- Peabody, H. G.**, Pasadena, Calif.
Tom Reed, Jr., Mining Company.

- Peake, A. P.**, Valley City, No. Dak.
Weringer Mines Company.
- Peake, Geo. T.**, Woody, Calif.
Weringer Mines Company.
- Peila, Joseph**, Wallace, Ida.
Advance Mining Company.
- Peirce, R. W.**, 906 Walnut Street, Philadelphia, Pa.
Ruby Copper Company.
Southern Arizona Mining Company.
- Pellatt, Sir H. M.**, 420 Traders Bank Bldg., Toronto, Ont.
McIntyre Extension Mines, Limited.
- Pelletier, J. M.**, Hyde Building, Spokane, Wash.
Mineral Farm Mining Company.
- Penrose, Spencer**, 25 Broad Street, New York, N. Y.
Cresson Consolidated Mining & Milling Company.
Ray Consolidated Copper Company.
- Percival, Jno. A.**, 61 Broadway, New York, N. Y.
Butte Ballaklava Copper Company.
- Perkins, Chas. E.**, Burlington, Iowa.
St. Mary's Mineral Land Company.
- Perkins, C. L.**, 60 Broadway, New York, N. Y.
Consolidated Coppermines Company.
- Perkins, N. H.**, Yamhill, Ore.
West Side Gold & Silver Mining Company.
- Perkins, T. N.**, 60 State Street, Boston, Mass.
Ahmeek Mining Company.
St. Mary's Mineral Land Company.
- Perrse, H. S.**, Stockbridge, Hants, Eng.
Red Rover Copper Company.
- Peters, Gustave**, Tipton, Ia.
Hartwig Mining Company.
- Peters, H. G.**, Bristol, Va.-Tenn.
Southern Zinc & Mining Company, Incorporated.
- Peterson, D. R.**, Rockford, Ill.
Nevada Superior Mines Company.
- Phelan, Jas. J.**, 10 Clark Street, Boston, Mass.
United States Smelting Refining & Mining Company.
- Phillips, J. B.**, Pittsburgh, Pa.
Old Town Mining & Milling & Transportation Corporation.
- Phillips, J.**, Milwaukee, Wis.
Nevada Arizona Mines Company.
- Phillips, Jas. Jr.**, 77 Franklin Street, Boston, Mass.
Regal Mines Company.
- Phillips, J. W.**, Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Pigeon, R. W.**, 190 Circuit Road, Boston, Mass.
Empire Copper & Gold Mining Company
- Pillsbury, Jno. S.**, 907 Metropolitan Building, Minneapolis, Minn.
Helvetia Copper Company.
- Plyley, C.**, Columbus, Ohio.
Hermosillo Copper Company.
- Poirier, C. H.**, Schumacher, Ont.
Porcupine Vipond Mines, Ltd.
- Pomeroy, R. W.**, Buffalo, N. Y.
Dome Mines Company.
- Poole, C. W.**, Box 1418, Salt Lake City, Utah.
North Mountain Mining Company.

- Pope, J. D.**, Butte, Mont.
Angelica Mining & Development Company.
- Pope, Thos. B.**, 1 Wall Street, New York City.
Tommy Burns Gold Mining Company.
- Poppleton, M. A.**, 180 Front Street, Portland, Ore.
Cascadia Mining & Development Company.
- Potter, E. R.**, 449 Main Street, Winnipeg, Man.
Star Lake Mines, Limited.
- Potter, Wm. C.**, 140 Broadway, New York, N. Y.
American Smelting & Refining Company.
- Potts, Wm. M.**, 572 Bullitt Building, Philadelphia, Pa.
Nevada Wonder Mining Company.
- Powers, S. L.**, Newton, Mass.
Corbin Copper Company.
North Lake Mining Company.
- Preston, Andrew W.**, 25 Bay State Road, Boston, Mass.
United States Smelting Refining & Mining Company.
- Price, F. A.**, 755 8th Avenue, Salt Lake City, Utah.
Rexall Silver & Copper Mining Company.
- Prosser, H. A.**, 120 Broadway, New York, N. Y.
American Smelting & Refining Company.
- Prosser, James, Jerome**, Ariz.
Boston & Jerome Copper Company.
- Prosser, Seward**, 120 Broadway, New York, N. Y.
Kennecott Copper Corporation.
- Pryor, R. C.**, Houghton, Mich.
Lake Copper Company.
- Pugh, L. W.**, Jerome, Ariz.
Boston & Jerome Copper Company.
- Quiat, L. L.**, Oatman, Ariz.
Paramount Mines Company.
- Raiff, F. R.**, 32 Broadway, New York, N. Y.
Federal Mining & Smelting Company.
- Ramey, G. L.**, Salida, Colo.
Giant Eclipse Consolidated Mines Company.
- Randall, D. P.**, Yerington, Nev.
Nevada Queen Copper Company.
- Randall, G. P.**, Rocky Ford, Colo.
Giant Eclipse Consolidated Mines Company.
- Rank, Geo. J.**, St. Paul, Minn.
Paragon Consolidated Mines Company.
- Rapalje, Robt. L.**, 109 W. 14th Street, Pueblo, Colo.
Equity Creede Mining Company.
- Rasmussen, M. A.**, Somers, Wis.
Hahns Peak Gold Mining & Milling Company.
- Rea, Wm. H.**, Pittsburgh, Pa.
Hussey-Howe Mining Company.
Calumet & Arizona Mining Company.
- Reed, Jas. H.**, Pittsburgh, Pa.
East Butte Copper Mining Company.
- Rees, A. F.**, Houghton, Mich.
New Arcadian Copper Company.
- Reese, J. H.**, 255 E. 11th South Street, Salt Lake, Utah.
Mason Valley Extension Mining Company.
- Reford, R.**, % The Robt. Reford Co., Montreal, Ont.
Porcupine Crown Mines, Limited.

- Reid, Geo. S.**, 180 Front St., Portland, Ore.
Cascadia Mining & Development Company.
- Reitsch, E. R.**, Rockford, Ill.
Antelope Springs Mining Company.
- Rennsey, H. F.**, 821 Security Building, St. Louis, Mo.
Philipsburg Mining Company.
- Rennsey, I. M., Jr.**, 821 Security Building, St. Louis, Mo.
Philipsburg Mining Company.
- Requa, M. L.**, 1024 Crocker Building, San Francisco, Calif.
Alaska Juneau Gold Mining Company.
- Reynolds, A. G.**, Denver, Colo.
Oatman Crescent Mining Company.
- Reynolds, J. F.**, Alamosa, Colo.
Tepee Mining & Development Company.
- Rice, Chas. G.**, 55 Congress Street, Boston, Mass.
(Acting Pres. & Dir.) Centennial-Eureka Mining Company.
American Zinc, Lead & Smelting Company.
- Rice, John H.**, Houghton, Mich.
Algomah Mining Company.
Copper Range Railroad Company.
- Rich, O.**, Harris Trust Building, Chicago, Ill.
Mascot Copper Company.
- Richard, David**, 20 Cophall Avenue, London, E. C., Eng.
Plymouth Consolidated Gold Mines, Ltd.
- Richards, H. J.**, 514 W. Franklin Street, Baltimore, Md.
Mansfield Mining & Smelting Company.
Ruby Copper Company.
Southern Arizona Mining Company.
- Richards, J. E.**, San Jose, Calif.
Cerro Gordo Mines Company.
- Richardson, J. E.**, Youngstown, Ohio.
Western Reserve Mining Company.
- Richardson, Wm.**, Ellsworth, Ill.
Butte & Great Falls Mining Company.
- Richter, Aug., Jr.**, Milwaukee, Wis.
Nevada Arizona Mines Company.
- Ricketts, L. D.**, 42 Broadway, New York, N. Y.
Inspiration Consolidated Copper Company.
Sierra Consolidated Mines Company.
- Riddle, Chas. A.**, Seattle, Wash.
Boston-American Mining Company.
- Riley, A. L.**, St. Cloud, Minn.
Consolidated Interstate Callahan Mining Company.
- Rindal, H.**, Vancouver, B. C.
Cork-Province Mines, Limited.
- Ritchie, S. S.**, New Liskeard, Ont.
Dome Lake Mining & Milling Company, Limited.
- Rittenour, J. M.**, Chillicothe, Ohio.
Ohio Mines Company.
- Robbers, Jno. H.**, 420 20th Street, Spokane, Wash.
Consolidated Interstate-Callahan Mining Company.
- Robeson, J. H.**, Denver, Colo.
Georgetown Tunnel & Transportation Company.
- Robinson, D. L.**, Houghton, Mich.
Chief Consolidated Mining Company.
Onondaga Copper Company.

- Robinson, Edw. C.**, 60 Congress Street, Boston, Mass.
South Lake Mining Company.
- Rockefeller, Manfred**, 1123 Broadway, New York, N. Y.
Bunker Hill Mining & Smelting Company.
- Rockefeller, Wm.**, 26 Broadway, New York, N. Y.
Anaconda Copper Mining Company.
Inspiration Consolidated Copper Company.
- Roeder, Jno.**, Whitefish, Mont.
Lupfer Mining Company.
- Roelofs, Richard**, Cripple Creek, Colo.
Cresson Consolidated Mining & Milling Company.
- Rogers, H. H.**, 26 Broadway, New York, N. Y.
Anaconda Copper Mining Company.
- Rogers, R. P.**, Cobalt, Ont.
Coniagas Mines, Limited.
- Rooney, Wm. S.**, 85 Devonshire Street, Boston, Mass.
Lake Copper Company.
- Rose, Wm. R.**, 309 West 81st St., New York, N. Y.
Tonopah Extension Mining Company.
- Rosen, Walter T.**, 25 Broad Street, New York, N. Y.
General Development Company.
Miami Copper Company.
- Rosenhaupt, Sidney**, 4117 Hutton Building, Spokane, Wash.
United Copper Mining Company.
- Rosenstamm, S. S.**, 61 Broadway, New York, N. Y.
General Development Company.
Kerr Lake Mining Company.
New Planet Copper Mining Company.
- Rosler, J. E.**, St. Louis, Mo.
Hermosillo Copper Company.
- Ross, D. G.**, 110 West 40th Street, New York, N. Y.
Kelvin Sultana Copper Company.
- Ross, J. W.**, 413 Fletcher Trust Building, Montreal, Ont.
Porcupine Crown Mines, Limited.
- Ross, Louis**, 79 Milk Street, Boston, Mass.
Utah Apex Mining Company.
- Rossin, Alfred S.**, 172 Water Street, New York, N. Y.
General Development Company.
- Rost, C. L.**, Indianapolis, Ind.
Frontier Mining Company.
- Rothwell, Jas. E.**, 24 Milk Street, Boston, Mass.
Utah Metal Mining Company.
- Rovnianek, A. V.**, Orizaba, Nev.
Orizaba Mining & Development Company.
- Rovnianek, P. V.**, Orizaba, Nev.
Orizaba Mining & Development Company.
- Rowland, Geo.**, 55 Wall Street, New York, N. Y.
Batopilas Mining Company.
- Rowland, J. R.**, Youngstown, Ohio.
Vulcan Mines & Smelters Company.
- Rushing, A. J.**, Bertrand, Mo.
Hermosillo Copper Company.
- Russell, Jas. A.**, Braddock, Pa.
Kelvin Sultana Copper Company.
- Rust, W. R.**, Tacoma, Wash.
Ellamar Mining Company.

- Ryan, Edw. J.**, 510 Odd Fellows Bldg., St. Louis, Mo.
Nevada Arizona Mines Company.
- Ryan, J. D.**, 42 Broadway, New York, N. Y.
Anaconda Copper Mining Company.
- Sabin, Chas. H.**, 140 Broadway, New York, N. Y.
Inspiration Consolidated Copper Company.
- Safford, A. W.**, Adams, Mass.
Mansfield Mining & Smelting Company.
- St. Clair, H. H.**, 20 Exchange Place, New York.
United Verde Copper Company.
- Saladine, John W.**, 133 Abbott Road, Boston, Mass.
Utah Apex Mining Company.
- Sanders, W. A.**, 401 Commonwealth Building, Denver, Colo.
Pine Martin Mining Company.
- Sangren, J. A.**, Spokane, Wash.
Idaho-Northern Mineral Company.
- Sarecky, L. A.**, 115 Broadway, New York, N. Y.
Montana-Radersburg Mining Company.
- Satterfield, Jas. H.**, 311 So. State Street, Dover, Del.
New Planet Mining Company.
- Satterfield, J. M.**, 77 Franklin Street, Boston, Mass.
Regal Mines Company.
- Saunders, M. G.**, Pueblo, Colo.
Manhattan Big Four Mining Company.
- Scallon, Wm.**, Helena, Mont.
Helena Mining Bureau, Incorporated.
- Scheave, Ida**, Wallace, Ida.
Belmont Mining Company, Limited.
- Schermerhorn, E. B.**, Galena, Kansas.
Arizona Southwestern Copper Company.
- Schindler, A. D.**, San Francisco, Calif.
Lightner Mining Company.
- Schirmer, Frank A.**, 79 Milk Street, Boston, Mass.
Utah Copper Company.
- Schley, G. B.**, 845 Fifth Avenue, New York, N. Y.
American Smelting & Refining Company.
- Schmid, Edw.**, 42 Broadway, New York, N. Y.
Tommy Burns Gold Mining Company.
- Schmidt, Eden**, 1311 Washington Avenue North, Minneapolis, Minn.
Minneapolis & Texada Copperite Company, Limited.
- Schmitt, F.**, 45 Montgomery Street, Jersey City, N. J.
New Jersey Mines Company.
- Schontz, A. F.**, Youngstown, Ohio.
Western Reserve Mining Company.
- Schultheis, F. J.**, Marquette, Mich.
Mass Consolidated Mining Company.
- Schultz, Nathan**, Jerome, Ariz.
Shea Copper Company.
- Scott, David**, Park City, Utah.
Reed's Peak Mining Company.
- Scott, W. D.**, Portland, Oregon.
Cascadia Mining & Development Company.
- Scribner, V. S.**, 1248 E. 1st South Street, Salt Lake City, Utah.
Dry Canyon Consolidated Mining Company.

- Seager, Jas. H.**, Houghton, Mich.
Winona Copper Company.
Helvetia Copper Company.
- Searle, F. E.**, 31 Nassau Street, New York, N. Y.
Hedley Gold Mining Company.
Consolidated Copper Mines Company.
- Sebenius, J. U.**, 1400 Alworth Building, Duluth, Minn.
Mogollon Mines Company.
North Butte Mining Company.
- Sebree, Jas. S.**, Pierre, So. Dak.
Kay Mine Smelting Company.
- Seide, G. A.**, 830 Bloomfield Street, Hoboken, N. J.
New Jersey Mines Company.
- Seligman, A. J.**, 52 Broadway, New York, N. Y.
Richmond-Eureka Mining Company.
- Semple, T. S.**, Richmond, Kansas.
Organ Mountain Mining Company.
Memphis Mining Company.
- Setz, Gust.**, San Antonio, Texas.
St. Joseph Lead Company.
- Shaffer, M. C.**, Plymouth, Ill.
Evergreen Mines Company.
- Shapleigh, A. L.**, 821 Security Building, St. Louis, Mo.
Philipsburg Mining Company.
- Shaw, Q. A.**, 12 Ashburton Place, Boston, Mass.
Smuggler Union Mining Company.
- Shelden, R. S.**, Houghton, Mich.
Douglass Copper Company.
- Sheldon, F. C.**, Shelbyville, Ind.
Platinum Mining & Milling Company.
- Shelley, Geo.**, Provo, Utah.
Utah Arizona Gold and Copper Mining Company.
- Shepherd, H. L.**, Cripple Creek, Colo.
Doctor Jack Pot Mining Company.
- Sheppard, W. J.**, Waubauskene, Ont.
McIntyre Extension Mines, Limited.
McIntyre Porcupine Mines, Limited.
Tretthewey Silver Cobalt Mines, Limited.
- Sherrill, Chas. L.**, 1100 D. S. Morgan Building, Buffalo, N. Y.
Dome Lake Mining & Milling Company, Limited.
Preston East Dome Mines.
- Shibley, F. W.**, 61 Broadway, New York, N. Y.
St. Joseph Lead Company.
- Shields, J. C.**, Houghton, Mich.
New Arcadian Copper Company.
- Shields, J. W.**, Houghton, Mich.
New Arcadian Copper Company.
- Shillington, R. L.**, Haileybury, Ont.
Preston East Dome Mines.
- Shove, E. P.**, 25 Broad Street, New York.
Ray Consolidated Copper Company.
- Shubert, F. G.**, Hancock, Mich.
Owosso Mining Company.
- Sibley, Hiram W.**, Sibley Building, Rochester N. Y.
McKinley-Darragh Savage Mines, Limited.

- Sielcken**, Hermann, 90 Wall Street, New York, N. Y.
General Development Company.
Miami Copper Company.
- Sigel**, Chas., Jr., 603 Symes Building, Denver, Colo.
Indicator Consolidated Gold Mining Company.
- Simmons**, C. W., Kellogg, Ida.
Highland Surprise Consolidated Mining Company.
- Simonds**, N. J., 1012 Baltimore Avenue, Kansas City, Mo.
Lucky Tiger Combination Gold Mining Company.
- Simpson**, J. D. G., Finsbury Pavement House, London, E. C., England.
Kirkland Lake Prop., Limited.
- Simpson**, J. E., Methuen, Mass.
Royal Gold Mines.
- Sinkler**, S. D., 500 Bullitt Building, Philadelphia, Pa.
Tonopah Belmont Development Company.
Belmont Milling Company.
- Sinnicks**, Geo. S., Manchester, Mass.
Rilla Mining Company.
- Sipley**, Geo. M., Nicholson, Pa.
Cuprite Copper Mining Company.
- Sleicher**, John A., 225 Fifth Avenue, New York, N. Y.
New Dominion Copper Company, Limited.
- Sloans**, R. E., 723 Title Insurance Building, Los Angeles, Calif.
London Arizona Copper Company.
- Sloan**, J. B., Burke, Ida.
Ooin Paul Consolidated Mining Company.
- Sloan**, W. W., % MacKenzie Mann Company, Toronto, Ont.
Calumet & Montana Consolidated Mining Company.
- Smart**, C. A., Montreal, Ont.
Porcupine Crown Mine, Limited.
Smart Woods, Limited.
- Smith**, A. J., 25 Broad Street, New York, N. Y.
Tri-Bullion Smelting & Development Company.
- Smith**, C. D., Minerville, Utah.
Blue Ribbon Gold Mining Company.
- Smith**, E. A., Cappelen, 120 Broadway, New York, N. Y.
Braden Copper Company.
- Smith**, F. W., (Supt.) Safford Mining District, Nevada.
Safford Copper Company.
- Smith**, Henry, Grand Rapids, Mich.
Ideal Copper Company.
- Smith**, Jas. D., Fargo, N. Dak.
British American Mining Company.
- Smith**, John, 449 Main Street, Winnipeg, Manitoba.
Star Lake Gold Mines, Limited.
- Smith**, L. N., Claremont, Calif.
Jerome Verde Copper Company.
- Smith**, Ralph, Wallace, Ida.
Red Monarch Mining Company.
- Smith**, R. W. H., 66 Broadway, New York, N. Y.
Atlanta-Home Gold Mining Company.
- Smith**, Samuel L., 82 Devonshire Street, Boston, Mass.
Copper Range Company.
Wolverine Copper Mining Company.
Copper Range Railroad Company.
Atlantic Mining Company.
Baltic Mining Company.
Champion Copper Company.

- Smith, S. D.**, 1884 Amsterdam Avenue, New York, N. Y.
 New Jersey Mines Company.
Smith, W. B., Flint, Mich.
 Onondaga Copper Company.
Smith, W. C., 40 Court Street, Boston, Mass.
 Boston Idaho Mining Company.
Smith, W. Hinckle, Franklin Bank Building, Philadelphia, Pa.
 Utah Copper Company.
 Mines Company of America.
 Ray Consolidated Copper Company.
 Chino Copper Company.
 Nevada Consolidated Copper Company.
Snow, Chas. A., 50 Ames Building, Boston, Mass.
 Trimountain Mining Company.
Solberg, Chas., Wallace, Ida.
 Great Eastern Mining Company, Limited.
Solinsky, T. A., Deadwood, S. D.
 Deadwood-Heidelberg Mining Company.
Somers, Peter J., Jr., Goldfield, Nev.
 Grandma Mining Company.
Sonne, O. H., Reno, Nev.
 Reno Yerington Copper Company.
Sorenson, L. A., 63 Wall Street, New York.
 Porcupine Vipond Mines, Limited.
Soto, Y., Douglas, Ariz.
 Nacozari Consolidated Copper Company.
Speer, J. R., Midland, Pa.
 Old Town Mining, Milling & Transportation Company.
Spencer, Ira, Lawson, Colo.
 Little Giant Gold Mining & Milling Company.
Sperry, Mark L., 25 Broad Street, New York.
 Chino Copper Company.
Sprague, Chas. S., Goldfield, Nev.
 Lone Star Consolidated Mining Company.
Spreckels, Richard, 393 Mills Building, San Francisco, Calif.
 Engels Copper Mining Company.
Spurgeon, W. H., Colorado Springs, Colo.
 Mary McKinney Mining Company.
Spurr, John, Calumet, Michigan.
 Calumet California Mining Company.
Stanhope, L. H., Butte, Mont.
 Montana Illinois Copper Mining Company.
Stanley, C. F., Los Angeles, Calif.
 Gold Bond Mining & Milling Company.
Stanton, J. R., 15 William St., New York.
 Trimountain Mining Company.
Starbuck, C. A., 165 Broadway, New York.
 Canada Copper Corporation, Limited.
Stark, M. F., Colorado Springs, Colo.
 Elkton Consolidated Mining & Milling Company.
Steele, J. N., 120 Broadway, New York.
 American Smelting & Refining Company.
 Kennecott Copper Corporation (Counsel).
Steindler, D. M., 61 Broadway, New York.
 Kerr Lake Mining Company.

- Steindler, J. J.**, 61 Broadway, New York.
Kerr Lake Mining Company.
- Steiner, Geo. A.**, 1175 Second Ave., Salt Lake City, Utah.
South Cardiff Mining Company.
- Stephens, F. C.**, P. O. Box 1656, Mexico City, D. F., Mex.
Pacific Copper Company, Limited.
- Stephens, M. W.**, 914 Merchant National Bank Building, Los Angeles, Calif.
Duplex Mining Company.
- Sternberg, M. L.**, Oklahoma City, Okla.
Mascot Mining & Milling Company, Limited, of Idaho.
- Stevens, Edw. L.**, Tribune Building, New York.
Batopilas Mining Company.
- Stevens, O. G.**, Rochester, Nev.
Rochester Elda Fino Mining Company.
- Stevenson, A. B.**, Pocatello, Idaho.
Pacific Mining & Milling Company.
- Stevenson, A. M.**, Denver, Colo.
Doctor Jack Pot Mining Company.
- Stevenson, H. G.**, 575 Mills Building, San Francisco, Calif.
Treasure Mining Company.
- Stevenson, Wm. E.**, Bay City, Mich.
Beaver Consolidated Mines, Limited.
Temiskaming Mining Company.
- Stewart, J. O.**, 11 Stevens Street, Spokane, Wash.
Rex Consolidated Mining Company.
- Stewart, Dr. J. S.**, Homestead, Pa.
Day Star Mines Company.
- Stewart, Judd**, Plainfield, N. J.
American Smelting & Refining Company.
Nevada Consolidated Copper Company.
- Stewart, R. M.**, Pemberton Building, Victoria, B. C.
Portland Canal Tunnels, Limited.
- Stoddard, L. E.**, New Haven, Conn.
Bingham-New Haven Copper & Gold Mining Company.
Utah Metal & Tunnel Company.
- Stone, F. M.**, 706 Sears Building, Boston, Mass.
Bluebird Company.
- Stone, H. P.**, Warren, Pa.
Cashier Gold Mining & Red. Company.
- Stone, John G.**, Houghton, Mich.
Old Colony Copper Company.
- Stone, N. H.**, Milton, Mass.
Smuggler Union Mining Company.
- Stoneman, Geo. J.**, Phoenix, Ariz.
Inspiration Needles Copper Company.
- Stoner, Wm.**, Lead City, So. Dak.
Hill City Mining & Developing Company (Engr.).
- Storrow, Jas. J.**, 44 State Street, Boston, Mass.
Centennial-Eureka Mining Company.
United States Smelting Company.
United States Smelting, Refining & Mining Company.
- Stotz, Martin**, 530 Land Title Building, Philadelphia, Pa.
Happy Jack Mining & Reduction Company.
- Stralem, C. I.**, 42 Broadway, New York.
% Canada Copper Corporation.
- Strandell, John E.**, Laurium, Mich.
Calumet & California Mining Company.

- Street, John A.**, Harris Trust Building, Chicago, Ill.
% Mascot Copper Company.
- Stricker, G. C.**, Kingman, Ariz.
Leviathan Mines Company.
- Sturges, N. F.**, 1514 Courtland Street, Spokane, Wash.
Security Copper Company.
- Stu. gis, I. J.**, 101 Milk Street, Boston, Mass.
Naumkeag Copper Company.
- Sturm, G. C.**, Idaho Springs, Colo.
Tungsten Exploration Company.
- Sullivan, J. D., Jr.**, 40 Court Street, Boston, Mass.
Vulture Mines Company.
- Sullivan, J. M.**, Dewey, Ariz.
Black Chief Copper Company (mgr.-v. p.).
- Summons, C. W.**, Kellogg, Idaho.
Highland Surprise Consolidated Mining Company.
- Susmann, J. H.**, 61 Broadway, New York.
Caribou Cobalt Mines Company.
Kerr Lake Mining Company.
Naumkeag Copper Company.
New Planet Copper Mining Company.
General Development Company.
Wettlaufer Lorrain Silver Mines, Limited.
- Sussman, Dr. Otto**, 61 Broadway, New York.
Consolidated Interstate Callahan Mining Company.
- Sutherland, R. M.**, Butte, Mont.
Butte & Great Falls Mining Company.
- Sutro, Richard**, 525 Park Avenue, New York.
Tennessee Copper Company.
- Swain, A. P.**, 265 Russ Building, San Francisco, Calif.
Sunset Mining & Development Company.
- Swallow, G. C.**, Sellwood Building, Duluth, Minn.
Butte Ballaklava Copper Company.
- Sweeny, Chas.**, Rookery Building, Spokane, Wash.
Federal Mining & Smelting Company.
- Sweeny, Frank**, Rookery Building, Spokane, Wash.
Federal Mining & Smelting Company.
- Sweet, H. N.**, 60 Congress Street, Boston, Mass.
% Bingham Mines Company.
- Swenson, L.**, Passaic, N. J.
Madera Mining Company.
- Switzer, J. T.**, Topeka, Kan.
Arizona Southwestern Copper Company.
- Synnott, T. W.**, Manhattan Building, Philadelphia, Pa.
Belmont Milling Company.
Tonopah Belmont Development Company.
- Taussig, J. J.**, 821 Security Building, St. Louis, Mo.
Philipsburg Mining Company.
- Taylor, C. B.**, Land Title Building, Philadelphia, Pa.
Belmont Milling Company.
Tonopah Belmont Development Company.
- Taylor, Frank**, Wallace, Idaho.
Bullion Mining Company, Limited.
- Taylor, Gordon, Melinda & Jordan** streets, Torontp, Ont.
Trethewey Silver Cobalt Mines, Limited.

- Taylor, Gustavus**, Providence, R. I.
Tri-Bullion Smelting & Development Company.
- Taylor, M. Allison**, Ames Building, Boston, Mass.
Utah Metal Mining Company.
- Taylor, W. N.**, Commonwealth Building, 316 4th Avenue, Pittsburgh, Pa.
National Lead Company.
- Tener, G. E.**, 42 Broadway, New York.
% Hedley Gold Mining Company.
Calumet & Arizona Mining Company.
- Tevis, H. L.**, West Coast Life Building, San Francisco, Calif.
Homestake Mining Company.
- Thatcher, M. D.**, Pueblo, Colo.
American Smelting & Refining Company.
- Thayer, Eugene V. R.**, 30 State Street, Boston, Mass.
St. Mary's Mineral Land Company.
- Theilman, Emil**, Altman Building, Kansas City, Mo.
Ruby Copper Company.
Southern Arizona Mining Company.
- Thiele, R. R.**, Johnstown, Pa.
Camp Bird Mining, Leasing & Power Company.
- Thom, E. P.**, Bradbury Building, Los Angeles, Calif.
Vivian Mining Company.
- Thoman, A. G.**, Rifle, Colo.
Silvered-Copper Mining Company.
- Thomas, M.**, Boston Building, Salt Lake City, Utah.
Utah Arizona Gold & Copper Mining Company.
- Thompson, G. L.**, Sibley Block, Rochester, N. Y.
McKinley-Darragh Savage Mines, Limited.
- Thompson, Geo. F.**, Minneapolis, Minn.
Leviathan Mining Company.
- Thompson, Wm. B.**, 14 Wall Street, New York.
Mines Company of America.
Utah Copper Company.
- Thomson, J. V.**, Kellogg, Idaho.
Wisconsin Mining Company.
- Thorne, Chas.**, Pleasant Grove, Utah.
Utah Centennial Mining Company.
- Thornton, A. K.**, American Fork, Utah.
Pacific Gold Mining & Milling Company.
- Thornton, W. D.**, 42 Broadway, New York.
% Hedley Gold Mining Company.
- Tierbey, G. O.**, Vancouver, B. C.
Cork-Province Mines, Limited.
- Tierney, Wm.**, Englewood, N. J.
Manhattan Exploration Company.
- Tilden, Jas. F.**, Winchester, Mass.
Abangarez Gold Fields of Costa Rica.
- Timmins, L. H.**, Montreal, Canada.
Hollinger Gold Mines, Limited.
- Titus, S. S.**, Grand Forks, No. Dakota.
Consolidated Interstate Callahan Mining Company.
- Todd, Ambrose G.**, 165 Broadway, New York.
New York & Honduras Rosario Mining Company.
- Toevs, G. I.**, Howard & Malton streets, Spokane, Wash.
Red Monarch Consolidated Mining Company.
- Tomlinson, G. Ashley**, 1400 Alworth Building, Duluth, Minn.
North Butte Mining Company.

- Towles**, Therrett, Wallace, Idaho.
Rainbow Mining & Milling Company, Limited.
- Tracy**, Geo., Waterbury, Conn.
Oronogo Divide Mining Company.
- Traphagen**, O. G., 393 Mills Building, San Francisco, Calif.
Engels Copper Mining Company.
- Treelooan**, John R., 1022 Crocker Building, San Francisco, Calif.
Mercury Mining Company.
- Truman**, I. J., Jr., 393 Mills Building, San Francisco, Calif.
Engels Copper Mining Company.
- Tudhope**, J. B., Orillia, Ont.
McIntyre Extension Mines, Limited.
McIntyre Porcupine Mines, Limited.
Trethewey Silver Cobalt Mines, Limited.
- Tufts**, Walter, 131 State Street, Boston, Mass.
National Lead Company.
- Turner**, Andrew, Folsom, Calif.
Green Horn Mountain Copper Company.
- Turner**, J. K., Goldfield, Nev.
Florence Goldfield Mining Company.
Pioneer Consolidated Mines Company.
- Tutt**, Chas L., Colorado Springs, Colo.
Granite Gold Mining Company.
- Tustin**, Ernest L., 1420 Chestnut Street, Philadelphia, Pa.
Warrior Copper Company.
- Twig**, V. A., Lovelock, Nev.
Packard Extension Mines Company.
- Tyson**, Geo., 8 Congress Street, Boston, Mass.
Antimony Corporation.
- Untermeyer**, Samuel, 37 Wall Street, New York.
General Development Company.
- Upton**, Maxwell M., 140 Cedar Street, New York.
Walker River Copper Company.
- Valtinke**, Paul, Bellevue, Idaho.
Mascot Mining & Milling Company, of Idaho.
- Van Derlip**, John R., 907 Metropolitan Life Building, Minneapolis, Minn.
Helvetia Copper Company.
- Van Law**, Carlos W., Newton Centre, Mass.
Franklin Mining Company.
Indiana Mining Company.
Rhode Island Copper Company.
- Van Orden**, Frank L., Houghton, Mich.
Naumkeag Copper Company.
- Van Wyck**, E. H., % Conn. Zinc Corporation, 500 Fifth Avenue, New York.
Oronogo Divide Mining Company.
- Vincent**, H. S., Deadwood, So. Dak.
Trojan Mining Company.
- Viridin**, Jas., Dover, Del.
Shannon Copper Company.
- Vogel**, Martin, 15 Broad Street, New York.
Tennessee Copper Company.
- Vogelstein**, L., 42 Broadway, New York.
American Zinc, Lead & Smelting Company.
Wisconsin Zinc Company.
- Volgamore**, W. P., Buffalo, N. Y.
Cashier Gold Mining & Reduction Company.

- Wachs, Leo J.**, Tucson, Ariz.
 Arizona Copper Mining Company.
- Wadden, Wm. M.**, Ames Building, Boston, Mass.
 Utah Metal Mining Company.
- Waghorn, J. R.**, Vancouver, B. C.
 Portland Canal Tunnels, Limited.
- Wagner, Henry R.**, Santiago, Chile.
 Braden Copper Company.
- Wagner, L. J.**, Stockton, Calif.
 Lightner Mining Company.
- Wagoner, Bracken**, Manilla, Ind.
 Day Star Mines Company.
- Wakefield, W. J. C.**, Peyton Building, Spokane, Wash.
 Hecla Mining Company.
- Walker, Jos., Jr.**, 61 Broadway, New York.
 Tennessee Copper Company.
- Walker, Jos. C.**, 60 Congress Street, Boston, Mass.
 Corbin Copper Company.
- Wall, Jos. J.**, 35 Congress Street, Boston, Mass.
 % Boston & Montana Development Company.
- Wanklyn, C.**, 20 Cophall Avenue, London, E. C., Eng.
 Plymouth Consolidated Gold Mines, Limited (Chairman).
- Waples, E. B.**, 609 Ford Building, Wilmington, Del.
 Montana-Tonopah Mines Company.
- Ward, M. R.**, Wayne, Pa.
 San Toy Mining Company.
- Warner, A. L.**, Lonsdale Building, Duluth, Minn.
 Alaska Consolidated Mining & Smelting Company.
 Consolidated Interstate Callahan Mining Company.
- Wasson, G. F.**, McCornick Building, Salt Lake City, Utah.
 Lowland Tunnel & Transportation Company.
- Watkins, H. J.**, South Boston, Va.
 Kay Mine Smelting Company.
- Wattis, W. H.**, Ogden, Utah.
 Walker Mining Company.
- Watta, M. F.**, St. Louis, Mo.
 St. Joseph Lead Company.
- Weaver, Chas. A.**, 222 D. F. Walker Building, Salt Lake City, Utah.
 % Beaver Copper Company.
- Weaver, W. S.**, Yerington, Nev.
 Yerington Mines & Exploration Company.
- Webb, C. M.**, Norfolk, Va.
 Tungsten Exploration Company.
- Webber, W. H.**, Denver, Colo.
 Round Mountain Mining Company.
- Weber, Peter**, Mace, Idaho.
 Hugo Gold & Copper Mining Company.
- Weed, W. H.**, 29 Broadway, New York.
 Crystal Copper Company (managing dir.).
- Weichel, Wm.**, Waterloo, Ont.
 Calumet & Montana Consolidated Mining Company.
- Weitman, S. H.**, 2616 E. 16th Street, Oakland, Calif.
 Smith Valley Mines Company.
- Welch, E. C.**, New Middletown, Ohio.
 Western Reserve Mining Company.
- Wellborn, Chas.**, Los Angeles, Calif.
 Estelle Mining Company.

- Wells, L. P.**, Helena, Mont.
Madden Scratch Gravel Mines Company.
- Wertheimer, D. L.**, Prescott Apartments, Salt Lake City, Utah.
Silver King Consolidated Mining Company.
- Wessels, H.**, Passaic, N. J.
Madera Mining Company.
- Westlake, E. H.**, 61 Broadway, New York.
General Development Company.
Tennessee Copper Company.
- Wettstein, J. R.**, Mt. Vernon, N. Y.
National Lead Company.
- Wheaton, H. M.**, 411 Commerce Building, Kansas City, Mo.
Kansas City-Nevada Consolidated Mines Company.
- Wheeler, D. C.**, Lovelock, Nev.
Willard Mines Company.
- Whipple, C. A.**, Helena, Mont.
Montana-Radersburg Mining Company.
- Whitaker, Dr. H. W.**, Columbus, Ohio.
Hermosillo Copper Company.
- White, Alfred B.**, 60 Congress Street, Boston, Mass.
Bingham Mines Company.
- White, A. E.**, Lloyd Building, Kansas City, Mo.
Mansfield Mining & Smelting Company.
Ruby Copper Company.
Southern Arizona Mining Company.
- White, B. F.**, Dillon, Mont.
Montana Oreway Mining Company.
- White, Byron N.**, 1825 Eighth Street, Spokane, Wash.
- White, D. L., Jr.**, Midland, Ont.
Preston East Dome Mines.
- White, J. C.**, 204 Mills Building, El Paso, Tex.
Organ Mountain Mining Company.
- Whitley, C. W.**, McCornick Building, Salt Lake City, Utah.
American Smelting & Refining Company.
Whale Mining Company.
- Whitten, J. L.**, New York.
Standard Amalgamated Exploration Corporation.
- Wiggin, Albert H.**, 42 Broadway, New York.
Inspiration Consolidated Copper Company.
- Williams, Alex.**, 608 So. Dearborn Street, Chicago, Ill.
Georgetown Tunnel Transportation Company.
- Williams, John**, Goodsprings, Nev.
Kansas-Nevada Mining Company.
- Williams, Lombard**, 40 Central Street, Boston, Mass.
Boston Mine Leasing Company (treas.).
- Williams, L.**, 40 Central Street, Boston, Mass.
Terrible Dunderberg Mining Group & Power Company.
- Williams, O. T.**, Elko, Nev.
Nevada Bunker Hill Mining Company.
- Williams, Thos.**, Goodsprings, Nev.
Kansas-Nevada Mining Company.
- Wilson, G. W.**, Greenland, Ark.
La Luz Copper Company.
- Wilson, J. S.**, Massey, Ont., Canada.
Dome Mines Company.
- Wimmer, R. S.**, 722 Kearns Building, Salt Lake City, Utah.
Mason Valley Extension Mining Company.

- Wimpfheimer, C. A.**, 131 Spring Street, New York.
Richmond-Eureka Mining Company.
- Winslow, S. W.**, 205 Lincoln Street, Boston, Mass.
United States Smelting Company.
United States Smelting, Refining & Mining Company.
Centennial-Eureka Mining Company.
- Wirthlin, Jos.**, 127 S. 8 E. Street, Salt Lake City, Utah.
Utah-Yerington Mining Company.
- Withers, J. S.**, Oatman, Ariz.
Black Range Mining Company.
- Wolfe, F. R.**, Ainsworth, B. C.
Red Monarch Copper Mining Company.
- Wolter, H. A.**, Green Bay, Wis.
Hahns Peak Gold Mining & Milling Company.
- Woody, E. H.**, Woody, Calif.
Weringer Mines Company.
- Woodhull, Maxwell**, 42 Broadway, New York.
Utah Consolidated Mining Company.
- Woodruff, Welland D.**, St. Catharines, Ont.
Coniagas Mines, Limited.
- Woods, H. E.**, 561 I. W. Hellman Building, Los Angeles, Calif.
Big Jim Gold Mining Company.
- Woods, W. W.**, Wallace, Idaho.
Amazon-Dixie Mining Company.
- Woods, Thos. S.**, 7 Ivy Street, Boston, Mass.
South Lake Mining Company.
- Wyant, B. H.**, Box 24, Mina, Nev.
Nevada Standard Copper Company.
- Wynn, J. M.**, % J. W. Sparks & Company, The Bourse, Philadelphia, Pa.
Montana-Tonopah Mines Company.
- York, H. W.**, 32 Broadway, New York.
Federal Mining & Smelting Company.
- Young, R. H.**, Lovelock, Nev.
Packard Extension Mines Company.
- Yount, S. E.**, 315 Mariposa Avenue, Los Angeles, Calif.
Yellow Pine Mining Company.
- Zapf, Geo.**, Pablo Beach, Fla.
Camp Bird Mining, L. & Power Company.
- Zoebel, W. E.**, Goldfield, Nev.
Reorganized Booth Mining Company of Goldfield.

MANAGERS OF MINING COMPANIES.

- Abbott, Frank P.**, 95 Madison Avenue, New York City.
Augusta Metal Mining Co.
- Adami, C. J.**, 61 Broadway, New York City.
c/o St. Joseph Lead Co.
- Adams, D. M.**, Box 386, Butte, Montana.
Reliance Mining & Milling Co.
- Adams, L. D.**, 31 South St., New York City.
c/o Weedon Mining Co., Ltd.
- Addams, C. E.**, 25 Broad St., New York City.
Ray Hercules Copper Co.

- Albinola, Peter, Kellogg, Idaho.
Lombardy Mining & Milling Co.
- Alexander, H. H., Maurer, New Jersey.
Perth Amboy Smelter, American Smelting, Refining, Mining Co.
- Alexander, John G., P. O. Box 64, Douglas, Ariz.
Nacozari Consolidated Copper Co.
- Allen, C. E., Newhouse Block, Salt Lake City, Utah.
Bullion Beck & Champion Mining Co.
Richmond Eureka Mining Co.
United States Smelting Co.
Continental Eureka Mining Co.
- Allen, E. E., Warren, Pa.
Cashier Gold Mining & Refining Co.
- Allen, W. R., 407 State Saving Bank Bldg., Butte, Montana.
Butte & Montana Development Co.
Butte & Anaconda Consolidated Mining & Milling Co.
- Amigo, F. J., Goldfield, Nevada.
New Empire Goldfield Mines Co.
- Anchor, H. C., South Porcupine, Ontario.
Dome Extension Mining Co.
- Anderson, A. P., 35 Congress St., Boston, Mass.
c/o United States Refining & Mining Exploration Co.
Needles Mining & Smelting Co.
Mammoth Copper Mining Co.
- Anderson, C. N., Strelna, Alaska.
Alaska Copper Corporation.
- Anderson, W. G., Hamilton, Ontario, Canada.
Ore Chimney Mining Co., Ltd.
- Angus, D. H., 17½ Elgin Street, Ottawa, Ontario, Canada.
c/o Right of Way Mines, Ltd.
- Ansley, Frank, 511 Hyde Block, Spokane, Wash.
Orient Gold Mines, Ltd.
- Anstic, H. Jno., Manitou, Colo.
Lexington Gold Mining Co.
- Aram, W. E., 319 Yuba St., Redding, Calif.
Mountain Monarch Gold Mining Co.
- Arentz, Samuel S., 303 Dooly Bldg., Salt Lake City, Utah.
Lakeview Mining Co.
- Argall, G. O., Leadville, Colo.
Iron Silver Mining Co.
Tucson Mine.
- Armendaiz, Francisco, Apartado 31, Monterey, N. L. Mexico.
c/o Armendaiz-Sucesores, Francisco.
- Armstrong, L. K., Box 215, Spokane, Washington.
Security Copper Co.
- Arzeno, C. L., 8 East 5th St., Covington, Ky.
Imperial Mining Co.
- Atkinson, H., Eureka, Utah.
Utah Minerals Concentration Co.
- Austin, Geo., Wallace, Idaho.
Rainbow Mining & Milling Co., Ltd.
- Avery, Geo. W., Jerome, Arizona.
Calumet & Jerome Copper Co.
- Ayland, Geo. H., Victoria, B. C.
Standard Silver Lead Mining Co.
- Bailey, F. W., Oil City, Pa.
c/o Two Lakes Copper Mining Company, Ltd.
- Bailey, Geo. S., Republic, Wash.
c/o Republic Consolidated Mines Corporation.
- Bains, T. B., Brice, New Mexico.
Jarilla Copper Syndicate, Inc.

- Baird, Richard, Yamhill, Ore.
West Side Gold & Silver Mining Co.
- Baker, G. E., 826 Northwestern Bank Bldg., Portland, Ore.
Oregon & B. C. Mining & Development Co., Ltd.
- Baker, G. L., Cia. Bancaria de Obras Bldg., Mexico, D. F., Mexico.
American Smelting, Refining & Mining Co. (Gen. Mgr. Southern Dept.)
- Baker, J. H., Phoenix, Ariz.
Gulf Copper Co.
- Balcolm, W. E., Parker, Yuma Co., Ariz.
c/o Ruby Gold & Copper Co.
- Baldwin, Geo. E., 45 Broadway, New York City.
Mother Lode Copper Mines Co. of Alaska.
- Ballard, Fred, Howardsville, Colo.
Hamlet Mining & Milling Co.
- Balliet, Letson, Tonopah, Nev.
Buckeye Belmont Mines Co.
- Balliet, S. A., Helena, Mont.
Helena Mining Bureau, Inc.
- Bamberger, Ernest, 163 South Main Street, Salt Lake City, Utah.
Ely Witch Copper Co.
Ontario Silver Mining.
- Banks, C. A., Greenwood, B. C.
Jewel-Denero Mines, Ltd.
- Barnard, John C., Julge Bldg, Salt Lake City, Utah.
American Consolidated Copper Co.
- Barnett, W. H., Patagonia, Ariz.
Happy Jack Mining & Reduction Co.
- Barrach, Geo., Latouche, Alaska.
Latouche Copper Mining Co.
- Barren, Stephen E., Oatman, Ariz.
Gold Cliff Exploration Co.
- Barrett, Jas. G., La Luz, N. M.
La Luz Copper Co.
- Batchelder, C. S., 8-9 Fall Bldg., Spokane, Wash.
New Crystal Mining Co.
- Battles, O. W., 22 East Columbia Street, Colorado Springs, Colo.
Lake George Development Co.
- Beach, E. N., La Plata, Colo.
Copper Hill Mining Co.
- Beardsley, A. L., Sioux City, Iowa.
Genease Valley Copper Co.
Sierra Range Copper Co.
- Beaudry, Wm., Kellogg, Idaho.
Big Creek Leasing Co.
Lone Mountain Mining Co., Tuscarora, Nev.
- Beckett, P. G., Globe, Ariz.
Old Dominion Copper Mining & Smelting Co.
- Beckwith, C. E., Bonanza, Colo.
Rawley Mining Co.
- Beeman, J. H., Gold Hill, Ore.
Lucky Bart Group.
Bill Nye Mine.
- Bell, P. A., Corbin, Mont.
Jefferson Montana Copper Mines Co.
- Beigin, Fred L., Kingston, Idaho.
Hypothek Mining & Milling Co.
- Bell, R. A., Helena, Mont.
Montana States Mining Corporation.
- Bell, Robt. W., 440 Gas & Electric Bldg., Denver, Colo.
Black Prince Copper Co.

- Bennett, C. A., Mercur, Utah.
West Mercur Mining Co.
- Bennie, J. W., Clifton, Ariz.
c/o Shannon Copper Co.
Leonard Copper Co.
- Bentley, C. A., Zacatecas, Mex.
San Roberto Mining Co.
- Bewick Moreing & Co., 62 London Wall, E. C., London, Eng.
Plymouth Consolidated Gold Mines, Ltd.
- Bierce, W. B., McGill, Nev.
Hamilton Power, Mining & Transportation Co.
- Biesel, Chas., Mills Bldg., El Paso, Texas.
Mines Company of America.
- Billingsley, J. H., Galena, Ill.
Burr Mining Co.
Frontier Mining Co.
- Bilsky, A. M., Cobalt, Ontario, Can.
c/o Shamrock Consolidated Mines, Ltd.
- Birch, E. E., Provo, Utah.
c/o Black Jack Consolidated Mining Co.
- Birch, Howard, Nizina, Alaska.
Dan Creek Gold & Copper Co.
- Blaine, J. P., Chesaw, Wash.
Shipper Gold Mining Co.
- Blake, Carolina, Autlan, Jalisco, Mex.
c/o Volcanillos Mines, Avenida Borbon No. 6.
- Blanchard, Chas. H., 546 East 1st South Street, Salt Lake City, Utah.
King William Mining Co.
- Blaylock, S. G., Trail, B. C.
Consolidated Mining & Smelting Co., of Canada, Ltd.
- Bobb, Chas. V., Hyde Bldg., Spokane, Wash.
General Mining, Milling & Leasing Co.
- Bodfish, Fred'k V., 618 Newhouse Bldg., Salt Lake City, Utah.
c/o American Exploration Co.
- Bohm, W. D., Kearns Bldg., Salt Lake City, Utah.
c/o Utah Lead & Copper Co.
- Bolduc, L., Kellogg, Idaho.
Wisconsin Mining Co.
- Bolles, F. R., Houghton, Mich.
Copper Range Railroad Co.
- Bostwick, F. O., Douglas, Ariz.
c/o Washington Mines Development Co.
- Bourke, Jas. A., 68 William Street, New York City.
c/o Standard Copper Mines Co.
- Bovee, J. M., Shawnee, Okla.
Shawnee Copper Mining Co.
- Bowden, W. E., Leadville, Colo.
Ponsardin Mine.
- Bowman, F. C., 206 South 4th Street, Minneapolis, Minn.
New Reliance Gold Mining Co.
- Bowen, Dr. B. S., Humboldt, Ariz.
Humboldt Consolidated Mines Co.
- Box, Oliver, 601 Canal Road, Cleveland, Ohio.
Ozark Smelting & Mining Co.
- Boyce, G. W., Twin Lakes, Colo.
c/o Twin Lakes Mining & Milling Co.
- Braden, E. B., Merchants Exchange, San Francisco, Calif.
American Smelting, Refining & Mining Co.
Dairy Farm Mining Co.
- Bradley, A. L., Danville, Wash.
Mineral Hill Tunnel & Copper Mining Co.

- Bradley, Mark**, Groom Creek, P. O., Ariz.
 Prince Albert Mining & Milling Co.
- Bradley, W. A.**, 912 Columbia Bank Bldg., Pittsburgh, Pa.
 c/o Pittsburgh-Silver Peak Mining Co.
- Bradshaw, Fred**, Tonopah, Nev.
 c/o Tonopah Belmont Development Co.
- Brady, S. H.**, Goldfield, Nev.
 Southwestern Mines Co.
- Bray, Elmer M.**, Delta Boulevard, Los Angeles, Calif.
 Atlanta-Home Gold Mining Co.
- Bretherton, S. E.**, 400 Meridian Life Bldg., Indianapolis, Ind.
 c/o Afterthought Copper Co.
- Brooke, Mary E.**, 423 McPhee Bldg., Denver, Colo.
 Globe & Lost Gulch Silver, Copper Mines Co.
- Brooks, Wm. B.**, 120 East Chestnut Street, Leadville, Colo.
 c/o Progress Mining & Milling Co.
- Brougher, H. E.**, 6150 Harwood Avenue, Oakland, Calif.
 Tonopah Midway Consolidated Mining Co.
- Brown, A. H.**, New Liskeard, Ontario, Canada.
 Temiscaming & Hudson Bay Mining Co.
 Dome Lake Mining & Milling Co., Ltd.
- Brown, Donald C.**, La Aurora, via Tezuitlan, Puebla, Mexico.
 Tezuitlan Copper Mining & Smelting Co.
- Brown, F. L.**, 944 West 6th Street, Reno, Nev.
 Reno Yerington Copper Co.
- Brown, Geo. P.**, P. O. Box C. C. C., San Diego, Calif.
 Esperanza Mining Co.
- Bruce, J. L.**, Butte, Mont.
 Butte & Superior Mining Co.
 Hudson Bay Zinc Co.
- Bruner, H. W.**, 411 Commerce Bldg., Kansas City, Mo.
 Kansas City-Nevada Consolidated Mines Co.
- Brunner, V.**, Mishawaka, Ind.
 Arizona Copper Mining Co.
- Buckley, E. V.**, Salmo, B. C.
 Queen Mines, Inc.
- Buckminster, W. B.**, 141 Milk Street, Boston, Mass.
 Harvard Mine, Inc.
 New Idria Quicksilver Mining Co.
- Budrow, L. R.**, Esqueda, Sonora, Mexico.
 Lucky Tiger Combination Gold Mining Co.
- Buehman, W. H.**, El Tiro, via Silver Bell, Pima Co., Ariz.
 El Tiro Copper Co.
- Burbridge, F. E.**, Wallace, Idaho.
 Federal Mining & Smelting Co.
- Burford, S. W.**, 625 Bank & Insurance Bldg., Dubuque, Iowa.
 c/o Cleveland Mining Co.
- Burke, B.**, Cripple Creek, Colo.
 Dig Gold Mining Co.
- Burke, Wm.**, Saltese, Mont.
 c/o Wilson Mining & Smelting Co.
- Burham, W. Franklin**, 518 Trust Bldg., El Paso, Texas.
 American Exploration & Mining Co.
- Burton, Jas. A.**, P. O. Copper Hill Box, Dixon, New Mexico.
 Champion Copper Co.
- Busey, A. P., Jr.**, Campo Seco, Calif.
 Penn Mining Co.
- Calderwood, Wm. T.**, 501 I. W. Hellman Bldg., Los Angeles, Calif.
 Mexico Mining, Refining & Exploration Co.

- Caldwell, J. U.**, 328 Foster Bldg., Denver, Colo.
American Mines Co.
- Campbell, L. E.**, Lida, Nev.
Syncline Gold & Silver Copper Mining Co.
- Campbell, S. S.**, Clifton, Ariz.
Chase Creek Copper Co.
- Champion, J. F.**, 929 Equitable Bldg., Denver, Colo.
Ibex Mining Co.
- Carlton, L. G.**, Cripple Creek, Colo.
Findley Mines Co.
Doctor Jack Pot Mining Co.
- Carmichael, Norman**, Clifton Ariz.
Arizona Copper Co., Ltd.
- Carnahan, A. L.**, Silver Plume, Colo.
Terrible-Dunderberg Mining Group & Power Co.
Boston Mine Leasing Co.
- Carnell, C. C.**, La Plata, Colo.
Boren Gulch Mining Co.
- Carter, C.**, Ohio City, Colo.
Carter Mining Co.
- Carver, E. Ross**, Hilltop, Nev.
Hilltop Milling & Reduction Co.
Kimberly Consolidated Mines Co.
- Casson, W. E.**, Carson City, Nev.
Shasta Belmont Mining Co.
- Castello, Chas.**, Colorado Springs, Colo.
Mary McKinney Mining Co.
- Castleman, S. J.**, Ikeda Bay, Queen Charlotte Islands, B. C.
Ikeda Mines, Ltd.
- Cates, Louis S.**, Hayden, Ariz.
Ray Consolidated Copper Co.
- Chalmers, Alex.**, Piedmont, Calif.
Lightner Mining Co.
- Chandler, J. W.**, Tonopah, Nev.
Rescue-Eula Mining Co.
- Chase, Chas. A.**, Capper Bldg., Denver, Colo.
Liberty Bell Gold Mining Co.
- Childs, W. H.**, Shamokin, Pa.
Keystone Mining Co.
- Churchill, Geo. W.**, 2837 Hennepin Avenue, Minneapolis, Minn.
San Lazarus Mines Co.
- Clapp, H. C.**, Goldfield, Nev.
Florence-Goldfield Mining Co.
- Clapp, Rolla E.**, 605 Newhouse Bldg., Salt Lake City, Utah.
Goldstrike Consolidated Mining Co.
- Clark, Chas. W.**, 20 Exchange Place, New York.
United Verde Copper Co.
- Clark, E. W.**, Miner Bldg., Butte, Mont.
Ophir Hill Consolidated Mining Co.
- Clark, John E.**, Marion, Ind.
Day Star Mines Co.
- Clark, Roy H.**, Takilma, Ore.
Queen of Bronze Mine.
- Clark, W. A., Jr.**, Butte, Mont.
Timber Butte Milling Co.
- Clark, Will L.**, Jerome, Ariz.
United Verde Copper Co.
- Cleveland, Earle C.**, Mogollon, New Mexico.
Deadwood Mining & Milling Co.
- Cloud, L. G.**, Cumpas, Sonora, Mexico.
Transvaal Mining Co. of Utah.

- Cohen, S. W., Cobalt, Ont., Canada.
Crown Reserve Mining Co., Ltd.
Porcupine Crown Gold Mining Co., Ltd.
- Colburn, E. A., 416 East 10th Street, Denver, Colo.
Ajax Gold Mining Co.
- Colby, F. L., Leib Street, Detroit, Mich.
Saratoga Mining Co.
- Coleman, Jos., Tonasket, Wash.
Trinidad Mining & Smelting Co.
- Collbran, A. H., Holkol, Whang Hai, Province Chosen, Korea.
Seoul Mining Co.
- Collins, Geo. E., 420 Boston Bldg., Denver, Colo.
Mary Murphy Gold Mining Co.
- Collins, John A., Bisbee, Ariz.
Empire State Mining Co.
- Colvocoresses, G. M., Humboldt, Ariz.
Consolidated Arizona Smelting Co.
- Comer, George, Sulzer, P. O., Prince of Wales Island, Alaska.
Beaver Mountain Mining Co.
- Conger, J. B., 433 Century Bldg., Denver, Colo.
Consolidated Mines & Reduction Co.
- Connell, C. O., Haileybury, Ont.
Tough Oaks Gold Mines, Ltd.
- Connell, E. L., Lovelock, Nev.
Humboldt Trinity Gold Mining & Milling Co.
- Conrad, E. W., Eagle Bldg., Spokane, Wash.
Lead King Mining Co.
- Cooke, Walter A., 422 McCornick Bldg., Salt Lake City, Utah.
Great Divide Mines Co.
- Cooney, Frank H., 113 Hamilton Street, Butte, Mont.
East Butte Extension Copper Mining Co.
Butte & Elliston Gold and Copper Mining Co.
- Coplin, J. D., Globe, Ariz.
Barney Copper Co.
- Corless, C. V., Algoma, Ont.
Mond Nickel Co., Ltd.
- Cornell, D. B., Great Barrington, Mass.
Steckner Gold Mining Co.
- Corrigan, Jas., Terrazas, Chihuahua, Mex.
Rio Tinto Copper Co.
- Cortellini, John, Leadville, Colo.
Garbutt Leasing Co.
- Courtney, Dan, Corbin, Mont.
Boston & Corbin Mining Co.
- Cowan, John F., 331 D. F. Walker Bldg., Salt Lake City, Utah.
Walker Mining Co.
Butte-Argenta Copper Co.
- Cowans, Fred, 608 Dooly Blk., Salt Lake City, Utah.
Utah Consolidated Mining Co.
- Cowden, H. D., Bloomington, Ill.
Boston-American Mining Co.
- Cox, Wm. J., Ouray, Colo.
Camp Bird, Ltd. (Gen. Mgr.)
- Coyler, S. E., 513 Denham Bldg., Denver, Colo.
American Fireproofing & Mining Co.
- Crawford, Chas. R., Valdez, Alaska.
Gold King Mining Co.
- Creden, W. L., First National Bank Bldg., Butte, Mont.
Butte-Central Mining & Milling Co.
Davis-Daly Copper Co.
Utah-Apex Mining Co.

- Crome, Wm.**, 27 Latimer Blk., Salt Lake City, Utah.
Gold Bond Mining & Milling Co.
- Crosby, Geo. H.**, 608 Lonsdale Bldg., Duluth, Minn.
Alaska Consolidated Mining & Smelting Co.
Copper Queen Mining & Smelting Co.
- Culver, F. L.**, 810 Lumsden Bldg., Toronto, Ont., Canada.
Temiskaming Mining Co., Ltd.
Beaver Consolidated Mines, Ltd.
- Culver, H. H.**, 1409 Wall Street, Joplin, Mo.
Owosso Mining Co.
- Cunningham, E. N.**, Joplin, Mo.
Phoenix Mining Co.
- Cutler, Harry C.**, Reno, Nev.
New Goldfield Simerone Mining Co.
- Cutright, A. H.**, 22 Continental Bank Bldg., Salt Lake City, Utah.
Beaver Mines Co.
- Czizek, J. A.**, Room 2646 120 Broadway, New York.
Underwriters Idaho Mines Syndicate.
United Gold Mines Co.
Unity Gold Mines Co.
- Dailey, M. J.**, 201 Judge Bldg., Salt Lake City, Utah.
Alta Consolidated Mining Co.
- Daniel, James M.**, Apt. 16, Aguascalientes, Mex.
Leonora y Huerta, Minas.
- D'Arcy, A. L.**, Goldfield, Nev.
Sandstorm-Kendall Consolidated Mines Co.
Reorganized Booth Mining Co. of Goldfield.
Atlanta Mines Co.
Reorganized Kewanas Gold Mining Co.
- Darlington, Harry**, East Ely, Nev.
Mizpah Consolidated Copper & Gold Mining Co.
- Davenport, Capt. Geo. H.**, 35 School Street, Greenfield, Mass.
New England Mining Co.
- Davis, A. W.**, 19 Lawler Blk., Prescott, Ariz.
Fortune Mining Co.
- Davis, E. K.**, 112 East State Street, Redlands, Calif.
Octo Mining Co.
- Davis, Fred N.**, Metaline, Wash.
Metaline Oriole Mining Co.
- Davis, Fred'k.**, Box 477, Elko, Nev.
Nevada Bunker Hill Mining Co.
- Davis, J. R.**, 1011 First National Bank Bldg., San Francisco, Calif.
Round Mountain Mining Co.
- Davis, L. H.**, P. O. Box 312, El Paso, Texas.
Anaconda-Skookum Copper Group.
- Davis, R. E.**, Platteville, Wis.
Midland Lead & Zinc Co.
- Davy, Frederick**, Nederland, Colo.
Western Tungsten Mines Co.
- Dawson, E. H.**, Oatman, Ariz.
Oatman Pioneer Mines, Inc.
- Daxon, Richard**, Hamilton, Mont.
Hamilton-Montana Gold Mining Co.
- Day, A. A.**, 436 Endicott Bldg., St. Paul, Minn.
Minnesota Nevada Investment Co.
- Day, Harry L.**, Wallace, Idaho.
Federal Mining & Smelting Co.
- Deardorf, E. S.**, Winnemucca, Nev.
Wolverine Copper Co.

- Dederichs, Jos.**, Good Springs, Nev.
Saint Anthony Mining Co.
- DeGex, R. M.**, 801 South 2nd Avenue, Phoenix, Ariz.
Red Rover Copper Co.
- Demming, H. C.**, 15 North 3rd Street, Harrisburg, Pa.
Paragon Mining Co.
- Deming, J. L.**, Crown King, Ariz.
Saratoga Mining Co.
- Dempster, Chas.**, Rossland, B. C.
Fife Mines, Ltd.
- Dengler, Theo.**, Kearsarge, Mich.
White Pine Extension Copper Co.
- Denison, Chas. L.**, 14 Wall Street, New York.
Buffalo Mines, Ltd.
- Dennis, C. G.**, Box 608, Vallejo, Calif.
St. Johns Mines Co.
- Denton, F. W.**, Painesdale, Mich.
Copper Range Co.
Trimountain Mining Co.
Champion Copper Co.
- Dern, John**, Box 1418, Salt Lake City, Utah.
North Mountain Mining Co.
- Deshler, Henry D.**, Belvidere, N. J.
National Copper Mining & Development Co.
- Devereux, W. G.**, 131 State Street, Boston, Mass.
Melones Mining Co.
Dutch Sweeney Mining Co.
- Devine, J. C.**, Ray, Ariz.
Pinal Development Co.
- Devlin, A. J.**, P. O. 2221, Spokane, Wash.
Horst-Powell Copper Mining Co.
- Dick, J. C.**, 515 Dooly Bldg., Salt Lake City, Utah.
Lower Mammoth Mining Co.
May Day Mining & Milling Co.
Uncle Sam Cons. Mining Co.
- Dickey, W. A.**, Ellamar, Alaska.
W. A. Dickey Copper Co.
- Dillman, L. C.**, 557 Coleman Blk., Seattle, Wash.
Alaska United Copper Exploration Co.
- Dingwall, W. B. A.**, 10 Cinco de Mayo, San Luis Potosi, Mex.
c/o Negoc. Min. Santa Maria De La Paz.
- Dinsmore, F. C.**, 810 Majestic Bldg., Denver, Colo.
King Solomon Tunnel & Development Co.
- Dittmar, M. E.**, Redding, Calif.
Shasta Copper Exploration Co.
- Dodd, A. B.**, Juneau, Alaska.
Alaska Gold Belt Mining Co.
- Doerr, Kuno**, El Paso, Texas.
American Smelting, Refining & Mining Co.
- Doolittle, C. H.**, 508 McCornick Bldg., Salt Lake City, Utah.
Bingham-New Haven Copper & Gold Mining Co.
Utah Metal & Tunnel Co.
- Douce, M. F.**, Greenhorn, Ore.
Golden Gate Mining Co.
- Douglas, Jas. S.**, 233 Broadway, New York.
United Verde Extension Mining Co.
- Douglas, J. W.**, Chewelah, Wash.
King Mining Co.
- Dowell, G. H.**, Bisbee, Ariz.
Copper Queen Consolidated Copper Co.

- Downe**, Alex. B., Superior, Ariz.
Silver King of Arizona Mining Co.
- Downs**, Carlton R., Jackson, Calif.
Keystone Mining Co.
- Dozier**, Melville, Jr., 443 Holbrook Bldg., San Francisco, Calif.
Willow Valley Mining Co.
- Drolet**, Hector, Haileybury, Ont., Canada.
Algunican Development Co.
Jualin-Alaska Mines Co.
- Drumheller**, D. M., Republic, Wash.
West Hill Mining Co.
- Drury**, W. M., Cia, Bancaria da Obras Bldg., Mexico, D. F., Mex.
American Smelting, Refining & Mining Co.
- Dunshee**, B. H., Hennessy Blk., Butte, Mont.
Anaconda Copper Mining Co.
- Dunyon**, Newton A., 420 Herald Bldg., Salt Lake City, Utah.
Commonwealth Mines Co.
- Dyer**, Geo. F., Goldfield, Nev.
Silver Pick Consolidated Mines Co.
- Eakins**, L. G., P. O. Box 1139, Denver, Colo.
Colorado Department, American Smelting, Refining & Mining Co.
Bachelor Khedive Mines Co.
- Easton**, Stanley A., 1022 Crocker Bldg., San Francisco, Calif.
Bunker Hill & Sullivan Mining & Concentrating Co.
- Eberhardt**, W. G., Johnson, Ariz.
Peabody Consolidated Copper Co.
- Eckloff**, R. C., Montpelier, Idaho.
Bonanza Mining Co.
- Edgren**, Robt. J., 203 Paulsen Bldg., Spokane, Wash.
Best Chance Mining Co., Ltd.
- Edmunds**, Jos. E., 61 Commercial Blk., Salt Lake City, Utah.
Bingham Amalgamated Copper Co.
- Edwards**, B. F., Syndicate Bldg., Oakland, Calif.
Halifax Tonopah Mining Co.
- Edwards**, R. M., Houghton, Mich.
Algolah Mining Co.
Corbin Copper Co.
Franklin Mining Co.
Indiana Mining Co.
Rhode Island Copper Co.
North Lake Mining Co.
South Lake Mining Co.
- Eldred**, I. S., Deer Lodge, Mont.
Independence Gold & Copper Co.
- Eldredge**, N. M., Pocatello, Idaho.
Pocatello Gold & Copper Mining Co.
- Elliott**, J. A., Phoenix, Ariz.
Sterling Copper Co.
- Emerson**, Edw. H., Room 2401, 60 Wall St., New York.
Cuba Copper Co.
- Emmons**, 2nd, N. H., Copperhill, Tenn.
Tennessee Copper Co.
- Ennis**, R. J., Schumacher, Ontario, Can.
McIntyre Extension Mines, Ltd.
McIntyre Porcupine Mines, Ltd.
- Epperly**, G. S., Placer, Ore.
Jim Blaine Mine.
- Ernest**, Harry, Goldfield, Ky.
New Jersey Mines Co.

- Evans, Jack**, Patagonia, Ariz.
 Bland Mine.
- Evans, Jacob**, Provo, Utah.
 King David Mining Co.
- Evans, M. R.**, Wallace, Idaho.
 Wallace Mining, Milling & Realty Co.
- Everett, Wesley**, 508 Bank Street, Wallace, Idaho.
 Leslie Copper Mining Co.
 Amazon-Dixie Mining Co.
- Fairlie, M. F.** (Mill Mgr.), Cobalt, Ontario, Can.
 Mining Corporation of Canada, Ltd.
- Farrell, M. J.**, Barnard Blk., Wallace, Idaho.
 Old Veteran Mining Co.
- Fay, Marcus L.**, 2105 East Superior Street, Duluth, Minn.
 Fay-Cananea Copper Co.
- Fickett, Hon. Fred W.**, 511 Chamber of Commerce, Milwaukee, Wis.
 Tucson Consolidated Copper Co.
- Fields, J. D.**, Chloride, Ariz.
 Silver Keystone Co.
- Fife, R. O.**, Dos Cabezas, Ariz.
 Hilltop, Ariz.
- Finucane, T. R.**, Cobalt, Ontario, Can.
 McKinley-Darragh-Savage Mines.
- Fisk, O. J.**, Goodsprings, Nev.
 Boss-Gold Mining Co.
- Fitch, Walter**, Eureka, Utah.
 Chief Consolidated Mining Co.
- Fitz, R. F.**, Box 275, Los Angeles, Calif.
 El Centro Mining & Milling Co.
 El Orito Mining & Milling Co.
- Fitzgerald, H. J.**, Atlas Block, Salt Lake City, Utah.
 Lehi-Tintic Mining Co.
- Flaig, Andrew**, 1398 21st, Milwaukee, Wis.
 Boston-Colby Copper Mining Co.
- Flanagan, D. D.**, Cobalt, Ontario, Can.
 Meteor Silver Mining Co., Ltd.
- Foster, F. F.**, Chewelah, Wash.
 Hecla Copper Silver Mining Co., Ltd.
- Foster, T. W.**, 408 Gumbel Bldg., Kansas City, Mo.
 Yaqui Canyon Copper Co.
- Fotheringham, A. L.**, Beaver, Utah.
 Granite Copper Co.
- Fowler, S. S.**, Nelson, B. C.
 New Canadian Metal Co.
- Frank, Alfred**, Newhouse Bldg., Salt Lake City, Utah.
 General Exploration Co.
- Franklin, Nelson**, Rollinsville, via Nederland, Colo.
 Rare Metals Co.
- French, S. W.**, Douglas, Ariz.
 Phelps, Dodge & Co.
- Fretz, David**, Vineland, Ontario.
 Ore Extension Mining Co., Ltd.
- Friederichs, C. L.**, Helena, Mont.
 Montana-Clinton Copper Co.
- Fritsche, August**, 35 Congress Street, Boston, Mass.
 Mexican Metals Co.
- Fugal, Louis**, 819 Newhouse Bldg., Salt Lake City, Utah.
 Lowland Tunnel Water & Transportation Co.
- Fuller, T. D.**, 805 Trans. Bldg., Chicago, Ill.
 Georgetown Tunnel & Transportation Co.

- Funston, E. N., Mills Bldg., El Paso, Texas.
U. S. Smelting, Refining & Mining Co.
- Furber, S. D., Redding, Calif.
Delta Consolidated Gold Mines Co.
- Gallwey, H. A., Anaconda, Mont.
B. A. & P. R. R., Anaconda Copper Mining Co.
- Garber, C. J., Gisborn, Utah.
Dry Canyon Consolidated Mining Co.
- Gaskill, Jos. P., Ajo, Ariz.
Ajo Consolidated Copper Co.
- Gates, A. W., Provo, Utah.
Utah Ore Sampling Co.
- Gaylord, Edwin, 516 Exchange Bank Bldg., Colorado Springs, Colo.
Dante Gold Mining Co.
- Gaylord, M. D., Brice, N. M.
Lucky Group.
- Geiger, John W., 625 Dooly Bldg., Salt Lake City, Utah.
Antelope Spring Mining Co.
Nevada Superior Mining Co.
- Geisendorfer, H. A., Pioche, Nev.
Calavada Copper Co.
- Gemmell, R. C., McCornick Blk., Salt Lake City, Utah.
Utah Copper Co.
- George, H. C., Galena, Wis.
Wisconsin Zinc Co.
- Getchell, N. H., Prescott, Ariz.
Y. P. Mining Co.
- Gibbs, C. H., 722 Judge Bldg., Salt Lake City, Utah.
Wasatch Mines Co.
- Gibson, S. A., 603 Jamieson Blk., Spokane, Wash.
Mont. Scotch Bonnet C. & G. Mining Co.
- Gilbert, Chas. O., Aptdo. 22, Zacatecas, Mex.
Magistral, S. A.; Negociacion Minera Del.
- Gilbert, F. C., Durango, Colo.
American Smelting & Refining Co.
- Gillie, John (Gen. Mgr.), Hennessey Block, Butte, Mont.
Anaconda Copper Mining Co.
- Gillmore, J. T., Deadwood, S. D.
Montezuma & The Whizzers Mine.
- Gilman, W. A., Idaho Springs, Colo.
New Era Mines.
- Glasser, J. B., Asst. Mgr., Ouray, Colo.
Camp Bird, Ltd.
- Glein, E. M., 255 California St., San Francisco, Calif.
e/o Presidio Mining & Milling Co.
- Gnaedinger, E. A., Wallace, Idaho.
Laclede Mining Co.
- Goldman, Louis, Paris, Texas.
Copper Queen Gold Mining Co.
- Goodall, Arthur, 24 Market Street, San Francisco, Calif.
Fremont Consolidated Mining Co.
- Gordon, A. R., San Juancito, Honduras.
New York & Honduras Rosario Mining Co.
- Gordon, L. D., 1011 First National Bank Bldg., San Francisco, Calif.
Cerro Gordo Mines Co.
- Gottsberger, B. B., Miami, Ariz.
Miami Copper Co.
- Goudy, F. B., 2379 Forest Street, Denver, Colo.
Southern Exploration & Mining Co.

- Granberg**, Ole, 55 High Street, Oshkosh, Wis.
 Doctor Jack Pot Mining & Milling Co.
 Independence Mining Co.
 Hahns Peak Gold Mining & Milling Co.
- Grannis**, W. D., Kingman, Ariz.
 Arizona Venture Corp.
- Grant**, L. S., Stent, Calif.
 Jumper Californian Gold Mining Co.
- Gray**, E. F., Room 907, 60 Broadway, New York and Kimberly, Nev.
 Giroux Consolidated Mines Co.
 Great Northern Development Co.
 Consolidated Copper Mines Co.
 Regal Mines Co.
- Gray**, S. J., Lakeside, Wash.
 King Solomon Mining Co.
- Gray**, W. F., Oatman, Ariz.
 Times Mining Co.
- Green**, R. M., Box 1393, Butte, Mont.
 Butte & Great Falls Mining Co.
 Snowstorm Mines Consolidated.
 Banner & Bangle Mining Co.
- Greenough**, W. D., Greenough Bros., Old National Bank Bldg., Spokane, Wash.
 Montana-Arizona Copper Co.
 Atlas Mining Co.
- Greenwalt**, Wm. C., 915 Union Bank Bldg., Pittsburgh, Pa.
 Arizona-Idaho Copper Extraction Co.
- Greenway**, John C., Warren, Ariz.
 Calumet & Arizona Mining Co.
- Gridley**, Haines, East Auburn, Calif.
 Oro Fino Mining Co.
- Groves**, F. E., Salida, Colo.
 Standard Gold, Copper & Milling Co.
- Grugan**, Justice, Edwards, N. Y.
 Northern Ore Co.
- Guess**, H. A., 120 Broadway, New York.
 Federal Lead Co.
 American Smelting & Refining Co.
- Guice**, F. A., 525 Plymouth Bldg., Minneapolis, Minn.
 Minneapolis Copper Co.
- Gutheil**, A. G., Price, Utah.
 Mason Valley Extension Mining Co.
 Utah-Yerington Mining Co.
- Guyot**, N. E., Oatman, Ariz.
 Modoc Mines Co.
- Hager** W. E., Century Bldg., Denver, Colo.
 Jewell Mines & Reduction Co.
- Haire**, W. Norman, 412 Dooly Blk., Salt Lake City, Utah.
 Creole Mining Co.
 Mangas Development Co.
 Utah Mining Co.
- Halderer**, Geo. B., Wickenburg, Ariz.
 Furlough Development Co.
- Hale**, F. A., Jr., Goodsprings, Nev.
 Yellow Pine Mining Co.
- Hall**, A. B., 1 Exchange Place, Jersey City, N. J.
 National Lead Co.
- Hall**, G. F., Tusas, N. M.
 Admiral Gold & Copper Mining Co.

- Hallingby, Ole., Calumet, Mich.
La Salle Copper Co.
- Hamburg, Henry, Hamburg, Ariz.
Hartford-Arizona Copper Mining Co.
- Hamlin, C. C., 301 Mining Exchange, Colorado Springs, Colo.
Granite Gold Mining Co.
- Hammons, A. T., Globe, Ariz.
Manitou Hill Copper Co.
- Hanley, Herbert R., 30 Church Street, New York City.
c/o Bully Hill Copper Mining & Smelting Co.
- Hannon, A. F., Kingman, Ariz.
Telluride Chief Mining Co.
- Hansen, G. T., Kearns Bldg., Salt Lake City, Utah.
Bannack Gold Mining Co.
- Hardy, L. G., Aurum, Nev.
Lucky Deposit Mining Co.
- Harbottle, John R., 50 Broad Street, New York City.
Batopilas Mining Co.
- Harley, Geo. F., Tularosa, N. M.
c/o Tularosa Copper Co.
- Harmon, Benj. G., Kellogg, Idaho.
Northern Light Mining & Milling Co.
- Harper, J. L., Cymru mine, Moira Sound, Alaska.
Lakinaw Tagish Co.
- Harrington, F. R., Joplin, Mo.
Underwriters Land Co.
- Harrington, Geo. P., Prescott, Ariz.
c/o Yapapai Consolidated Gold-Silver Copper Co.
- Harrington, Chas. L., Dove Creek, Colo.
Overall Mining Co.
- Harris, C. C., Findlay, Ohio.
Harris Copper Co.
- Harris, Geo., Victor, Colo.
Cripple Creek Gold Mining Co.
- Harris, John L., Hancock, Mich.
Hancock Consolidated Mining Co.
Oneca Copper Mining Co.
- Hartness, J. C., Patagonia, Ariz.
Hardshell-Flux Mining & Development Co.
- Hartwig, Geo., Vancouver, Wash.
Hartwig Mining Co.
- Harvey, Jas. P., 201 Hibernian Bldg., Los Angeles, Calif.
Magistral—Ameca Copper Co.
- Harwood, Wm., McGill, Nev.
Hamilton Power, Mining & Transportation Co.
- Hatfield, Wm., Provo, Utah.
Opohongo Mining Co.
- Hawkins, John T., 218 Burns Bldg., Colorado Springs, Colo.
Jennie Sample Consolidated Mining Co.
- Hawkins, G. T., Jr., 60 State Street, Boston, Mass.
c/o Alvarado Mining & Milling Co.
- Hawley, W. S., 614 Hutton Bldg., Spokane, Wash.
Silver Hoard Mining Co.
- Hayden, Jas., Seward, Alaska.
Kenai-Alaska Gold Mining Co.
- Hayes, J. E., 810 Broad Street, Newark, N. J.
New Jersey Zinc Co.
- Hays, C. W., Goldfield, Nev.
Justice Gold Mining Co.
- Headberg, A. L., 27 Latimer Blk., Salt Lake City, Utah.
American Mining Co., Ltd.

- Hearne, W. H., Wheeling, W. Va.
Hearne Gold & Copper Co.
- Hechtman, Hon. J. F., Globe, Ariz.
Globe Mining Co.
- Heckscher, G. M., 576 Fifth Avenue, New York City.
Vermont Copper Co.
- Heidenreich, W. L., 165 Broadway, New York City.
c/o South Utah Mines & Smelters.
- Heinrich, Metasville, Ga.
Lincoln Gold & Copper Mining Co.
- Heintz, Geo. W., 55 Congress Street, Boston, Mass.
c/o Centennial Eureka Mining Co.
Richmond Eureka Mining Co.
United States Smelting Co.
- Heizer, Otto, Idaho Springs, Colo.
Argo Red'n & Ore Purch'n'g Co.
- Helehan, John, 616 Lyceum Bldg., Duluth, Minn.
c/o Cayuga Development Co.
- Hemple, S. A., Valdez, Alaska.
Hemple Copper Mining Co.
- Henderson, R. M., Breckenridge, Colo.
Wellington Mines Co.
- Hendrickson, Wm. H., 27 Cedar Street, New York.
Horn Silver Mining Co.
- Herr, H. T., Westinghouse Bldg., Pittsburgh, Pa.
Duquesne Mining & Reduction Co.
- Herrick, W. H., Wallace, Idaho.
Idaho Copper Mining Co.
Gray Copper Mining Co., Ltd.
- Herron, D. A., Telluride, Colo.
Tomboy Gold Mines Co., Ltd.
- Herron, Geo., 419 Chamber of Commerce Bldg., Spokane, Wash.
Midway Summit Mining & Milling Co., Ltd.
- Hertzell, T. F., Chewelah, Wash.
Highgrade Silver & Copper Co.
- Heyn, Albert, Nederland, Colo.
Western Tungsten Mines Co.
- Hicks, Edw., 30 Church Street, New York City.
c/o West Coast Mining & Smelting Co.
- Higgins, C. C., Rochester, Nev.
c/o Rochester United Mines Co.
- Higgins, W. I., Twin Bridge & Deer Lodge, Mont.
B. & H. Mines & Mill.
- Hill, Otis, Saltese, Mont.
Montana-Idaho Copper Co.
- Hilty, Eli, Kingman, Ariz.
Oatman Gold Mining & Milling Co.
- Hoar, F. W., Globe, Ariz.
c/o Southwestern Miami Development Co.
- Hodder, Obadiah, Pittsburgh, Pa. (Commonwealth, Bldg.)
Great Northern Copper Co.
- Hoefer, Henry, 280 Chestnut Street, Kingston, Pa.
J. Bennett Smith Mining Co.
- Hoffman, C. E., Cananea, Sonora, Mex.
Democrata Cananea Sonora Copper Co.
- Hoffman, Geo., Whitefish, Mont.
Lupfer Mining Co.
- Hoffman, J. C., Yucca, Ariz.
Arizona Southwestern Copper Co.
- Hogg, Wm. L., Crimora, Augusta Co., Va.
Crimora Manganese Corporation.

- Hollis, H. L.**, 1025 Peoples Gas Bldg., Chicago, Ill.
Surprise Mine.
- Holmes, John**, Mellen, Wis.
Holmes Mining & Milling Co.
- Holmes, J. A.**, Toronto, Ontario, Can.
c/o British-American Nickel Corporation.
- Holmes, Wm.**, Courtland, Ariz.
Leadville Mining Co.
- Holtum, Bernard**, Centennial, Wyo.
c/o Utopia Mining & Milling Co.
- Homaday, F. A.**, Joplin, Mo.
Short Creek Zinc & Lead Co.
- Hopkins, Geo.**, Carrizozo, N. M.
Economic Mining & Milling Co.
- Horstkotte, Arthur**, Potlach, Idaho.
c/o Silver Mountain Mining Co., Ltd.
- Houser, J. N.**, Mascot, Tenn.
American Zinc, Lead & Smelting Co.
- Howbert, Chas.**, Cripple Creek, Colo.
Leland Mining & Development Co.
Anchoria Leland Mining & Milling Co.
- Howe, C. Fred**, Ketchum, Idaho.
Boston-Idaho Mining Co.
- Hoyle, Chas.**, El Oro, Mex.
Esperanza Mining Co.
- Hubbard, Dr. Lucius L.**, Houghton National Bank Bldg., Houghton, Mich.
Sombrero Development Co.
- Hubbard, W. E.**, 66 West Broadway, Salt Lake City, Utah.
Montana-Bingham Consolidated Mining Co.
- Hudnutt, Dr. F. O.**, 405 Kuhn Bldg., Spokane, Wash.
Multnomah Mining, Milling & Development Co.
- Hughes, M. L.**, Joplin, Mo.
Lucky George Mining Co.
- Hughes, Robt. B.**, 8 Allen Blk., Missoula, Mont.
c/o Triangle Mining & Development Co.
- Hughes, Rev. W. J.**, 2441 Center St., Baker City, Ore.
Equity Copper & Gold Mining Co.
- Hull, Hon. Geo. W.**, Jerome, Ariz.
Hull Copper Co.
Huron Gold Co.
- Hunter, H. G.**, Corinth, Vt.
Pike Hill Mines.
- Hunter, H. H., Sr.**, Lovelock, Nev.
Willard Mines Co.
Delaware Mining Co.
- Hutchison, J. W.**, Goldfield, Nev.
Aurora Consolidated Mines Co.
Goldfield Consolidated Mines Co.
- Illingsworth, Nossler**, Randsburg, Calif.
King Solomon Leasing Co.
- Innes, Murray**, Cambria, Calif.
Oceanic Quicksilver Mine.
- Interriden, A. J.**, Lordsburg, N. Mex.
Eighty-Five Mining Co.
- Irwin, D. D.**, 1 Broadway, New York.
Stevens Copper Mining Co.
- Jackson, G. T. (Asst. Mgr.)**, Juneau, Alaska.
Alaska Gastineau Mining Co.

- Jacobsen, A. O.**, Alta, Utah.
Emma Copper Co.
Michigan-Utah Consolidated Mines Co.
Columbus Extension Mining Co.
- Jacobson, R. C.**, 203 Essex Bldg., St. Paul, Minn., or Kingman, Ariz.
Leviathan Mines Co.
- Jahnke, W. P.**, Briston, Mont.
Montana Oreway Mining Co.
- James, J. T.**, Pinos Altos, N. Mex.
Hardscrabble Mining Co.
- James, R. H.**, Cobalt, Ont., Canada.
O'Brien Mining Co.
- James, Sam.**, Northport, Wash.
Northport Smelting & Refining Co.
- James, Mrs. Theresa**, Wallace, Idaho.
Saint James Mining & Milling Co.
- Jaquish, L. C.**, 602 Paulsen Bldg., Spokane, Wash.
Mineral Farm Mining Co., Ltd.
- Jardine, Frank**, Orpheum Bldg., Salt Lake City, Utah.
Lakeview Volunteer Mining Co.
- Jay, C. H.**, Salida, Colo.
Giant Eclipse Consolidated Mines Co.
- Jeffrey, R. H.**, Saltillo, Mex., or 638 Salisbury House, London, E. C. Eng.
Avino Mines. Ltd.
Mazapil Copper Co.
- Jeffs, David W.**, 423 Douglas Avenue, Salt Lake City, Utah.
Rye Patch Mining & Leasing Co.
- Jenkins, C. V.** (Business Mgr.), 120 Broadway, New York.
Nevada Consolidated Copper Co.
- Jennings, W. P.**, 503 McIntyre Bldg., Salt Lake City, Utah.
Grand Gulch Mining Co.
- Jensen, C. A.**, Rico, Colo.
Rico Consolidated Mines Co.
- Jensen, J. C.**, Provo, Utah.
Mineral Flat Mining Co.
Rico-Wellington Mining Co.
- Johnesse, F. E.**, Empire Bldg., Boise, Idaho.
Blue Jacket Mining Co.
Lucky Boy Gold Mining Co.
- Johnson, G. S.**, Clay Peters Bldg., Reno, Nev.
Lincoln Hill Milling & Mining Co.
- Johnson, H. C.**, American Fork, Utah.
Pacific Gold Mining & Milling Co.
- Johnson, J. E.**, Dooly Blk., Salt Lake City, Utah.
Big Cottonwood Consolidated Mining Co.
- Johnson, Lou K.**, Grub Gulch, Calif.
Madera Enterprise Mines Co.
- Johnson, M. M.**, Pioche, Nev.
Uvada Copper Co.
- Jordan, F. M.**, 211 American Bank, Seattle, Wash.
Ellamar Mining Co.
- Joslyn, V. C.**, 46 Cedar St., New York, or Estacion Baca, Chihuahua, Mex.
Almoloya Mining Co.
- Judd, L. S.**, Vicksburg, Ariz.
La Belle Mining Co.
- Julian, E. A.**, Reno, Nev.
Nevada Hills Mining Co.
- Kaeding, C. D.**, South Porcupine, Ont., Canada.
Dome Mines Co.

- Kaufman**, Geo. C. (Mng. Dept.), Matchuala, San Luis Potosi, Mex.
American Smelters Securities Co.
- Kay**, Z. L., R. F. D. No. 2, South Boston, Va.
Kay Mine Smelting Co.
- Kearns**, Thomas, Salt Lake City, Utah.
Kearns-Keith Mining Co.
- Keating**, J. J., Georgetown, Colo.
Georgetown Tunnel & Transportation Co.
- Keever**, Frank B., 33 State Street, Boston, Mass.
Canyon Mines Corporation.
Fortuna Mines Corporation.
- Keith**, David, Kearns Bldg., Salt Lake City, Utah.
O. K. Silver Mining & Milling Co.
- Kennedy**, Chas. F., Montezuma, Colo.
Altezuma Gold Mining & Milling Co.
- Kennedy**, David, Georgetown, Colo.
Kennedy Gold Mining & Milling Co.
- Kent**, W. A., Prescott, Ariz.
Aladdin Mining Co.
- Kern**, J. H., Wallace, Idaho.
Hypotheek Mining & Milling Co.
- Ketr**, J. E., 337 Monadnock Bldg., San Francisco, Calif.
Queen Regent Merger Mines Co.
- Kerr**, M. B., 626 Mills Bldg., San Francisco, Calif.
Barbarossa Mine.
Tajo Mine.
- Kett**, Wm. F., 332 Pine Street, San Francisco Calif.
Mountain Copper Co., Ltd.
- Kidder**, S. J., Mogollon, N. Mex.
Mogollon Mines Co.
- Kimball**, Geo. K., Idaho Springs, Colo.
Old Town Mining, Milling & Transportation Co.
- Kincannon**, Fred, Granby, Mo.
Golden Rule Mining & Milling Co.
- King**, E. W., 146 North Virginia Street, Reno, Nev.
Nevada New Mines Co.
- Kinnon**, W. H., Steins Pass, N. Mex.
November Mining Co.
- Kirchen**, John G., Tonopah, Nev.
Loretto Copper Mining Co.
Tonopah Extension Mining Co.
West Tonopah Mining Co.
Yerington Mountain Copper Co.
- Kirkland**, A. R., 546 East Weber Avenue, Stockton, Calif.
Jamestown Exploration Co.
- Kirkland**, Thornton C., 42 Broadway, New York,
Pacific Smelting & Mining Co.
- Kirkland**, T. C. (Asst. Mgr.), Fundicion, Sonora, Mex.
Anita Copper Mines Co., S. A.
- Kiser**, Chas., 1 Madison Avenue, New York.
Yaqui Copper Co.
- Kishman**, M. W., Cripple Creek, Colo.
Kishman Leasing Co.
- Klockman**, A., 711 Paulsen Bldg., Spokane, Wash.
Idaho-Continental Co.
- Klous**, Samuel, 50 Congress Street, Boston, Mass.
Rilla Mining Co.
- Knapp**, Paul, San Antonio, Baja Calif., Mex.
San Juan Reduction Co.
- Knight**, H. S., 222 Kearns Bldg., Salt Lake City, Utah.
Wilbert Mining Co., Ltd.

- Knight, Jesse**, Provo, Utah.
Beck Tunnel Consolidated Mining Co.
- Knight, J. Wm.**, Knight Blk., Provo, Utah.
Dragon Consolidated Mining Co.
Iron Blossom Consolidated Mining Co.
- Knox, Chas. E.**, 300 First National Bank Bldg., San Francisco, Calif.
Black Oak Mines & Milling Co.
Commonwealth Mining & Milling Co.
Mizpah Extension Mining Co.
Montana-Tonopah Mines Co.
- Kolinski, P. C.**, 1536 First National Bank Bldg., Milwaukee, Wis.
Shamrock Mining Co.
- Korff, M.**, Cripple Creek, Colo.
Komet Mining Co.
- Krape, Wm. G.**, 954 Gas & Electric Bldg., Denver, Colo.
Crown Prince Consolidated Mines Co.
Pine Martin Mining Co.
West Mexico Mines Co.
- Kromer, J. W.**, 407 Exchange Bldg., Denver, Colo.
Packard North Extension Mining Co.
- Lachmund, Oscar**, Greenwood, B. C.
British Columbia Copper Co., Ltd.
New Dominion Copper Co., Ltd.
- Laforgue, Ch.**, 56 Rue de Provence, Paris, France.
Inguaran; Compagnie D'.
- Lakenan, C. B.**, Ely, Nev.
Nevada Consolidated Copper Co.
- Lambourne, G. M.**, 1022 Kearns Bldg., Salt Lake City, Utah.
Daly Judge Mining Co.
Judge Mining & Smelting Co.
- LaMontague, Alfred, Victor**, Colo.
School Section Leasing Co.
- Lamoreaux, W. F.** (Asst Mgr.), Isabella, Tenn.
Ducktown Sulphur, Copper & Iron Co., Ltd.
- Lanyon, Capt. J. H.**, 416 Lonsdale Bldg., Duluth, Minn.
Duluth-Lemhi Mining Co.
- Lassiter, Robt. G.**, 35 Congress St., Boston, Mass.
Blue Wing Mining Co.
- Lathrop, B. A.**, Centennial, Wyo.
Kimball Mining Co.
- Laughlin, W. C.**, San Xavier, Sonora, Mex.
San Xavier Copper Co.
- Laurent, L.**, Tarachi, Sonora, Mex.
Trenton-Sonora Mining Co.
- Lawrence, Willis**, Goldfield, Nev.
Goldfield Merger Mines Co.
- Lawther, T. D.**, 65 London Wall, London, E. C., England.
Esperanza Copper & Sulphur Co., Ltd.
- Lawton, Chas. L.**, Hancock, Mich.
Quincy Mining Co.
- Lea, Rowland**, 18 South Mulberry St., Mansfield, Ohio.
Nevada Copper Hills Mining Co.
- Leach, E. R.**, Security Bank Bldg., Oakland, Calif.
Island Copper Co.
- Leeper, J. E.**, Jerome, Ariz.
Arkansas & Arizona Copper Co.
- Leishman, J. H.**, Cherry Creek, Nev.
Vulcan Mining, Smelting & Refining Co.

- Leland, Frank M., Coram, Calif.
Balaklava Consolidated Copper Co.
First National Copper Co.
Trinity Copper Co.
- Lennie, R. S., 901 Vancouver Blk., Vancouver, B. C.
Kootenay Bonanza Mines, Ltd.
- Leonard, R. W., St. Catharines, Ont., Canada.
Coniagas Mines, Ltd.
- Levensaler, L. A., Ellamar, Alaska.
Fidalgo-Alaska Copper Co.
- Levy, Ernest, Rossland, B. C.
Le Roi No. 2, Ltd.
- Levy, S. M., 414 Judge Bldg., Salt Lake City, Utah.
Ely Consolidated Copper Co.
- LeWald, W. B., Montezuma, Colo.
Philadelphia Mines Co.
- Lewis, W. D., Park City, Utah.
Reeds Peak Mining Co.
- Li, K. C., 2283 Woolworth Bldg., New York.
Wah-Chang Mining & Smelting Co.
- Libbey, J. M., Pennsylvania Bldg., Philadelphia, Pa.
Arizona United Mining Co.
- Limacher, P. J., Wallace, Idaho.
Idaho Nevada Exploration Co., Ltd.
- Lind, H. B., Goldfield, Nev.
Iroquois Copper Co.
- Linden, Wm., Groom Creek, Ariz.
Linden Mining Co.
- Lindsley, Halstead, Room 1508, 60 Broadway, New York.
Cobrizza Mines Development Corporation.
Homestead Iron Dyke Mines Co.
- Linke, Harold A., Cedar, Nev.
Nevada Central Copper Co.
- Linton, Robt., 1400 Alworth Bldg., Duluth, Minn.
Sierra Consolidated Mines Co.
- Littrell, C. F., Valley City, N. D.
Austin Dakota Development Co.
- Lively, W. B., Wallace, Idaho.
Idaho Nevada Exploration Co., Ltd.
- Livermore, Robert, Cobalt, Ont., Canada.
Caribou Cobalt Mines Co.
Kerr Lake Mining Co.
Wettlaufer Lorrain Silver Mines, Ltd.
- Loeb, C. M., 61 Broadway, New York.
Metallurgical Co. of America.
- Loose, Col. Edwin C., Provo, Utah.
Gold Chain Mining Co.
Grand Central Mining Co.
- Loose, W. D. (Asst. Mgr.), Mammoth, Utah.
Gold Chain Mining Co.
- Loper, Weaver, 213 Belmont Bldg., Victoria, B. C.
Lucky Jim Zinc Mines, Ltd.
- Loring, Frank, Home Life Bldg., Toronto, Ont., Canada.
La Belle Kirkland Mines, Ltd.
- Low, W. S., Salem, Ore.
United Copper Gold Mines Co.
- Lowden, John R., Redding, Calif.
Friday-Lowden Copper Co.
- Lucia, Paul, Mullan, Idaho.
Snowshoe Mining Co.

- Ludlow**, Hedley, Avenida 16 de Septiembre No. 26, Mexico, D. F.
Hidalgo Copper Mining & Smelting Co.
- Lusk**, Lewis, Kingman, Ariz.
Arizona-Eastern Mining Co.
- Lyman**, R. H., 103 Bay St., Toronto, Ont., Canada.
Seneca Superior Silver Mines, Ltd.
- MacBoyle**, Errol., 716 Phelan Bldg., San Francisco, Calif.
c/o Union Hill Mining Co.
- Macdermid**, G. A., Cripple Creek, Colo.
C. K. & N. Mining Co.
- MacDonald**, W. B., Leadville, Colo.
American Smelting, Mining & Refining Co.
- Machay**, A. R., Wickenburg, Ariz.
Vulture Mines Co.
- Mackey**, A. P., 427 Symes Bldg., Denver, Colo.
Jerry Johnson Gold Mining Co.
- Maclay**, Wm., Bliss, Mo.
Washington Land Mining Co.
- MacLennan**, F. W. (Asst. Mgr.), Miami, Ariz.
Miami Copper Co.
- MacNaughton**, James, Calumet, Mich.
Ahmeek Mining Co.
Allouez Mining Co.
Calumet & Hecla Mining Co.
Centennial Copper Mining Co.
Cliff Mining Co.
Gratiot Mining Co.
Isle Royale Copper Co.
La Salle Copper Co.
Lake Milling, Smelting & Refining Co.
Lake Superior Smelting Co.
Laurium Mining Co.
Osceola Consolidated Mining Co.
Seneca Mining Co.
St. Louis Copper Co.
Superior Copper Co.
Tamarack Mining Co.
- Madden**, J. S., Austin, Nev.
Nevada Gold Mines Co.
- Madsen**, Andrew, Knight Blk., Provo, Utah.
Tintic Delmar Mining Co.
- Magnum**, C. L., Box 365, Grants Pass, Ore.
Old Glory Gold Mining Co.
- Main**, A. F., El Oro, Mexico.
El Oro Mining & Railway Co., Ltd.
- Maitland**, A., Negaunee, Mich.
North Homestake Mining Co.
- Malchus**, Arthur D., Silverton, Colo.
Aggie Leasing Co.
- Malette**, C. E., Jamieson Bldg., Spokane, Wash.
Idora Mining Co., Ltd.
- Malm**, W. E., Keller, Wash.
Northwest Mines Development Co.
- Maloney**, J., Mifflin, Wis.
Shamrock Mining Co.
- Marhugh**, O. N., 347 West Broad Street, Columbus, Ohio.
Marshall & Russell Gold Mining, Milling & Transportation Co.
- Marsh**, W. E., Box 24, Mina, Nev.
Nevada Standard Copper Co.

- Marshall, J. V.**, Contact, Nev.
Seattle Contract Mining Co.
- Martin, A.**, 601 Canal Road, Cleveland, Ohio.
Ozark Smelting & Mining Co.
- Martin, L. A.**, Newhouse Bldg., Salt Lake City, Utah.
c/o Tintic Tunnel Co.
- Martin, N. J.**, 923 Monadnock Bldg., San Francisco, Calif.
Pioneer Chief Gold Mine Co.
- Mathews, W. M.**, Hostotipaquillo, Jalisco, Mex.
Mololoa Mining Co., Ltd.
- Matthewson, E. P.**, Anaconda, Mont.
Washoe Reduction Works, Anaconda Copper Mining Co.
- Matson, John**, 18-20 East 1st South Street, Salt Lake City, Utah.
Leonora Mining & Milling Co.
- McCarn, H. L.**, Chloride, Ariz.
Rainbow Mountain Mining Co.
- McCarthy, Jas. F.**, Wallace, Idaho.
Hecla Mining Co.
National Copper Mining Co., Ltd.
Oom Paul Consolidated Mining Co.
- McCarthy, A. L.**, Pinos Altos, N. M.
C. & O. Mining & Milling Co.
- McCauley, T. N.**, Harris Trust Bldg., Chicago, Ill.
Mascot Copper Co.
- McCheaney, W. B.**, Oroville, Wash.
Ivanhoe Mining Co.
- McChrystal, Jackson H.**, Eureka, Utah.
Gemini Mining Co.
- McCullough, J. I.**, 204 Mills Bldg., El Paso, Texas.
Organ Mountain Mining Co.
Memphis Mining Co.
- McCune, Vivian**, P. O. Box 1225, Salt Lake City, Utah.
c/o Victor Consolidated Mining Co.
- McDermott, A. M.**, Choix, Fuerte, Sinaloa, Mex.
Los Platanos Mining Co.
- McDonald, D. C.**, Boyd Park Bldg., Salt Lake City, Utah.
McDonald-Ely Copper Co.
- McDonald, Jesse F.**, Leadville, Colo.
Down Town Mines Co.
- McDowell, J. C.**, 218 Colorado Bldg., Denver, Colo.
La Anozira Gold Mining Co.
- McEwen, Kenneth**, Republic, Wash.
Knob Hill Mining Co.
- McFadden, Geo. B.**, Georgetown, Colo.
Mid-Colorado Mines Co.
- McFatrige, J. W.**, 941 West 35th Street, Los Angeles, Calif.
Azurite Mining Co.
- McGarry, H.**, Colorado Springs, Colo.
El Paso Consolidated Gold Mining Co.
- McGee, Geo. P.**, Jerome Place, Helena, Mont.
Barnes-King Development Co.
- McGoffin, Wm. J.**, Galena, S. D.
New Puritan Mining Co.
- McGrath, Daniel L.**, Wallace, Idaho.
c/o Ray Jefferson Mining Co.
- McIntosh, Burke**, Kellogg, Idaho.
c/o Star Antimony Co.
- McIntyre, Samuel, Sr.**, 409 Hooper Bldg., Salt Lake City, Utah.
Mammoth Mining Co.
Melcher Mining & Milling Co.
- McIntyre, W. P.**, Elizabethtown, N. M.
Gold & Copper Deep Tunnel Mining & Milling Co.

- McIver, J. L.**, Oatman, Ariz.
Oatman Syndicate Mining Co.
- McKinley, Chas. E.**, Prescott, Ariz.
McKinley Mining & Development Co.
- McKinnis, Chas.**, Wallace, Idaho.
c/o Alameda Mining Co.
Caledonia Mining Co.
- McLean, W. H.**, Morenci, Ariz.
Detroit Copper Mining Co. of Arizona.
- McMullen, A. J.**, Milford, Utah.
Beaver Copper Co.
Utah United Copper Co.
O. K. Extension Mining & Reduction Co.
- McLeod, Geo. A.**, Chesaw, Wash.
Grant Consolidated Copper Mining Co.
- McLeod, R. J.**, Mullan, Idaho.
Missoula Copper Mining Co.
- McLeod, Will**, 218 Colorado Bldg., Denver, Colo.
c/o Arapahoe Mining & Milling Co.
- McMillan, A. C.**, Platteville, Wis.
McMillan Zinc Co.
- McMillan, H. G.**, 649 East South Temple Street, Salt Lake City, Utah.
Old Evergreen Mining & Transportation Co.
- McNaughton, Allan**, Elliston, Powell Co., Mont.
Twin City Mining & Milling Co.
- McQuarrie, R. G.**, 1025 Kearns Bldg., Salt Lake City, Utah.
c/o Bull Valley Gold Mines Co.
- McQuatters, A.**, 706 Mills Bldg., El Paso, Texas.
Alvarado Mining & Mining Co.
- McVichie, J. A.**, Cobalt, Ontario, Can.
Aladdin Cobalt, Ltd.
- Mead, E. H.**, Tonopah, Nev.
Cash Boy Consolidated Mining Co.
- Mensch, Major W. A.**, 1729 29th Street, San Diego, Calif.
Enterprise Mining & Smelting Co.
- Mercer, J. W.**, 15 Broad Street, New York City.
c/o South American Development Co.
- Mercer, W. H.**, Globe, Ariz.
Radium Mines Co.
- Merrill, I. L.**, 42 Broadway, New York City.
Hedley Gold Mining Co.
- Messer, Frederick W.**, Silao, Gto., Mexico.
Compania Minera Caridad.
- Metcalfe, C. W.**, Kennett, Calif.
Mammoth Copper Mining Co. of Maine.
- Meyer, J. E.**, Vidal, Calif.
Bendigo Mines Co.
- Millard, B. F.**, 425 Orchestra Bldg., Chicago, Ill.
Galena Bay Mining Co.
- Miller, B.**, Austin, Ore.
Vincent Creek Gold & Copper Co.
- Miller, C. N.**, 617 Pacific Bldg., San Francisco, Calif.
Nevada Champion Copper Co.
- Miller, I. C.**, Rawlins, Wyo.
Itmay Copper Mining Co.
- Miller, John H.**, Hawthorne, Nev.
Lucky Boy Consolidated Mining Co.
- Miller, Wm. A.**, Suite 22, Moffatt & Kassler Blk., Denver, Colo.
Gilpin Orion Gold Mining Co.
- Miller, Wm. P.**, Virginia City, Nev.
Jacket Crown Point Belcher Mines Co.

- Miller, W. W.**, 603 West Broadway, Newton, Kan.
 Keystone Copper Mining Co.
- Mills, C. E.**, Miami, Ariz.
 International Smelting Co.
 Inspiration Consolidated Copper Co.
- Minier, H. E.**, Lawson, Colo.
 Little Giant Gold Mining & Milling Co.
- Mishler, R. T.** (asst. gen. mgr.), Esqueda, Sonora, Mexico.
 Lucky Tiger Combination Gold Mining Co.
- Mitchell, Clark G.**, Box 133, Independence, Colo.
 Isabella Mines Co.
- Mitchell, Robt.**, 209 National Bank of Ariz. Bldg., Phoenix, Ariz.
 La Cobriza Mining Co.
- Moffat, Alex. D.**, Milford, Utah.
 Majestic Mines Co.
- Molder, John C.**, Morenci, Ariz.
 New York Arizona Gold & Copper Co.
- Moodie, J. W. D.**, 747 Fifth Avenue, New York City.
 Howe Sound Co.
- Moore, Geo.**, Webb City, Mo.
 Twin City Mining Co.
- Moore, Ray W.**, 1202 Hollingsworth Bldg., Los Angeles, Calif.
 Good Springs Anchor Co.
- Moreland, I. S.**, Clancey, Mont.
 King Solomon Mining Co.
- Morningstar, Freeman**, 159 South Main Street, Salt Lake City, Utah.
 Nevada Bonanza Copper Co.
- Morris, M. C.**, 17 Battery Place, New York City.
 c/o Cupric Mines Co.
- Morrison, J. D.**, Butte, Mont.
 Iowa-Montana Development Co.
 Montana-Illinois Copper Mining Co.
- Morrison, J. W.**, Haileybury, Ontario, Can.
 Lake Shore Mines, Ltd.
- Morrison, L. N.**, Tobar, Nev.
 Nevada Zinc Co.
- Morrison, R. B.**, Washington, Calif.
 Calumet & California Mining Co.
- Moser, Geo. F.**, Oatman, Mohave Co., Ariz.
 Arizona Tom Reed Gold Mines Co.
- Mowers, E. P.**, 1102 West Seventh Street, Salt Lake City, Utah.
 Glenwood Mining Co.
- Muir, D. D., Jr.**, Newhouse Bldg., Salt Lake City, Utah.
 Intermountain mgr. United States Smelting, Refining & Mining Ex-
 ploration Co.
- Muir, D. R.**, Goldroad, Ariz.
 Gold Road Mines Co.
 Needles Mining & Smelting Co.
- Mulholland, J. H.**, Wickenburg, Ariz.
 Monarch Mining & Smelting Co.
- Mullen, R. G.**, Cripple Creek, Colo.
 Hondo Mining & Milling Co.
- Mulley, P. J.**, Fortuna, Calif.
 Fortuna Copper Co.
- Mulliken, H. S.**, 61 Broadway, New York City.
 c/o Penoles Mining Co.
- Mumme, T. E.**, 1502 Flores St., San Antonio, Texas.
 Mumme Mining Co.
- Murphy, Arthur**, Pioche, Nev.
 E. & F. Mining Co.

- Murphy, F. M.**, Room 514, 49 Wall Street, New York City.
Gila Copper Sulphide Co.
- Murphy, Jas. J.**, Burke, Idaho.
Moonlight Mining Co.
- Nagle, Owen H.**, R. F. D. No. 3, Fairfield, Pa.
Eagle Metallic Copper Co.
- Naylor, Hugh E.**, Front Royal, Va.
Gooney Manor Copper Co.
- Neal, Walter**, Makeever Bros. Journal Bldg., Boston, Mass.
El Favor Mining Co.
- Neer, O. L.**, Cumpas, Sonora, Mex.
United Mexican Mines.
- Neff, S. G.**, Bluecreek, Wash.
Liberty Copper Mining Co.
- Neilly, R. Verner**, Goldenville, N. S.
Goldenville Mining Co.
- Nelson, Chas.**, Jarbridge, Nev.
Alpha Mine.
- Neustaedter, A.**, 44 Pine Street, New York.
c/o Arminius Chemical Co., Inc.
- Neville, John B.**, Altman, Colo.
Free Coinage Gold Mining Co.
- Newberger, M.**, Parkersburg, W. Va.
West Virginia-Wyoming Copper Co.
- Nicholas, Francis C.**, 15 William Street, New York.
Copete Consolidated Copper Co.
- Nichols, A. O.**, Superior, Mont.
Wisconsin-Montana Mining Co.
- Nichols, Ralph**, Gilmore, Idaho.
Latest Out Mining & Smelting Co.
- Nordquist, John H.**, Burke, Idaho.
Imperial Mining Co.
Comstock Copper Mining Co., Ltd.
Lucky Calumet Copper Mining Co., Ltd.
- Nordquist, Oscar**, 308 Pine Street, Wallace, Idaho.
Intermountain Copper Mining Co.
Rose Consolidated Mining Co.
Ivanhoe Mining Co.
- Norman, Sidney**, Columbia Bldg., Spokane, Wash.
Norman Mines Co.
- Northrup, J. C.**, Palouse, Wash.
Merger Mining Co., Ltd.
- Norton, A. O.**, 286 Congress Street, Boston, Mass.
Norton, A. O.
- Norton, Jas. W.**, 809 Sellwood Bldg., Duluth, Minn.
Duluth-Sonora Copper Co.
- O'Brien, Chris. D., Jr.**, 513 Germania Life Bldg., St. Paul, Minn.
Mascota Copper Co.
- O'Brien, F. X.**, Wickenburg, Ariz.
Gold Bar Mining Co.
- O'Brien, P. E.**, 2740 Telegraph Avenue, Berkeley, Calif.
Black Eagle Mining Co.
- O'Connell, Chas. A.**, Kirkland, Ont.
Sylvanite Gold Mines Co.
- O'Grady, Jas.**, Great Falls, Mont.
Boston-Montana Reduction Works, Anaconda Copper Mining Co.
- Oliver, C. M.**, 415 Rogers Bldg., Vancouver, B. C.
Bowena Copper Mines, Ltd.
- Oliver, F.**, Sun Life Bldg., Toronto, Ontario, Can.
Cordova Mines, Ltd.

- O'Neill, John, Hennessy Blk., Butte, Mont.
(Asst. mgr.) Anaconda Copper Mining Co.
- Orem, W. C., 222 South W. Temple Street, Salt Lake City, Utah.
Nevada-Douglas Consolidated Copper Co.
- Orr, Chas. O., Goldfield, Nev.
Gold Prince Mining & Leasing Co.
- Orr, E. W., c/o G. S. Johnson Co., Clay Peters Bldg., Reno, Nev.
Nevada Tungsten Mines Co.
- Orr, W. J., Forest, Idaho.
Deer Creek Mining & Milling Co.
- Osborn, Ralph R., c/o Wm. A. Kerr, 111 Broadway, New York.
Empire Copper Co.
- Osborn, S., American Fork, Utah.
Osborn Consolidated Mining & Milling Co.
- Osborne, Arthur H., 717 Onondaga Bank Bldg., Syracuse, N. Y.
Onondaga Mines Co.
- Ostronick, M. R., Twin Bridges, Mont.
Little Goldie Mine.
- Packard, Edw., Kearns Bldg., Salt Lake City, Utah.
Godiva Mining Co.
- Paddock, R. G., 215 Balboa Bldg., San Francisco, Calif.
Inyo Copper Mines Corp.
- Page, F. W., Hodson, Calif.
Royal Gold Mines.
- Page, Walter T., Omaha, Neb.
American Smelting, Refining & Mining Co.
- Page, Warren F., Leadville, Colo.
Luema Mining Co.
- Painter, Robt. K., 25 Broad Street, New York.
Northern Pyrites Co.
- Pate, W. S., Joplin, Mo.
Kentucky Lead & Zinc Co.
- Patriquin, D. J., Baddeck, N. S.
Great Bras D'Or Mining Co.
- Patriquin, Louis, Parkfield, Calif.
Patriquin Quicksilver Mine.
- Patterson, R. C., 436 Sibley Street, St. Paul, Minn.
Paragon Consolidated Mining Co.
- Pattison, Byron M., Sellwood Bldg., Duluth, Minn.
Juanita Mining Co., S. A.
- Paul, Samuel J., Hornitos, Calif.
Mount Gaines Gold Mining Co.
- Paxton, E. E., 393 Mills Bldg., San Francisco, Calif.
Engels Copper Mining Co.
- Pearson, Morris, 625 Cedar Street, Wallace, Idaho.
Lucky Swede Gold & Copper Mining Co.
- Pearson, W. S., Allegheny, Calif.
Oriental Gold Mining Co.
- Peck, E. E., Los Angeles, Calif.
Los Angeles Gem Co.
- Pella, Joe, 824 Vine Street, Missoula, Mont.
c/o Advance Mining Co.
- Peirce, Geo. W., 25 Broad Street, New York.
Oatman Crescent Mining Co.
- Pembroke, Herbert, 22 E. Broadway, Salt Lake City, Utah.
Morgan Argentine Mining Co.
- Penberthy, J. E., Gleeson, Ariz.
Leonard Copper Co.
- Penman, Jas., 914 Columbus Savings & Trust Bldg., Columbus, Ohio.
Hermosillo Copper Co.

- Percival, John A.**, 61 Broadway, New York.
Consolidated Interstate Callahan Mining Co.
- Perkins, W. A.** (Bus. Mgr.), Ogden, Utah.
Lakeview Mining Co.
- Perrier, Felix**, St. Maries, Idaho.
Iron Mask Mining Co.
- Perry, O. B.**, 120 Broadway, New York.
Yukon Gold Co.
- Peter, Chas.**, 644 E. South Temple Street, Salt Lake City, Utah.
Mascot Mining & Milling Co., Ltd., of Idaho.
- Peterson, L. P.**, Kearns Bldg., Salt Lake City, Utah.
Selma Mines Co.
- Peterson, O. F.**, 54 E. 4th South Street., Salt Lake City, Utah.
Dugway Copper Mining & Smelting Co.
- Peterson, Peter**, Wallace, Idaho.
Big Elk Mining Co.
- Pett, Imer**, 404 Dooly Blk., Salt Lake City, Utah.
Eagle & Blue Bell Mining Co.
Bingham Mines Co.
American Star Mining Co.
Victoria Consolidated Mining Co.
Yosemite Mines Co.
- Petty, W. W.**, Walcott, Wyo.
Walcott Copper Mining Co.
- Phillips, C. E.**, Kerby, Ore.
Vanguard Gold-Copper Co.
- Pierce, A. S.**, 501 Majestic Bldg., Denver, Colo.
Laura Lee Mining & Leasing Co.
- Pierce, W. H.**, Baltimore, Md.
American Smelting & Refining Co.
- Pitney, F. R.**, 303 Lankershim Bldg., Los Angeles, Calif.
Lucile Gold & Copper Mining Co.
- Platt, Edwin H.**, Equitable Bldg., Denver, Colo.
St. John Mines, Ltd.
- Plonin, R.**, Santa Rosalia, Sur. Baja California, Mex.
c/o Boleo; Compagnie Du.
- Poirier, C. H.**, Schumacher, Ont., Canada.
Porcupine Vipond Mines, Ltd.
- Pomeroy, W. E.**, Mina Mexico, Sonora, Mex.
Chicago Exploration & Development Co.
- Pond, Col. D. H.**, Blackstone Bldg., Cleveland, Ohio.
Los Cerros Copper Co.
- Poole, C. W.**, Seven Troughs, Nev.
Seven Troughs Mining Co.
- Pope, John D.**, O'Rourke Est. Bldg., Butte, Mont.
Rainbow Lode Development Co.
- Porter, L.**, Tungsten City, via Bishop, Calif.
Standard Tungsten Co.
- Porter, Peter** (Asst. Mgr.), Columbia Bldg., Spokane, Wash.
Norman Mines Co.
- Porter, Rudolph**, Federal, Ill.
American Smelting, Refining & Mining Co.
- Potter, Ocha**, Houghton, Mich.
Houghton-Alaska Exploration Co.
- Prealey, John**, Wallace, Idaho.
North American Mining Co., Ltd.
- Prinsk, W. J.**, Tangier, N. S.
Dominion Mining Co.
- Robert, A. C.**, Box 56, Taos, N. Mex.
Taos Mining Co.

- Proff, Peter**, Meteor, Wash.
Gwinn Mining Co.
- Prout, John W.**, Rico, Colo.
Puzzle Leasing Co.
- Pryor, Fred R.**, Minersville, Utah.
Blue Ribbon Gold Mining Co.
- Pryor, Reginald C.**, Houghton, Mich.
Onondaga Copper Co.
- Pullen, E. F.**, Porquois Junction, Ont., Canada.
Alexo Mines, Ltd.
- Qualey, Frank D.**, Hawthorne, Nev.
Excelsior Mountain Copper Co.
- Quigley, W. J.**, Chihuahua, Mex.
Chihuahua Mining Co.
- Quinlan, Jas. E.**, Luning, Nev.
c/o Shipper Copper Mining Co.
- Raddatz, E. J.**, 422 Judge Bldg., Salt Lake City, Utah.
Tintic Standard Mining Co.
- Rainsford, R. S.**, 404 Humboldt Bank Bldg., San Francisco, Calif.
Argonaut Mining Co.
- Rapp, M. B.**, Cripple Creek, Colo.
Last Dollar Mining & Development Co.
- Ream, F. L.**, P. O. Box 488, Salida, Colo.
Giant-Eclipse Consolidated Co.
- Reber, F. L.**, Lower Rochester, Nev.
Rochester Buck & Charlie Mines Co.
- Reece, P. L.**, 406 North Ewing Street, Helena, Mont.
Cuprite Copper Mining Co.
- Reeser, E. B.**, 331 Fourth Ave., Pittsburgh, Pa.
Mineral Hill Consolidated Copper Co.
- Reed, Jos.**, 728 Mission St., Spokane, Wash.
Lawrence Mining and Milling Co., Ltd.
- Reid, John T.**, Lovelock, Nev.
Mines Development Co. of Nevada.
- Renshaw, Wm. E.**, Idaho Springs, Colo.
Idaho Mining, Reduction & Transportation Co.
- Renwick, C. W.**, Isabella, Tenn.
Ducktown Sulphur, Copper & Iron Co., Ltd.
- Reynolds, J. B.**, Strafford, Vt.
Orange County Copper Mine.
- Reynolds, J. F.**, Alamosa, Colo.
Tepee Mining & Development Co.
- Rhodes, C. J.**, 733 Central Bldg., Los Angeles, Calif.
Orion Mining & Milling Co.
- Richards, E. R.**, Buckhorn, Nev.
Buckhorn Mines Co.
- Richards, L. A.**, Silver City, S. Dak.
Homelode Mining & Milling Co.
- Richardson, S. H.**, 622 Old National Bldg., Spokane, Wash.
Knob Hill Mining Co.
- Rickards, J. R.**, Cedar City, Utah.
Silver Peak Mining Co.
- Ricketts & Co., Inc.**, 80 Maiden Lane, New York.
Mojave Tungsten Co.
Mountain Silver, Lead & Zinc Co.
- Ricketts, L. D.**, 42 Broadway, New York.
Cananea Consolidated Copper Co.
San Pedro Copper Co., S. A.

- Riddell, H. K., Goodsprings, Nev.
Oro Amigo Platino Mining Co.
- Riggs, Edw., 414 Judge Bldg., Salt Lake City, Utah.
Carisa Gold & Copper Mining Co. of Maine.
- Rinehart, E. S., Stevensville, Mont.
Mt. Thompson Gold Mining & Milling Co.
- Robbins, P. A., 85 Bay St., Toronto, Ont., Canada.
Hollinger Consolidated Mines, Ltd.
Canadian Mining & Finance Co., Ltd.
Hollinger Gold Mines, Ltd.
- Roberts, John T., Jr., Ouray, Colo.
Wanakah Mining Co.
- Roberts, Thos., Gem, Idaho.
Roberta Mining & Milling Co.
- Robertson, F. Y., 120 Broadway, New York.
U. S. Metals Refining Co. of New Jersey.
- Robin, Louis, Esmeralda, Calif.
Standard Amalgamated Exploration Corp.
- Robinson, H. S., Cobalt, Ont., Canada.
Tretthewey Silver-Cobalt Mines, Ltd.
- Rogers, H. T., Idaho Springs, Colo.
Oneida-Stagg Mining & Milling Co.
- Rogers, P. F., Beeler, Idaho.
Highland Surprise Consolidated Mining Co.
- Rohn, Oscar, Butte, Mont.
East Butte Copper Mining Co.
Pittsmtont Copper Co.
- Roodhouse, O. E., Tungsten, via Osceola, White Pine County, Nev.
U. S. Tungsten Corp.
- Roos, A. T., Deadwood, S. Dak.
Deadwood-Heidelberg Mining Co.
- Roote, Jesse B., Butte, Mont.
Keating Gold Mining Co.
- Rosenfield, S., East Helena, Mont.
Economy Gold Mines Co.
- Ross, Edgar C., 222 Kearns Bldg., Salt Lake City, Utah.
Allie Mining Co., Ltd.
Gilmore Mining Co.
- Ross, Harvey M., Kellogg, Idaho.
Nabob Mining Co.
- Ross, J. B., Silverton, Colo.
St. Paul Mining & Reduction Co.
- Ross, Kenneth, Missoula, Mont.
(Lumber Dept.), Anaconda Copper Mining Co.
- Rossman, W. F., 1012 Pierce Bldg., St. Louis, Mo.
Smelter Mgr., American Zinc, Lead & Smelting Co.
- Royer, Frank W., 120 Broadway, New York.
Pacific Mines Corp.
- Rudebeck, N., Index, Wash.
Florence-Rae Copper Co.
- Rush, U. S., Kasaan, Prince of Wales Island, Alaska.
Rush & Brown Group.
- Russell, W. C., Cardinal, Colo.
Caribou Mines & Mills Co.
- Russell, W. W., Burke, Idaho.
Great Western Mining Co.
- Rutherford, J. R., Sheep Creek, B. C.
Mother Lode Sheep Creek Mining Co.
- Ryan, Dennis, Mullan, Idaho.
Gold Hunter Mining & Smelting Co.

- Ryan, W. D., 601 Providence Bldg., Duluth, Minn.
St. Mary Mining Co.
- Rybon, Benj., Humboldt, Ariz.
Humboldt Consolidated Mines Co.
- Rystrom, Dr. W. A., Valdez, Alaska.
Landlock Bay Copper Mining Co.
- Sanford, J. B., Cananea, Sonora, Mex.
(Asst. Mgr.), Carnegie Lead & Zinc Co.
- Sarrick, Geo. H., Kelvin, Ariz.
Golden Bell Mining Co.
- Saul, H. C., Douglas, Wyo.
North Laramie Peak Copper Mining Co.
- Sawyer, E. M., Tyrone, N. M.
Burro Mountain Copper Co.
- Sayres, Robt., H., Central City, Colo.
Lake Mine.
- Schacht, H., 82 Devonshire St., Boston, Mass.
Champion Copper Co.
- Scheave, Wm., Wallace, Idaho.
Belmont Mining Co., Ltd.
- Scheerer, H. F., Box 1116, Tucson, Ariz.
Cababi Mining Co.
- Schirmer, R. E., 79 Milk St., Boston, Mass.
Argo Mining & Tunnel Co.
- Schnitzel, Henry, Deadwood, S. Dak.
Golden Reward Consolidated Gold Mining & Milling Co.
- Schott, Max, 822 A. C. Foster Bldg., Denver, Colo.
Ohio & Colorado Smelting & Refining Co.
- Schrader, E. J., Yerington, Nev.
Pittsburgh-Dolores Mining Co.
- Schuyler, W. S., Pike, Calif.
Sierra-Alaska Mining Co.
- Scott, A. W., 44 Broad Street, New York.
Superstition Consolidated Mining Co.
- Scott, J. C., Jerome, Ariz.
Boston & Jerome Copper Co.
- Scotten, S. C., 39 Board of Trade, Chicago, Ill.
National Mines Co.
- Seaman, D. A., Phoenix, Ariz.
Juanita Mining & Milling Co.
- Seemann, Henry I., 402 First National Bank Bldg., Denver, Colo.
Gilt Edge Mines & Smelting Co.
- Semis, W., Park City, Utah.
Reed's Peak Mining Co.
- Senecal, C. A., Lake Linden, Mich.
Hussey Howe Mining Co.
- Sessions, E. A., 1005 Kelly Street, Portland, Ore.
Cascadia Mining & Development Co.
- Shafer, C. E., Jamestown, Calif.
Nyman Consolidated Mines Co.
- Shanks, D. W., Los Angeles, Calif.
Trinity Gold Mining & Reduction Co.
- Sharp, Alex., Vancouver, B. C.
First Thought Mining Co.
- Shea, D. J., Jerome, Ariz.
Shea Copper Co.
- Sheck, Wm., Hutton Bldg., Spokane, Wash.
American Tungsten Consolidated Corporation.
- Sheffell, Robt., Govan, Wash.
Jack Waite Mining Co., Ltd.

- Shelley, J. F.**, Shelley, Idaho.
 Utah Arizona Gold & Copper Mining Co.
- Shields, H. M.**, 45 West Second Street, Salt Lake City, Utah.
 Copper Shield Mining Co.
- Shields, R. H.**, Houghton, Mich.
 New Arcadian Copper Co.
 New Baltic Copper Co.
- Silverman, S. I.**, Seward, Alaska.
 Alaska Gold Extension & Development Co.
- Simmons, A. J.**, Deadwood, S. Dak.
 Echo Gold Mining Co.
- Simpson, K. M.**, Goldfield, Nev.
 Goldfield Consolidated Mines Co.
- Slak, John, Mayer**, Ariz.
 International Copper & Mining Co.
- Slattery, M. J.**, 2120 W. Tioga Street, Philadelphia, Pa.
 La Regina Mining Co.
- Slick, B. B.**, Ridgeway, Colo.
 Slick Bros. Mining & Milling Co.
- Slusser, C. R.**, 415 Kittredge Bldg., Denver, Colo.
 Gold Bond Consolidated Mines Co.
- Smale, F. L.**, Victor, Colo.
 Portland Gold Mining Co.
- Smith, A. O.**, West 1619 Clark Street, Spokane, Wash.
 c/o Silver Trail Mining Co.
- Smith, B. L.**, Pioche, Nev.
 Yuba Leasing & Development Co.
- Smith, C. T.**, Winnemucca, Nev.
 Haystack Mines.
- Smith, E. Romilly**, Montague, N. S.
 Loon Brook Mining Co., Ltd.
- Smith, F. D.**, 217 Linden Avenue, Ithaca, New York.
 Seven Devils Copper Co.
- Smith, F. M.**, East Helena, Mont.
 c/o American Smelting, Refining & Mining Co.
- Smith, Gus.**, Wallace, Idaho.
 Amy-Matchless Mining & Milling Co.
- Smith, Henry**, Contact, Nev.
 Nevada Copper Mining, Milling & Power Co.
- Smith, H. P.**, Guanajuato, Gto., Mexico, or Columbus, Ohio.
 Guanajuato Reduction & Mines Co.
- Smith, Lucien**, 60 India Street, Boston, Mass.
 Mt. Champion Mining Co.
- Smith, P. E.**, Wallace, Idaho.
 (Asst. Gen. Mgr.), Federal Mining & Smelting Co.
- Smith, V. Y.**, Globe, Ariz.
 McMillen-Stonewall Mining Co.
- Smith, W. A.**, Herculaneum, Mo.
 Herculaneum Plant, St. Joseph Lead Co.
- Smith, W. N.**, Cuba, Wis.
 National Zinc Separating Co.
- Smith, W. N.**, Platteville, Wis.
 Vinegar Hill Zinc Co.
- Snow, H. S.**, Platteville, Wis.
 Wisconsin Zinc Co.
- Snyder, I. T.**, Suite 603-610 Symes Bldg., Denver, Colo.
 Vindicator Consolidated Gold Mining Co.
- Sorensen, S. Severin**, Rancagua, Chile.
 Braden Copper Co.
- Sowers, Edw. B.**, Chacala, Durango, Mex.
 Amazon Gold Co.

- Spencer, W. C., 1888 Beacon Street, Brookline, Mass.
Jarilla Consolidated Copper Co.
- Spiro, Solon, Newhouse Bldg., Salt Lake City, Utah.
Silver King Consolidated Mining Co. of Utah.
Little Bell Consolidated Mining Co.
- Spitko, A. P., Continental National Bank Bldg., Salt Lake City, Utah.
Lead King Mining & Milling Co.
- Spriggs, Hon. A. E., Helena, Mont.
Montana-Radersburg Mining Co.
- Spriggs, C. H., Eureka, Utah.
Oxford Consolidated Mining Co.
- Staley, Clifford A., Magnolia, Colo.
Keystone Consolidated Mining & Milling Co.
- Stark, Chas. D., Jr., Johnsville, Calif.
Plumas Eureka Mines Co.
- Starr, Chas., Gage, N. Mex.
Nevada Hills Mining Co.
- Stedman, L. W., Paragon, Idaho.
Paragon Consolidated Mining Co.
- Steele, Chas., 13 North Wyoming Street, Butte, Mont.
Balkan Butte Copper Mining Co.
- Steenman, L. F., Cobalt, Ont., Canada.
Genesee Mining Co.
- Stephens, F. C., Box 1656, Mexico City, Mex.
Pacific Copper Co., Ltd.
- Stephens, Thos. F., 22 West Park Street, Butte, Mont.
Indian Queen Mining & Smelting Co.
- Stephens, W. J., Missoula, Mont.
Hidden Treasure Group.
- Steubing, W. C., Tucson, Ariz.
Copper State Mining Co.
- Stevens, L. L., Bishop, Inyo Co., Calif.
Tungsten Mines Co.
- Stewart, Banks, Trojan, S. D.
Hidden Treasure Co.
- Stewart, Dayton H., 410 Columbia Blk., Spokane, Wash.
Laurier Mining Co.
- Stewart, R. H., Trail, B. C.
Consolidated Mining & Smelting Co. of Canada, Ltd.
- Stewart, S. O., Winkelman, Ariz.
Apex Mine.
- Stillwell, Geo., Silverton, B. C.
Silverton Mines, Ltd.
- Stoddard, C. M., Phoenix, Ariz.
Stoddard Mines Co.
- Stone, Geo. W., 405 Crocker Bldg., San Francisco, Calif.
North Fork Mining Co.
- Stroud, Amos M., Wallace, Idaho.
Nonpareil Copper Mining Co.
- Sturdy, N., Montgomery, Ariz.
Sturdy Gold Mining Co.
- Sullivan, J. M., Dewey, Ariz.
Black Chief Copper Co.
- Sully, John M., Hurley, N. Mex.
Chino Copper Co.
- Sulzer, Chas. A., 115 Broadway, New York.
Alaska Industrial Co.
- Summerhayes, M. W., Timmins or Cobalt, Ont., Canada.
Porcupine Crown Gold Mining Co.

- Swan, A. T., Joplin, Mo.
A. T. S. Mining Co.
- Swanson, F., 1432 7th St., Spokane, Wash.
Idaho Northern Mineral Co.
- Swayze, E. G., Pomona, Kansas.
Plata-Fina Mining & Development Co.
- Sweeny, M. J., Wallace, Ida.
Rex Consolidated Mining Co.
- Sylvester, F. M., Vancouver, B. C.
Granby Consolidated Mining, Smelting & Power Co., Ltd.
- Symmes, Whitman, Virginia City, Nev.
Mexican Gold & Silver Mining Co.
- Taylor, Chas. G., 1023 Montgomery Street, Spokane, Wash.
Giant Ledge Mining Co.
- Taylor, Geo. M., Colorado Springs, Colo.
Portland Gold Mining Co.
- Temme, Prof. W. H., c/o Temme Eng. Co., Evansville, Ind.
Dolphin Mine.
- Thane, B. L., Juneau, Alaska.
Alaska Gastineau Mining Co.
- Thatcher, L. R., Union, Nev.
Union Mines Co.
- Thennes, J. N., Wallace, Idaho.
Independent Copper Mining & Milling Co.
- Thielman, Julius, Holmes, Wyo.
Platinum Mining & Milling Co.
- Thoman, C. E., Telkwa, B. C.
Silvered-Copper Mining Co.
- Thomas, Geo. G., Cobalt, Ontario, Can.
c/o Calumet & Montana Consolidated Mining Co.
- Thomarson, Edward, Pioche, Nev.
Ely Valley Mining & Milling Co.
- Thompson, E. D. R., 411 Felt Bldg., Salt Lake City, Utah.
Old Susan Mining Co.
- Thompson, John, Moscow, Utah.
Utah Mining, Milling & Transportation Co.
- Thorn, J. F., Santa Rosa, Salvador, C. A.
Butters Salvador Mines, Ltd.
- Thorne, J. W., Pleasant Grove, Utah.
Utah Centennial Mining Co.
- Thwaite, Thos., 525 Seventh Street, Spokane, Wash.
Constitution Mining & Milling Co.
- Tisher, A., Clumie Bldg., 519 California Street, San Francisco, Calif.
Shenandoah Mines Co.
- Tobin, W. J., Pioneer, Nev.
Pioneer Consolidated Mines Co.
- Todd, Robt. B., 203 Nixon Bldg., Reno, Nev.
Luning-Idaho Mining Co.
- Tomich, T., 13 N. Wyoming Street, Butte, Mont.
Balkan Butte Copper Mining Co.
- Tong, J. T., Johnson, Ariz.
Arizona & Michigan Development Co.
Johnson Copper Development Co.
- Towle, Franklin F., Gibson, via Miami, Ariz.
Gibson Copper Co.
- Townsend, Willis, Orient, Wash.
Copper Butte Mining Co.
- Trent, W. E., Reno, Nev.
Louisiana Consolidated Mining Co.

- Tribolet, S. J.**, Phoenix, Ariz.
 Kay Copper Co.
- Troeger, R. C.**, 310 So. Grand Ave., Los Angeles, Calif.
 Estelle Mining Co.
- Trojanovich, Anton**, Miami, Ariz.
 Inspiration Extension Copper Co.
- Troutman, J. H.**, Symes Bldg., Denver, Colo.
 Colonel Sellers Mines.
- Turner, J. K.**, Goldfield, Nev.
 Ely-Calumet Copper Co.
 Jumbo Extension Mining Co.
- Tuttle, Arthur L.**, Copperhill, Tenn.
 Asst. Mgr., Tennessee Copper Co.
- Tyler, P. M.**, Breckenridge, Colo.
 Washington Mine.
- Upton, Geo. B.**, Clinton, Ia.
 Oro Grande Mines Co.
- Uren, W. J.**, Calumet, Mich.
 Keweenaw Copper Co.
 Phoenix Consolidated Copper Co.
- Van Deman, C. B.**, Dallas, Texas.
 Las Animas Peak Gold Mines Co.
- Van Dyck, Edw.**, 265 Russ Bldg., San Francisco, Calif.
 Sunset Mining & Development Co.
- Van Ness, L.**, Minersville, Calif.
 Five Pines Mining Co.
- Van Orden, Frank L.**, Houghton, Mich.
 c/o Wyandot Copper Co.
- Van Wagenen, H. R.**, Pioche, Nev.
 Consolidated Nevada-Utah Corp.
- Varden, Thos. A.**, Goodsprings, Nev.
 Whale Mining Co.
- Vial, J. N.**, Mifflin, Wis.
 Lucky Six Mining Co.
- Villareal, F. S.**, Torreon, Viesca, Coahuila, Mex.
 Asst. Gen. Mgr., Compania Metalurgica De, Torreon, S. A.
- Vincent, H. S.**, Deadwood, S. Dak.
 Trojan Mining Co.
- Von Leer, I. Wayne**, 52 Front St., New York.
 Carmen Copper Co.
- Wade, J. H.**, Wallace, Idaho.
 Lucky Friday Mining Co.
- Walker, E. W.**, Mass City, Mich.
 Lake Copper Co.
- Walker, H. Y.**, Tacoma, Wash.
 c/o American Smelting, Refining & Mining Co.
- Walker, Samuel F.**, Bozeman, Mont.
 International Mining Co.
- Wallace, H. Vincent**, Guanajuato, Gto., Mexico.
 Mineral Development Company.
- Wallace, O. B.**, Kellogg, Idaho.
 c/o Pittsburgh Lead Mining Co.
- Wallinder, E. G.**, 609 First National Bank Bldg., Duluth, Minn.
 Kamloops Copper Co.
- Walser, Mark**, 998 Phelan Bldg., San Francisco, Calif.
 Nevada Packard Mines Co.
- Walsh, M. J.**, Oatman, Ariz.
 Cone Mining & Milling Co.

- Walter, R. J.**, Silverton, Colo.
 Kittimac Mines Co.
- Wanke, Herman**, Roseland, Va.
 American Rutile Co.
- Wanvig, John D., Jr.**, Golconda, Ariz.
 Union Basin Mining Co.
- Ward, H. B.**, Fruitvale, Calif.
 Shasta May Blossom Copper Co., Consolidated.
- Wardman, Geo. B.**, Aguascalientes, Mexico.
 Compania Minera La Fortuna, S. A.
- Waring, Guy H.**, Oronogo, Mo.
 Oronogo Mutual Mining Co.
- Warmbath, S. M.**, 561 I. W. Hellman Bldg., Los Angeles, Calif.
 Big Jim Gold Mining Co.
- Warner, Joe.**, Animas Forks, Colo.
 Frisco Mines & Tunnel Co.
- Warren, Jas. J.**, 1202 C. P. R. Bldg., Toronto, Ont., Canada.
 Consolidated Mining & Smelting Co. of Canada, Ltd.
- Waters, Albert L.**, 314 Railway Exchange, Milwaukee, Wis.
 c/o Twin Buttes Mining & Smelting Co.
- Watson, C. E.**, Cobalt, Ont.
 Mining Corporation of Canada, Ltd.
- Watson, Geo. H.**, 49 South Main St., Salt Lake City, Utah.
 South Hecla Mining Co.
 Albion Mining Co.
- Watson, Jas. H.**, Parker, Ariz.
 Arizona Empire Copper Mines Co.
- Watson, R. B.**, Cobalt, Ont.
 Nipissing Mines Co., Ltd.
- Weber, Arthur**, Oatman, Ariz.
 Paramount Mines Co.
- Webster, W. C.**, 25 Broad St. New York City.
 Nichols Copper Co.
- Weed, Walter Harvey**, 29 Broadway, New York City.
 Crystal Copper Co.
- Weiss, A.**, Tottenville, New York.
 c/o Tottenville Copper Co.
- Welhaven, Alfred**, Unsan, Korea.
 Oriental Consolidated Mining Co.
- Weller, J. C.**, Telluride, Colo.
 Weller Gold Mining Co.
- Wells, Bulkeley**, Telluride, Colo.
 Humboldt Mines Co.
 Lewis Mine Co.
 Smuggler Union Mining Co.
- Wells, H.**, Joplin, Mo.
 Dallas Mining Co.
- Welsh, Henry**, 724 East 2nd South St., Salt Lake City, Utah.
 Lost Packer Mining Co.
- Wenstrom, Olaf**, Room 1209, 71 Broadway, New York City.
 Antimony Corporation.
- Wentworth, J. H.**, 10 Cinco de Mayo, San Luis Potosi, Mexico.
 c/o Negoc Min., Santa Maria De La Paz.
- Werden, A. C.**, Oatman, Ariz.
 Gold Ore Mining Co.
- Weringer, Jos.**, Woody, California.
 Weringer Mines Co.
- West, Milton J.**, Ogden, Utah.
 June Bug Development Co.

- Weston, Geo.**, Boston Bldg., Salt Lake City, Utah.
Hope Mines Development Co.
- Wheaton, W. G.**, Columbus, Ohio.
Guanajuato Reduction & Mines Co.
- Wheeler, W. E. A.**, Miller Bldg., Scranton, Pa.
Similkameen Consolidated Copper Co.
- Wheeler, R. P.**, Kingman, Ariz.
c/o Walnut Creek Mining & Milling Co.
- Whitcomb, Frank R.**, Coulterville, California.
McAlpine Mines Co.
- Whitcomb, H.**, 154 West Randolph St., Chicago, Ill.
c/o Whitcomb Mining & Milling Co.
- White, Bruce**, 901 Vancouver Bldg., Vancouver, B. C., or Sandon, B. C.
c/o Slocan Star Mines, Ltd.
- White, H. H.**, Joplin, Mo.
Hartford Mining Co.
- Whitley, C. W.**, McCornick Bldg., Salt Lake City, Utah.
Gen. Mgr. Utah Dept., American Smelting & Refining Co.
- Whyte, F. W. C.**, Anaconda, Mont.
Mgr. Coal Dept., Anaconda Copper Mining Co.
- Wickham, John F.**, 207 Board of Trade, Portland, Ore.
c/o Alameda Consolidated Mines Co.
- Wilcox, Edw. J.**, 725 Colorado Bldg., Denver, Colo.
Imperial Consolidated Mining Co.
- Wilfley, C. R.**, Denver, Colo.
Barstow Mine.
- Wilkinson, Thos.**, 715 High St., Burlington, Ia.
Oro Cobra Mining Co.
- Williams, H. L.**, Seattle, Washington.
Idaho Antimony Mining Co.
- Williams, Jos. K.**, Libby, Mont.
Montana Silver-Lead Mining Co.
- Williams, J. F.**, 602 Empire Bldg., Denver, Colo.
La Reina Union Mining & Reduction Co.
- Williams, J. S., Jr.**, 99 John St., New York City.
Moctezuma Copper Co.
- Williams, Percy**, Vancouver, B. C.
Lasqueti Island Mining Co., Ltd.
- Williams, W. D.**, Milford, Utah.
Orphan Boy Mining Co.
- Williams, W. W.**, Philipsburg, Mont.
Swastika Mining Co.
- Williamson, Dan. R.**, Globe, Ariz.
Inspiration Needles Copper Co.
- Williamson, V. D.**, Empire Bldg., Spokane, Washington.
Keystone Mines Corporation.
- Wilson, Chas. N.**, Box 1116 Tucson, Ariz.
Stratton Copper Co.
- Wilson, Geo.**, Eureka, California.
Horse Mountain Copper Co.
- Wilson, Geo. B.**, 11 Broadway, New York City.
c/o Salt Lake Copper Co.
- Wilson, Geo. W.**, Wickes, Montana.
Angelica Mining & Development Co.
- Wilson, W. A.**, P. O. Box 7, Salt Lake City, Utah.
Miller Mining & Smelting Co.
Vipond Mining Co.
- Wingfield, Geo.**, Goldfield, Nevada.
Deep Mines Co.

- Wise, John**, Hill City, S. Dak.
 Hill City Mining & Development Co.
- Wolf, E. O.**, Douglas, Ariz.
 c/o Arizona Mining & Trading Co.
- Wolf, H. J.**, 1023 First National Bank Bldg., Denver, Colo.
 Square Deal Gold Mining Co.
 Stanley Mines Co.
- Wolfe, Conrad**, 417 Hutton Bldg., Spokane, Washington.
 United Copper Mining Co.
- Wolfe, F. R.**, Hutton Bldg., Spokane, Washington.
 Florence Silver Mining Co.
- Woods, H. E.**, Oldtrails, Ariz.
 Lexington Arizona Mining Co.
 Nellie Mining Co.
- Woodworth, K. D.**, Gowanda, Ontario.
 Miller Lake O'Brien Mine.
- Wookey, S. W.**, Schumacher, Ontario.
 c/o Schumacher Gold Mines, Ltd.
- Woolley, E. R.**, Canning Apts., Salt Lake City, Utah.
 Alta Copper Mining Co.
- Worswick, E. A.**, Lovelocks, Nevada.
 Smoky Bullion Group.
- Wraith, Wm.**, Kearns Blk., Salt Lake City, Utah.
 International Smelting Co.
- Wright, I. L.**, Pinos Altos, New Mexico.
 Pinos Altos Mining & Milling Co.
- Wright, S. B.**, Deloro, Ontario, Canada.
 Deloro Mining & Reduction Co.
- Yaeger, Amos J.**, 314 American National Bank Bldg., Los Angeles, Calif.
 c/o Zambona Development Co.
- York, E. H.**, Three Rivers, Quebec, Canada.
 La Mine D'Or Huronia, Ltd.
- Young, Geo. W.**, Phoenix, Ariz.
 Young Mines Co., Ltd.
- Young, H. I.**, Carterville, Mo.
 American Zinc Lead & Smelting Co.
- Yundt, J. L.**, Mammoth, Utah.
 Emerald Mining Co.
- Zwicky, W. E.**, Kaslo, B. C.
 Cork Providence Mines Ltd.

MINE AND MILL SUPERINTENDENTS

- Ackerson, A. E.**, Ouray, Colo.
 Brown Mountain Smelting Co.
- Acock, F.**, Tarachi, Mexico.
 Trenton Sonora Mining Co.
- Adams, H. H.**, Newhouse, Utah.
 Utah Leasing Co.
- Adams, R. E.**, Velardeña, Mexico.
 Velardeña Mines, American Smelting, Refining & Mining Co.
- Addams, C. E.**, Ray, Ariz.
 Ray Hercules Copper Co.
- Agnew, J. L.**, Copper Cliff, Ontario, Canada.
 Canadian Copper Co.

- Aho, Matt., Alta, Utah.
South Hecla Mining Co.
- Ailman, H. B., Parker, Ariz.
Juniata Gold & Copper Co.
- Allen, Fred., Townsend, Mont.
Montana-Radersburg Mining Co.
- Amidon, R. G., Cornucopia, Oregon.
Queen of the West Mines Co.
- Anderson, L. D., Midvale, Utah.
Smelter Supt., United States Smelting Co.
- Andrews, A. G., Houghton, Mich.
Mill Supt., Isle Royale Copper Co.
- Armstrong, Jas. H., Zimapan, Mexico.
Hildalgo Copper Mining & Smelting Co.
- Arpa, Williams, Winthrop, California.
Shasta Belmont Mining Co.
- Arthur, E. P., Cripple Creek, Colo.
Gold Sovereign Mining & Tunnel Co.
- Auger, Wm., Central City, Colo.
Cashier Gold Mining & Reduction Co.
- Austin, B. C., Mountain King, California.
Mountain King Mining Co.
- Bacorn, H. C., Cable, Mont.
Cable Consolidated Mining Co.
- Bailey, A. C., Cobalt, Ont.
Mercer Silver Mines, Ltd.
- Bailey, Marc., Bisbee, Ariz.
Wolverine & Arizona Mining Co.
- Baird, Jules V., Carrara, Nevada.
Carrara Mining, Milling & Leasing Syndicate.
- Baldwin, F. R., Deadwood, South Dakota.
Golden Reward Consolidated Gold Mining & Milling Co.
- Barkdall, I. H., Globe, Ariz.
Old Dominion Copper Mining & Smelting Co.
- Barnard, J. F., Monterey, Mexico.
Supt. Monterey Smelter, American Smelting, Refining & Mining Co.
- Barney, Henry, Alta, Utah.
Michigan-Utah Consolidated Mines Co.
Columbus Extension Mining Co.
- Barney, R., Alta, Utah.
Cardiff Mining & Milling Co.
- Barstow, E. S., Unsan, Korea.
Supt. Trans., Oriental Consolidated Mining Co.
- Bartlett, W. C., Johnson, Arizona.
Black Prince Copper Co.
- Baskett, G. L. L., Elk City, Idaho.
Mineral Zone Mining Co.
- Bastian, Louis C., Gladstone, Colo.
Mill Supt., Gold King Leasing Co.
- Bauman, Edw. C., Georgetown, Colo.
Georgetown Mining & Tunnel Co.
- Bean, C. H., Dos Cabezos, Ariz.
Sterling Copper Co.
- Beck, Mr., Toy, Nevada.
Toy Tungsten Mine.
- Becker, Geo., Leadville, Colo.
Ibex Mining Co.
- Been, John T., Calumet, Mich.
Tamarack Mining Co.

- Bell, Chas. N.**, Telluride, Colo.
 Smuggler Union Mining Co.
Bell, J. H., Amador City, California.
 Treasure Mining Co.
Bender, L. V., Anaconda, Montana.
 Washoe Reduction Works, Anaconda C. M. Co.
Bender, G. L., Greenhorn, Oregon.
 Golden Gate Mining Co.
Bender, R. W., Nevada City, California.
 Willow Valley Mining Co.
Benjovsky, T. J., Boulder, Colo.
 United States Gold Corporation.
Bennett, A. F., Salmon, Idaho.
 Copper Queen Mining & Smelting Co.
Bennett, Geo., Butte, Montana.
 Leonard Mine, Anaconda C. M. Co.
Bennett, Thos. H., Lake Mine, Mich.
 Algomah Mining Co.
 Indiana Mining Co.
 North Lake Mining Co.
Berger, Fréd., Elkton, Va.
 United States Manganese Co.
Berrien, C. L., Hennessy Blk., Butte, Mont.
 Anaconda Copper Mining Co.
Beston, Frank, Globe, Arizona.
 Inspiration Needles Copper Co.
Beveridge, J. E., Alta, Utah.
 Wasatch Mines Co.
Bird, Frank, Lovelock, Nevada.
 c/o Seven Froughs Coalition Mining Co.
Blackburn, W. H., Tonopah, Nevada.
 Tonopah Mining Company of Nevada.
Blackstone, Richard, Lead, S. Dak.
 Homestake Mining Co.
Blaine, Jas. P., Chesaw, Washington.
 Apex Mining Co.
Blamey, R. M., Hol Kol, Hwang-Hai, Korea.
 Seoul Mining Co.
Bodfish, F. V., Park City, Utah.
 American Flag Mining Co.
Bolly, Wm. H., Pinex, Mich.
 White Pine Extension Copper Co.
Bond, Wm. H., Clifton, Ariz.
 Mill Supt., Shannon Copper Co.
Bone, A. J., Copperhill, Tenn.
 Smelter Supt., Tennessee Copper Co.
Bonnamate, R. J., Bellingham, Wash.
 Red Mountain Mining Co.
Booth, Fred, Index, Wash.
 Florence-Rae Copper Co.
Borgman, Wm., Placer, Oregon.
 Jim Blaine Mine.
Bound, Ben., Cananea, Sonora, Mexico.
 Empire Mining Co.
Bowen, T. W., Salt Lake City, Utah.
 c/o Boston Development Co.
Boyd, Robt. R., Globe, Arizona.
 Arizona Commercial Mining Co.
Boyd, W. S., Ray, Arizona.
 Ray Consolidated Copper Co.

- Boyle, J. J., Bonanza, Idaho.
Lost Packer Mining Co.
- Bradley, P. R., Juneau, Alaska.
Alaska Juneau Gold Mining Co.
Alaska Treadwell Gold Mining Co.
Alaska Mexican Gold Mining Co.
Alaska United Gold Mining Co.
- Bradshaw, Fredk., Tonopah, Nevada.
Belmont Milling Co.
Jim Butler Tonopah Mining Co.
- Brady, Samuel, Rockland, Michigan.
Michigan Copper Mining Co.
- Brann, Chas. B., Constellation, Ariz.
Monte Cristo Mining & Milling Co.
- Breckenridge, Frank, Luning, Nevada.
Calavada Copper Co.
- Brigstocke, R. W., Naughton, Ont.
Canadian Exploration Co.
- Brinegar, T. P., Tucson, Arizona.
Plata-Fina Mining & Development Co.
- Brockington, C. A., Grassvalley, California.
Golden Center Mining Co.
- Bromly, A. H., Petatlan, Guerrero, Mexico.
Pacific Copper Co., Ltd.
- Brooks, J. L., Quartz, California.
Dutch Sweeney Mining Co.
- Brough, Edward, Barnwell, California.
Giant Ledge Gold & Copper Co.
- Brown, F. C., Hol-Kol, Hwang-Hai, Korea.
Mill Supt., Seoul Mining Co.
- Brown, H. A., Mackay, Idaho.
Champion Mining Co.
- Brown, T. W., Tonasket, Washington.
Trinidad Mining & Smelting Co.
- Brown, W., Platteville, Wis.
West Hill Mining Co.
- Browning, C. P., Britannia Beach, B. C.
Britannia Mining & Smelting Co., Ltd.
- Bruce, H. F., Goldfield, Nevada.
Spearhead Gold Mining Co.
- Bryson, Ren., Goldstrike, Utah.
Bull Valley Hassiampie Gold Mining Co.
- Buchanan, Jas. Trail, B. C.
Consolidated Mining & Smelting Co. of Canada.
- Buckles, Dave, Anaconda, Colo.
Mary McKinney Mining Co.
- Budd, J. J., Kettle Falls, Stevens Co., Washington.
Silver Queen Mining Co.
- Bull, John, Ingot, California.
Smelter Supt., Afterthought Copper Co.
- Burgan, A. Lincoln, Osceola, Michigan.
Mill Supt., Osceola Consolidated Mining Co.
Tamarack Mining Co.
- Burge, Wm., Battle Mountain, Lander Co., Nevada.
Copper Basin Mining & Milling Co.
- Burgess, J. A., Wonder, Nevada.
Nevada Wonder Mining Co.
- Burgner, F., Silver City, Utah.
Utah Ore Sampling Co.
- Burns, Albert, Harvard, Idaho.
Garfield Mining & Milling Co.

- Butler, Henry**, Georgetown, Colo.
 Imperial Consolidated Mining Co.
- Butler, J. C.**, Victoria, Michigan.
 Victoria Copper Mining Co.
- Caine, M. A.**, Copperhill, Tenn.
 Mine Supt., Tennessee Copper Co.
- Cairns, Frederick I.**, Houghton, Mich.
 Michigan Smelter Co.
- Calloway, S. R.**, St. Thomas, Nev.
 Grand Gulch Mining Co.
- Camerer, Herman**, Daisy, Wash.
 Hall Creek Mining & Milling Co.
- Campbell, C. M.**, Phoenix, B. C.
 Granby Consolidated Mining, Smelting & Power Co., Ltd.
- Canavan, Andrew J.**, Goldfield, Nev.
 Diamondfield Black Butte Reorganized Mining Co.
- Cark, H.**, Cobalt, Ont.
 Nipissing Mines Co.
- Carpenter, E. E.**, Wonder, Nev.
 Mill Supt., Nevada Wonder Mining Co.
- Carpenter, J. A.**, (Mill), Tonopah, Nev.
 Mill Supt., West End Consolidated Mining Co.
- Carper, A. F.**, Oatman, Ariz.
 Sun Dial Gold Mining Co.
- Carrigan, J. J.**, Butte, Mont.
 Zinc Group, Anaconda Copper Mining Co.
- Cary, W. P.**, Sneffels, Colo.
 Atlas Mining & Milling Co.
- Chambers, Jas.**, Rancagua, O'Higgins, Chile.
 R. R. Supt., Braden Copper Co.
- Chandler, J. W.**, Tonopah, Nev.
 Halifax Tonopah Mining Co.
 Tonopah North Star Tunnel & Development Co.
 West End Consolidated Mining Co.
- Chapman, J. F.**, 2041 Emerson St., Berkeley, Calif.
 New Providence Gold Mining Co.
- Childs, W. A.**, Calumet, Mich.
 Calumet & Hecla Mining Co.
- Chope, Thos.**, Butte, Mont.
 High Ore Mine, Anaconda Copper Mining Co.
- Churchill, N. S.**, Chloride, Ariz.
 Tennessee Mine.
- Clancy, W.**, Quatsino, Vancouver Island, B. C.
 Quatsino Copper Co.
- Clapp, L. R.**, Silver Lake, Colo.
 Silver Lake Mines.
- Clark, E. C.**, Perth Amboy, N. J.
 Raritan Copper Works, International Smelting & Refining Co.
- Clark, Capt. Wesley**, Copper Falls, Mich.
 Arnold Mining Co.
 Ashbed Mining Co.
- Climo, J. C.**, Keeler, Calif.
 Cerro Gordo Mines Co.
- Colburn, E. A., Jr.**, Victor, Colo.
 Ajax Gold Mining Co.
- Cole, John**, Big Pine, Calif.
 Loretto Copper Mining Co.
- Cole, W. L.**, Keswick, Calif.
 Mountain Copper Co., Ltd.

- Colley, B. F., Rancagua, O'Higgins, Chile.
Smelter, Braden Copper Co.
- Collins, Edgar A., Pearce, Ariz.
Commonwealth Mining & Milling Co.
- Colvin, G. T., Paradise, Ariz.
Bisbee-Sonora Development Co.
- Conant, Harry B., Dollar Bay, Mich.
Lake Superior Smelting Co.
- Conant, H. D., Hubbell, Mich.
Smelter Supt., Calumet & Hecla Mining Co.
- Cooper, J. H., Skidoo, Calif.
Skidoo Mines Co.
- Corbin, Harry, Bruce, Prince of Wales Island, Alaska.
Alaska Metals Co.
- Corts, W. E., Magdalena, N. Mex.
Smelter Supt., Ozark Smelting & Mining Co.
- Cowan, J. A., Hazelton, B. C.
Rocher De Boule Copper Co.
- Cox, Samuel, Eureka, Utah.
Opohongo Mining Co.
- Craddock, Ross C., Lida, Nev.
Indian Springs Mining Co.
- Crouch, H., Hilltop, Nev.
Kimberly Consolidated Mines Co.
- Crow, John F., Mizpah, Nev.
Mizpah Consolidated Copper & Gold Mining Co.
- Crowe, Thos. B., Victor, Colo.
Mill Supt., Portland Gold Mining Co.
- Crowley, D. H., Butte, Mont.
St. Lawrence Mine, Anaconda Copper Mining Co.
- Croyle, George S., Copper Creek, Ariz.
Mill Supt., Copper State Mining Co.
- Cuneo, Chas., Esmerelda, Calif.
Standard Amalgamated Exploration Corp.
- Cunningham, M. L., Painesdale, Mich.
Asst. Mill Supt., Champion Copper Co.
- Curley, J., Ajo, Ariz.
Calumet & Arizona Mining Co.
- Dagenhardt, L. C., Hazel Green, Wis.
McMillan Zinc Co.
- Daly, A. D., Amadoville, Ariz.
Casanega-Daly Mining & Reduction Co.
- Daly, W. B., Hennessy Bldg., Butte, Mont.
Gen. Supt., Anaconda Copper Mining Co.
- Dana, L. N., Benton, Wis.
Indian Mound Mining Co.
- Daniels, Mathew, Central City, Colo.
Hearne Gold & Copper Co.
- Danielson, E. A., Pioneer, Nev.
Pioneer Consolidated Mines Co.
- Daveler, E. S., Juneau, Alaska.
Supt. Met. Dept., Alaska Gastineau Mining Co.
- Davies, Chas., Cullowhee, N. Carolina.
Smelter Supt., Cullowhee Mining & Reduction Co.
- Davis, H., Rawhide, Nev.
Mill Supt., Nevada New Mines Co.
- Davis, J. E., Sutton Creek, Calif.
Central Eureka Mining Co.

- Davis**, Wm. B., Aurora, Nev.
Aurora Mines Co.
- Deacon**, R. W., Chrome, N. J.
U. S. Metals Refining Co. of New Jersey.
- Deal**, F. W., Unsan, Korea.
Supt., Maibong & Kuk San Dong, Oriental Consolidated Mining Co.
- DeCamp**, W. V., Middletown, via Humboldt, Ariz.
Consolidated Arizona Smelting Co.
- Dengler**, Theodore, Kearsarge, Mich.
Mohawk Mining Co.
Wolverine Copper Mining Co.
- Denton**, E. C., Warm Springs, Mont.
Girard Copper Co.
- DeWitt**, R. W., Camp Tungstonia, via McGill, Nev.
Salt Lake Tungstonia Mines Co.
- Dilthey**, C. F., Constellation, Ariz.
Arizona Copper Belt Mining Co.
- Dittmar**, M. E., Redding, Calif.
Green Horn Mountain Copper Co.
- Dodley**, Chas., Joplin, Mo.
Spiral Lead & Zinc Co.
- Donohue**, E. J., Britannia Beach, New Westminster Dist., B. C.
Britannia Mining & Smelting Co., Ltd.
- Donovan**, Wm., Pinos Altos, N. Mex.
B. V. N. Mining Co.
- Doolittle**, C., Orilla, Ont., Canada.
Canadian Smelting & Refining Co.
- Douglass**, R. E., Rancagua, O'Higgins, Chile.
Mill Supt., Braden Copper Co.
- Douglass**, W. J., Tonopah, Nev.
Tonopah Midway Consolidated Mining Co.
- Dowling**, John F., P. O. Box 312, El Paso, Texas.
Anaconda-Skookum Copper Group.
- Doyle**, R. J., Mancos, Colorado.
Doyle Consolidated Mines Co.
- Draper**, L. L., Nipton, Nev.
Asst. Supt., Mojave Tungsten Co.
- Drummond**, Frank, Herrick, Idaho.
Copper Prince Consolidated Mining & Milling Co.
- Dryden**, D. F., Copperhill, Tenn.
Supt. of Acid Plant, Tennessee Copper Co.
- Dunbar**, Herbert G., Copper City, Mont.
Three Forks Copper Mining Co.
- Dunning**, C. H., Prescott, Ariz.
Big Pine Consolidated Mining Co.
- Dunstan**, R. H., Ophir, Utah.
Mill Supt., Ophir Hill Consolidated Mining Co.
- Dunyon**, Newton A., Park City, Utah.
Ontario Silver Mining Co.
- Durant**, C. M., Spring Gulch, via Martinsdale, Mont.
Durant Mining & Smelting Co.
- Duviz**, J. E., Sutter Creek, Calif.
Central Eureka Mining Co.
- Dyer**, H. H., Metcalf, Ariz.
Shannon Copper Co.
- Earl**, C. W., American Fork, Utah.
Earl & Eagle Mining Co.
- Earles**, F. A., Gilmore, Idaho.
Pittsburgh-Idaho Co., Ltd.

- Ehrenberg**, Ed., Burke, Idaho.
Silver Moon Mining Co., Ltd.
- Enderton**, W. H., Fortuna, Ariz.
Fortuna Mines Corporation.
- English**, H. G., Hol-Kol, Hwang-Hai, Korea.
Mach. Supt., Seoul Mining Co.
- Enlow**, J. R., Chihuahua, Mex.
Chihuahua Smelter, American Smelting, Refining & Mining Co.
- Ernest**, R. H., Round Mountain, Nev.
Round Mountain Mining Co.
- Evans**, E. J., Cripple Creek, Colo.
C. O. D. Consolidated Gold Mining & Development Co.
- Evans**, E. W., Pilares de Nacozari, Sonora, Mex.
Mill Supt., Nacozari Consolidated Copper Co.
- Evans**, W. E., Murray, Utah.
Utah Ore Sampling Co.
- Eye**, H. A., Terrazas, Chihuahua, Mex.
Rio Tinto Copper Co.
- Farnum**, L. L., Silver City, South Dakota.
Homelode Mining & Milling Co.
- Faught**, Jno. H., Globe, Arizona.
German Copper Co.
- Feeley**, John J., Basin, Mont.
Crystal Copper Co.
- Ferguson**, Swan, 636 7th St., Douglas, Arizona.
Nacozari Consolidated Copper Co.
- Fesing**, Herman W., Houghton, Michigan.
Cherokee Copper Co.
- Finnigan**, M., Butte, Montana.
Southern Cross Mine, Anaconda C. M. Co.
- Fisher**, Henry, Calumet, Michigan.
Mill Supt., Calumet & Hecla Mining Co.
- Fitch**, Cecil, Eureka, Utah.
Chief Consolidated Mining Co.
- Fitzgerald**, Andrew, 1391 Fruitvale Ave., Oakland, California.
Andy Fitz Mining & Milling Co.
- Fitzgerald**, T. F. M., Tonopah, Nevada.
Tonopah Belmont Development Co.
- Flagg**, A. L., Kelvin, Arizona.
Kelvin Sultana Copper Co.
- Fletcher**, J. N., Unsan, Korea.
Supt. of Fuel & R. R., Oriental Consolidated Mining Co.
- Flynn**, Thos. J., Rawhide, Nevada.
Nevada New Mines Co.
- Foote**, A. B., Grass Valley, California.
North Star Mines Co.
- Forbes**, Jas. Sr., Capsheaf, Texada Island, B. C.
Norseman Exploration Co.
- Forsman**, John, Alta, Utah.
Alta Tunnel & Transportation Co.
- Fountain**, Jos., Maitland, South Dakota.
North Homestake Mining Co.
- Fouyer**, Wm., Mammoth, Utah.
Lower Mammoth Mining Co.
- Frank**, Harry L., Gladstone, Colo.
Gold King Leasing Co.
- Fraser**, A. J., Old Glory, Santa Cruz Co., Arizona.
Oro Mine.

- Fredman, Alf.**, Idaho Springs, Colo.
 Boston Mine Leasing Co.
- Freeburn, Jas. L.**, Chichagoff, Alaska.
 Chichagoff Mining Co.
- Freitag, K.**, Rochester, Nevada.
 Nevada Packard Mines Co.
- French, F. E.**, Montezuma, Colo.
 Philadelphia Mines Co.
- Freundenthal, H. E.**, Pioche, Nevada.
 Arcane Mining Co.
- Friendly, O. N.**, Park City, Utah.
 Judge Mining & Smelting Co.
- Fry, C. H.**, Randsburg, California.
 Yellow Astor Mining & Milling Co.
- Garden, F. B.**, Winkelman, Pinal Co., Arizona.
 Central Mining & Development Co.
- Gaudin, Pablo**, Torreon Viesca, Coahuila, Mexico.
 Compania Metalurgica De Torreon, S. A.
- Gaul, John C.**, Butte, Montana.
 Berkeley Mine, Anaconda Copper Mining Co.
- Genung, Dan B.**, Stanton, via Prescott, Arizona.
 Mildred Gold Mining Co.
- Gibbons, I. W.**, Alturas, California.
 Hess Mining Co.
- Gibson, Wm. D.**, Butte, Montana.
 Butte & Zenith City Mining Co.
- Gibson, W. M.**, Calumet, Michigan.
 Asst. Supt., Calumet & Hecla Mining Co.
- Giles, Edwin S.**, Pioneer, Nye Co., Nevada.
 Pioneer Extension Mines Co.
- Giles, V. A.**, Yerington, Nevada.
 New Yerington Copper Co.
- Gitsch, Chas. H.**, Pioche, Nevada.
 Demijohn Consolidated Mining Co.
- Gohring, W. B.**, Warren, Arizona.
 Calumet & Arizona Mining Co.
- Goldsworthy, W. E.**, Ione, Nevada.
 Mercury Mining Co.
- Good, Thos.**, Anaconda, Montana.
 Coal Dept., Washoe Smelter, Anaconda C. M. Co.
- Goodale, Geo. S.**, Houghton, Michigan.
 Contact Copper Co.
 Mayflower Mining Co.
 Old Colony Copper Co.
- Gow, Paul A.**, Butte, Montana.
 Tuolumne Copper Mining Co.
- Graenling, N. H.**, Bailey Blk., Helena, Montana.
 Contact Consolidated Copper Co.
- Graff, Alvin**, Turkey, Arizona.
 Buckeye Copper & Gold Mining Co.
- Graham, A. L.**, Globe, Arizona.
 Superior & Boston Copper Co.
- Graham, H. R.**, Rancagua, O'Higgins, Chile.
 Mine Supt., Braden Copper Co.
- Grandin, Milton V.**, Cheticamp, Inverness Co., N. S.
 Cheticamp Copper Co.
- Grant, A. D.**, Bacon Bldg., Oakland, California.
 Kate Hardy Mines Co.

- Grant, Alex.**, Van Anda Island, B. C.
 Tacoma Steel Co.
- Gray, H. J.**, Rye, Colo.
 Marion Mines & Mills Co.
- Gray, W. A.**, Winlock, Washington.
 Cascadia Mining & Development Co.
- Grebe, Dr. E.**, Tombstone, Arizona.
 Bunker Hill Mines Co.
- Green, Geo. W.**, Jackson, California.
 Mill Supt., Argonaut Mining Co.
- Greene, H. D.**, Alta, Utah.
 Tar Baby Mining Co.
- Griffith, Dr. E. T.**, Landlock, Alaska.
 Chisna Consolidated Mines Co.
- Griggs, C. C.**, Box 1418 Salt Lake City, Utah.
 May Day Mining & Milling Co.
 Uncle Sam Consolidated Mining Co.
- Griswold, G. G.**, Maurer, New Jersey.
 Perth Amboy Smelter, American Smelting & Refining Co.
- Guion, Abel**, Empire, Clear Creek Co., Colo.
 Tennessee Mining & Milling Co.
- Hale, A. E.**, Metropolitan Life Bldg., Minneapolis, Minn.
 Anaconda Gold Mining Co.
- Hall, J. T.**, Tyrone, New Mexico.
 Mill Supt., Burro Mountain Copper Co.
- Hall, Oliver**, Algoma, Ont., Canada.
 Victoria Mines, Mond Nickel Co., Ltd.
- Hall, Walter**, Elkton, Va.
 High Top Mining Corp.
- Hall, W. B.**, Moscow, Utah.
 Paloma Gold & Silver Mining Co.
- Haller, Frank H.**, Osceola, Mich.
 Osceola Consolidated Mining Co.
- Hanley, R. E.**, Kennett, Calif.
 Mammoth Copper Mining Co. of Maine.
- Haug, E. J.**, Schurz, Nev.
 Yerington Mountain Copper Co.
- Hauser, Carl**, Elliott Creek, Alaska.
 Hubbard-Elliott Copper Co.
- Hard, Frank J.**, Bohemia, Ore.
 Vesuvius Mines Co.
- Hardy, R. A.**, Aurora, Nev.
 Aurora Consolidated Mines Co.
- Harmon, Sidney E.**, Kellogg, Idaho.
 Northern Light Mining & Milling Co.
- Harms, Ernesto**, Torreon, Viesca, Coahuila, Mex.
 Smelter Supt., Metalurgica de Torreon, S. A.
- Harper, J. B.**, Stoddard, Ariz.
 Copper Queen Gold Mining Co.
- Harrington, Peter**, Park City, Utah.
 New Quincy Mining Co.
- Harrington, Chas. L.**, Dove Creek, Colo.
 Overall Mining Co.
- Harrison, P. G.**, National, Nev.
 National Mines Co.
- Harry, W. A.**, Chesaw, Wash.
 Shipper Gold Mining Co.
- Hartmann, F. W.**, Kearsarge, Mich.
 Asst. Supt., Wolverine Copper Mining Co.

- Haskell, A. C.**, Ouray, Colo.
Mill Supt., Barstow Mine.
- Haskell, P. H.**, Mineral, Va.
Sulphur Mining & Railroad Co.
- Haskins, A. H.**, Tonopah, Nev.
Umatilla-Tonopah Mining Co.
- Hayes, E. B.**, Provo, Utah.
Mill Supt., Rico Wellington Mining Co.
- Headley, W. F.**, 409 Exchange Bldg., Denver, Colo.
Mutual Co-operative Mining Co.
- Healy, J. M.**, Goldfield, Nev.
Lone Star Consolidated Mining Co.
- Heffernan, J. B.**, Colorado Springs, Colo.
Mill Supt., Portland Gold Mining Co.
- Heggie, J.**, El Paso, Texas.
El Paso Smelter; American Smelting & Refining Co.
- Heine, H. W.**, Schumacher, Ont., Canada.
Porcupine Vipond Mines, Ltd.
- Heller, George H.**, Box 22, Osborne, Idaho.
Artic Mining & Milling Co., Ltd.
- Henderson, Enoch**, Houghton, Mich.
Franklin Mining Co.
Rhode Island Copper Co.
- Heslett, S. L.**, Kimberly, Nev.
Giroux Consolidated Mines Co.
- Heydenfeldt, F. F.**, Tonopah, Nev.
Mill Supt., Tonopah Mining Co. of Nevada.
- Hewitt, John**, Butte, Mont.
Alice Mine, Anconda Copper Mining Co.
- Hibbert, E. E.**, Sudbury, Ont., Canada.
British-American Nickel Corp.
- Hickman, Frank**, Steeple Rock, N. Mex.
American Exploration & Mining Co.
- Hicks, George E.**, Rico, Colo.
Rico Mining Co.
- Higginson, E. R.**, Provo, Utah.
Dragon Consolidated Mining Co.
- Hildebrand, J. H.**, Basin, Mont.
Western Reserve Mining Co.
- Hill, H. H.**, Acme, Nev.
Nevada Ore Copper Co.
- Hilton, P. M.**, Pantano, Ariz.
Verde Queen Mining Co.
- Hinton, J. M.**, Oro Grande, Ida.
Una Mining Co.
- Hodgson, Joseph P.**, Bisbee, Ariz.
Mine Supt., Copper Queen Consolidated Mining Co.
- Hoge, A. W.**, Nevada City, Calif.
Willow Valley Mining Co.
- Holbrook, H. C.**, Nacozari, Sonora, Mex.
Arizona Mining & Trading Co.
- Holler, F. W.**, (Surf Inlet Companies) Surf Inlet, P. C.
Belmont-Canadian Mines, Ltd.
Surf Inlet Gold Mines.
Tonopah Belmont Development Co.
- Holmes, F. W.**, Goldfield, Nev.
Yellow Tiger Mining Co.
- Holt, T. P.**, Provo, Utah.
Tintic Milling Co.
- Homer, Wm. H.**, Carbonate, Utah.
Mineral Flat Extension Mining & Milling Co.

- Hooper**, George, Victoria, Mich.
Victoria Copper Mining Co.
- Hooper**, John, Superior, Ariz.
Calumet & Arizona Mining Co.
- Hopkins**, J. B., Wise River, Mont.
Boston & Montana Development Co.
- Horton**, Chas. D., Wickes, Mont.
Angelica Mining & Development Co.
- Houle**, Arthur, Bisbee, Ariz.
Shattuck Arizona Copper Co.
- Howard**, L. O., Globe, Ariz.
Smelter Supt., Old Dominion Copper Mining & Smelting Co.
- Hullinger**, C. B., Chloride, Sierra Co., N. Mex.
Black Range Tunnel & Mining Co.
- Hulst**, G. P., 151st St. & McCook Ave., East Chicago, Ind.
The International Lead Refining Co.
- Humes**, Jas., Park City, Utah.
Silver King Coalition Mines Co.
- Hyatt**, G. E., Chewelah, Wash.
Security Copper Co.
- Hyland**, Joseph, Lark, Utah.
Bingham Mines Co.
- Ingalls**, H. W., Mullan, Idaho.
Copper King Mining & Smelting Co.
- Jacobson**, A. O., Alta, Utah.
Sells Mining Co.
- Janes**, J. T., Pinos Altos, N. Mex.
Hardscrabble Mining Co.
- Janney**, T. A., Bingham Canyon, Utah.
Utah Copper Co.
- Janney**, W. H., Hurley, N. Mex.
Mill Supt., Chino Copper Co.
- Jarvis**, F. M., Chewelah, Wash.
Chewelah Grey Copper Mining Co.
- Jenkin**, W., Suffield, Quebec, Canada.
A. O. Norton Co.
- Jenkins**, John C., Idaho Springs, Colo.
Gilpin-Eureka Mining Co.
- Jennings**, George H., Wardner, Idaho.
East Caledonia Mines Co.
- Johns**, J. W., Amazon, Mont.
Blue Bird-Corbin Gold, Silver & Copper Mining Co.
Robert Emmet Copper Co.
- Johnson**, D. S., Berlin, Nev.
Goldfield Blue Bell Mining Co.
- Johnson**, F. A., Goldstrike, Utah.
Goldstrike Consolidated Mining Co.
- Johnson**, John A., Holmes, Wyo.
Platinum Mining & Milling Co.
- Johnson**, W. E., Barry, Wash.
Northwest Mines Development Co.
- Jolly**, John, Painsdale, Mich.
Underground Supt., Champion Copper Co.
Trimountain Mining Co.
- Jones**, A. H., Tonopah, Nev.
Mill Supt., Tonopah Belmont Development Co.
- Jones**, E. W., Bingham Canyon, Utah.
Bingham Amalgamated Copper Co.

- Jones, Fred, Victor, Colo.**
 Portland Gold Mining Co.
- Jones, G. A., Landore, Ida.**
 Seven Devils Copper Co.
- Jones, G. P., Hedley, B. C.**
 Hedley Gold Mining Co.
- Jones, J. R., Alta, Utah.**
 Alta Tiger Mining Co.
- Jones, H. L., Hazel Green, Wis.**
 Cleveland Mining Co.
- Jones, R. E., Silver City, Utah.**
 Southern Swansea Mining Co.
- Jones, Thos. R., Cobalt, Ont., Canada.**
 Buffalo Mines, Ltd.
- Kalor, Geo. A., Steeple Rock, Grant Co., New Mexico.**
 Shamrock Mining & Milling Co.
- Keating, A. G., Oatman, Arizona.**
 Big Jim Gold Mining Co.
 Ivanhoe Consolidated Mines Co.
- Keating, J. J., Georgetown, Colo.**
 Georgetown Tunnel Transportation Co.
- Keck, Ulrich, Morningstar, Lyon Co., Nevada.**
 Albany Copper Co.
- Kellogg, R. M., Ruth, via Ely, Nevada.**
 Ely Consolidated Copper Co.
- Kelly, Ernest, Wallace, Idaho.**
 Nellie Mining Co.
- Kemp, Joe, Park City, Utah.**
 Little Bell Consolidated Mining Co.
- Kemple, J. C., Goodsprings, Nevada.**
 Yellow Pine Mining Co.
- Kendall, Jos. B., Goldfield, Nevada.**
 Goldfield Consolidated Mines Co.
- Kennedy, E. A., Magistral, Durango, Mexico.**
 National Mines & Smelters Co.
- Kent, Wm., Copper Cliff, Ont.**
 Smelter Supt., Canadian Copper Co.
- Kilpatrick, R. L., Copper Mount, via Sulzer, P. W. I., Alaska.**
 Alaska Consolidated Mining & Smelting Co.
- King, H. L., Romley, Colo.**
 Mill Supt., Mary Murphy Gold Mining Co.
- King, Jasper, Keller, Washington.**
 Walla Walla Copper Mining Co.
- King, J. E., San Andreas, California.**
 Pioneer Chief Gold Mining Co.
- Kingdon, Geo., Cananea, Sonora, Mexico.**
 Cananea Consolidated Copper Co.
- Kinney, H. D., Tooele, Utah.**
 Utah Metal Mining Co.
- Kinzie, R. A., Douglas Island, Alaska.**
 Alaska Mexican Gold Mining Co.
 Alaska Treadwell Gold Mining Co.
 Alaska United Gold Mining Co.
- Kirby, A. G., Cobalt, Ont.**
 Dominion Reduction Co., Ltd.
- Kirkbride, J. W., Goldhill, Colo.**
 American Mines Co.
- Kitchin, Jacob C., Granite, Colo.**
 Granite Tunnel Co.

- Kialingsbury, Geo.**, Rosario, Sinaloa, Mexico.
 Minas Del Tajo.
- Knous, O. W.**, Ouray, Colo.
 Barstow Mine.
- Knowles, Thos.**, Cambria, California.
 Oceanic Quicksilver Mine.
- Knowles, W. H.**, Sonora, California.
 Poison Oak Mine, South American Development Co.
- Knox, R. C.**, Soulsbyville, California.
 Black Oak Mines & Milling Co.
- Knuth, Peter**, Lakewood, Colo.
 Tungsten Exploration Co.
- Knutson, C. C.**, Northport, Washington.
 Norman Mines Co.
- Koepel, Edw.**, Painesdale, Michigan.
 Mill Supt., Champion Copper Co.
 Trimountain Mining Co.
- Koppes, A. O.**, Nogales, Ariz.
 Manhattan Development Co.
 Arnold Mining Co.
- Krueger, K. P.**, Butte, Montana.
 West Colusa Mine, Anaconda C. M. Co.
- Kyes, D. R.**, Monte Cristo, Wash.
 Boston American Mining Co.
- Kyner, T.**, Georgetown, Colo.
 Onondaga Mines Co.
- Lain, G. B.**, Goldfield, Nevada.
 Mill Supt., Goldfield Consolidated Mines Co.
- Laist, Alex.**, Hancock, Michigan.
 Smelter Supt., Quincy Mining Co.
- Landon, S. L.**, Fierro, New Mexico.
 Emma Mine.
- Lang, S. S.**, Houghton, Michigan.
 Naumkeag Copper Co.
- Lannon, F. P.**, Sand Springs, Okla.
 Smelter Supt., American Smelting, Refining & Mining Co.
- Larson, Andrew G.**, Ikeda Bay, Queen Charlotte Islands, B. C.
 Ikeda Mines, Ltd.
- Larson, A. N.**, Newhouse Bldg., Salt Lake City, Utah.
 c/o Union Chief Mining Co.
- Larson, Walter**, Helena, Montana.
 c/o Scratch Gravel Gold Mining Co.
- Latta, E. L.**, Wallace, Idaho.
 Idora Mining Co., Ltd.
- Lawrence, D. H.**, San Antonio, Baja Calif., Mexico.
 West Mexico Mines Co.
- Lawry, A. H.**, Tonopah, Nevada.
 Montana Tonopah Mines Co.
- Lawton, Chas. L.**, Hancock, Michigan.
 Adventure Consolidated Copper Co.
- Ledyard, L. W.**, Swastika, Kirkland Lake Dist., Ontario, Canada.
 Teck-Hughes Gold Mines, Ltd.
- Lefler, John**, Yucca, Ariz.
 Arizona Southwestern Copper Co.
- Lejune, Andrew**, Tin Cup, Gunnison Co., Colo.
 Blistered Horn Mine.
- Lemmon, D. J.**, Alta, Utah.
 West Toledo Mines Co.

- Leonard, W. D.**, Garfield, Utah.
American Smelting & Refining Co.
- Leslie, R. R.**, Morazan, Salvador, C. A.
Butters Divisadero Co.
- Levy, S. M.**, Copperopolis, California.
Calaveras Copper Co.
- Lewis, A. S.**, Phoenix, Ariz.
Young Mines Co., Ltd.
- Libbey, F. W.**, Wickenburg, Ariz.
Vulture Mines Co.
- Lind, John**, Cripple Creek, Colo.
Queen Gold Mining Co.
- Linstrom, C. A.**, Santaquin, Utah.
Granite Mining & Milling Co.
- Little, A.**, Randsburg, California.
Mill Supt., Yellow Astor Mining & Milling Co.
- Lockman, F. W.**, Rhyolite, Nevada.
Sunset Mining & Development Co.
- Loose, W. D.**, Mammoth, Utah.
Grand Central Mining Co.
- Lower, J. B.**, Unsan, Korea.
Oriental Consolidated Mining Co.
- Lucas, J. R.**, Philipsburg, Montana.
Philipsburg Mining Co.
- Lundberg, Herman**, Central City, Colo.
U. P. R. Milling & Mines Co.
- MacDonald, R. R.**, Prescott, Ariz.
Oro Cobra Mining Co.
- MacDougall, C. H.**, Trail, B. C.
Supt. of Construction, Consolidated Mining & Smelting Co. of Canada.
- MacFadden, J. P.**, Sandon, B. C.,
Surprise Mine.
- Mace, C. H.**, Iola, Colo.
Vulcan Mines & Smelter Co.
- Machol, H. E.**, Idaho Springs, Colo.
Seaton Mining & Milling Co.
- MacLachlan, K. S.**, Welland, Ont., Canada,
Metals Chemical Co.
- Magill, Patrick**, Hahn's Peak, Colo.
Hahn's Peak Gold Mining & Milling Co.
- Mahoney, D. J.**, Pocatello, Ida.
Southern Idaho Development Co.
- Mallen, C. H.**, Grass Valley, Calif.
Brunswick Consolidated Gold Mining Co.
- Malmberg, G.**, Brighton, Utah.
American Consolidated Copper Co.
- Maloit, Frank Jr.**, Lordsburg, N. Mex.
Bonney Mining Co.
- Manwaring, J. H.**, Butte, Mont.
Butte-Ballaklava Copper Co.
- Marsh, G. A.**, Pueblo, Colo.
Pueblo Smelter, American Smelting & Refining Co.
- Marsh, Robt. Jr.**, McGill, Nev.
Nevada Consolidated Copper Co.
- Marshall, Wm.**, Silver Plume, Colo.
Terrible-Dunderberg Mining Group & Power Co.
- Martens, B. H.**, Hawthorne, Nev.
Royal Consolidated Copper Co.

- Martin, Fred J.**, Angels Camp, Calif.
Utica Gold Mining Co.
- Martin, John**, Cooke, Mont.
Goose Lake Copper Co.
- Martin, Thos.**, Central City, Colo.
Square Deal Gold Mining Co.
- Martin, W. J.**, Findlay, Ohio.
Harris Copper Co.
- Matson, John**, Globe, Ariz.
Powers Gulch Development Co.
- Matt, J. L.**, Santa Rosa, N. Mex.
Pintado Consolidated Copper Co.
- Mayberry, A. P.**, Eureka, Utah.
Centennial-Eureka Mining Co.
- McBride, W. G.**, Courtland, Ariz.
Great Western Copper Co.
- McCallum, J. A.**, Magdalena, N. Mex.
Calumet-New Mexico Mining Co.
Hop Canyon Mining & Smelting Co.
- McCarthy, D. L.**, Victor, Colo.
Granite Gold Mining Co.
- McCarthy, J. J.**, Oatman, Ariz.
Record Lode Mining Co.
- McCarty, A. L.**, Pinos Altos, N. Mex.
C. & O. Mining & Milling Co.
- McChrystal, Jackson H.**, Eureka, Utah.
Godiva Mining Co.
Ridge & Valley Mining Co.
- McClain, H. G.**, Telluride, Colo.
Liberty Bell Gold Mining Co.
- McCormick, I. H.**, Marysville, Mont.
Piegan-Gloster Mines, Barnes-King Development Co.
- McCormick, Thos. F.**, Virginia City, Nev.
Andes Silver Mining Co.
Consolidated Virginia Mining Co.
- McCree, P. M.**, Bingham, Utah.
New Utah Bingham Mining Co.
- McCroskey, S.**, Yerington, Nevada.
Utah-Yerington Mining Co.
- McCulloch, J.**, Platteville, Wis.
Vinegar Hill Zinc Co.
- McDermott, A. M.**, Choix, Sinaloa, Mex.
Choix Consolidated Mining Co., Ltd.
- McDonald, Alex.**, Box 902, Park City, Utah.
Reed's Peak Mining Co.
- McDonald, B.**, Redding, Calif.
Brown Bear Mining Co.
- McDonald, J. C.**, Phoenix, B. C.
Granby Consolidated Mining, Smelting & Power Co., Ltd.
- McDonough, Pete**, Empire, Colo.
Crown Prince Consolidated Mines Co.
- McElvenny, R. F.**, Tacoma, Wash.
Tacoma Smelting Co.
- McFadden, C. D.**, Georgetown, Coló.
Farwell Mountain Copper Co.
Mid-Colorado Mines Co.
- McFadden, J. P.**, Sandon, B. C.
Surprise Mine.
- McGarry, Sherman**, Beaver, Utah.
Beaver-Butte Copper Co.

- McGee**, John, Tonopah, Nev.
Greenwater Copper Mining & Smelting Co.
- McGillivray**, A. J., Zwicky, B. C.
Cork-Province Mines, Ltd.
- McHenry**, Chas., Fronteras, Sonora, Mex.
Consolidated Sonora Mines Co.
- McIntyre**, John E., San Antonio de la Huerta, Sonora, Mex.
San Antonio Copper Co.
- McIntyre**, Samuel, Jr., Mammoth, Utah.
Mammoth Mining Co.
- McKay**, Alex, Republic, Wash.
Ben Hur Leasing Co.
- McKinley**, M. R., Dodgeville, Wis.
Lucky Five Mining Co.
- McLaggan**, E. J., Winthrop, Calif.
Bully Cave Co.
- McLean**, W. H., Jeffress, Va.
Carnegie Copper Co.
- McLeod**, Angus, S̄relna, Alaska.
Alaska Copper Corp.
- McLeod**, Angus, Butte, Mont.
Butte & Superior Mining Co.
- McNaughton**, Dan, Animas Forks, Colo.
Frisco Mines & Tunnel Co.
- McOmie**, J. H., Minersville, Utah.
Blue Ribbon Gold Mining Co.
- McPhee**, A. D., Chesaw, Wash.
Grant Consolidated Copper Mining Co.
- Manchester**, Wm. D., Chuquicamata, Chile.
Supt. Crushing Dept., Chile Copper Co.
- Merriman**, Lew, Eureka, Utah.
Yankee Consolidated Mining Co.
- Merritt**, Wilbur J., Milford, Utah.
Red Warrior Mining Co.
- Michel**, M. T., Lawson, Colo.
Little Giant Gold Mining & Milling Co.
- Middlekamp**, L. L., Ellamar, Alaska.
Ellamar Mining Co.
- Miller**, A. E., Kellogg, Ida.
Big Creek Leasing Co.
- Miller**, G., Manzanar, Calif.
Reward Gold Mines Syndicate.
- Miller**, G. H., Rand, Nev.
Golden Pen Mine.
- Miller**, J. F., Trail, B. C.
Supt. of Refinery, Consolidated Mining & Smelting Co. of Canada.
- Miller**, Thos. H., Rambler, Wyo.
West Virginia-Wyoming Copper Co.
- Miller**, U. R., Johnson, Ariz.
Keystone Copper Mining Co.
- Minear**, John, 1062 N. 39th St., Seattle, Wash.
British American Mining Co.
- Minner**, A. R., Independence, Colo.
Mill Supt., Vindicator Consolidated Gold Mining Co.
- Mitchell**, Wm., Breckenridge, Colo.
American Mine.
- Mocine**, John, 912 Columbia Bank Bldg., Pittsburgh, Pa.
Pittsburgh-Silver Peak Mining Co.
- Moffatt**, D. D., Ray, Ariz.
Mill Supt., Ray Consolidated Copper Co.

- Moffett, J. W.**, Cobalt, Ont., Canada.
 Beaver Consolidated Mines, Ltd.
 Temiskaming Mining Co., Ltd.
- Moore, John A.**, Calera, Sahuaripa, Sonora, Mex.
 Garretson-Sahuaripa Co.
- Morgan, David P.**, Jerome, Ariz.
 United Verde Extension Mining Co.
- Morgan, Donald R.**, Torreon Viesca, Coahuila, Mex.
 Compania Metalurgica De Torreon, S. A.
- Morrison, R. C.**, Mancos, Colorado.
 Doyle Consolidated Mines Co.
- Moses, Horace, Hurley**, N. Mex.
 Chino Copper Co.
- Mugford, John**, Houghton, Mich.
 Asst. Supt., Michigan Smelter Co.
- Mulholland, W. W.**, Cobalt, Ont., Canada (Box 227).
 Calumet & Montana Consolidated Mining Co.
- Murphy, F. H.**, Wallace, Ida.
 Advance Mining Co.
- Murray, Capt. M. D.**, Terrazas, Chihuahua, Mex.
 Rio Tinto Copper Co.
- Naething, F. S.**, Nipton, Nev.
 Mojave Tungsten Co.
- Nagel, H. P., Jr.**, Independence, Colo.
 Vindicator Consolidated Gold Mining Co.
- Nagle, Edw. B.**, El Cobre, Santiago de Cuba.
 Cuba Copper Co.
- Navala, Ike**, Telluride, Colo.
 Black Bear Mining Co.
- Neill, J. K.**, Salmo, B. C.
 Hudson Bay Zinc Co., Ltd.
- Neilly, B.**, Cobalt, Ont., Canada.
 Penn Canadian Mines, Ltd.
- Nettle, W. J.**, Jackson, Calif.
 Argonaut Mining Co.
- Newell, John E.**, Silverton, Wash.
 Eclipse Consolidated Mining & Investment Co.
- Newman, John**, Humboldt, Ariz.
 Humboldt Consolidated Mines Co.
- Newton, C. W.**, Wallace, Ida.
 Consolidated Interstate Callahan Mining Co.
- Nicholls, J. C.**, Copper Cliff, Ont., Canada.
 Canadian Copper Co.
- Nieding, B. B.**, Juneau, Alaska.
 Alaska Gastineau Mining Co.
- Norcross, F. S.**, Greenwood, B. C.
 British Columbia Copper Co., Ltd.
- Norrie, D. G.**, New Hazelton, B. C.
 Silver Standard Mining Co.
- Norton, W. W.**, Murray, Utah.
 Murray Smelter, American Smelting, Refining & Mining Co.
- Nye, F. H.**, Boulder, Colo.
 Boulder Tungsten Production Co.
- Oates, Geo. W.**, Boulder, Colo.
 United States Gold Corporation.
- O'Brien, F. K.**, Constellation, Ariz.
 Hale Mining & Milling Co.
- O'Brien, T. S.**, Amador City, California.
 Original Amador Consolidated Mines Co.

- Okuse, J. C.**, 203 Nixon Bldg., Reno, Nev.
Luning Idaho Mining Co.
- Olson, Andrew**, Spirit Lake, Wash.
Mount St. Helens Consolidated Mining Co.
- Olson, C. R.**, Yerington, Nev.
Mill Supt., Pittsburg Dolores Mining Co.
- Olson, Chas.**, Columbine, Colo.
Hahns Peak Gold Mining & Milling Co.
- O'Neil, Con.**, Butte, Mont.
Bell Diamond Mine, Anaconda C. M. Co.
- O'Neil, D. J.**, Butte, Mont.
Never Sweat Mine, Anaconda Copper Mining Co.
- Orem, A. J.**, Ludwig, Nev.
Nevada-Douglas Consolidated Copper Co.
- Orr, Geo.**, Randsburg, Calif.
Consolidated Mines Co.
- Osborne, Jerry**, 107 West 3rd Street, Pueblo, Colo.
c/o Equity Creede Mining Co.
- Owen, Jno.**, Idaho Springs, Colo.
Saratoga Mining Co.
Specie Payment Gold Mining Co.
- Owen, W. M.**, Eureka, Utah.
King William Mining Co.
- Owens, Wm.**, Eureka, Utah.
Eagle & Blue Bell Mining Co.
Victoria Consolidated Mining Co.
- Palmer, A. L.**, Amador City, Calif.
Fremont Consolidated Mining Co.
- Parker, Harry L.**, Pioche, Nev.
Pioche Bristol Mining Co.
- Parks, J. F.**, Plymouth, Calif.
Plymouth Consolidated Gold Mines, Ltd.
- Parr, Ed.**, Wellington, Nevada.
Nevada Progressive Gold Mining Co.
- Parshall, A. N.**, Eureka, Utah.
Utah Minerals Concentration Co.
- Passow, F. M.**, Eustis, Quebec, Canada.
Eustis Mining Co.
- Peach, A. B.**, Prescott & Skull Valley, Ariz.
Commercial Mining Co.
- Pearce, J. A.**, Idaho Springs, Colo.
Mill Supt., Argo Reduction & Ore Purchasing Co.
- Pearson, Walter B.**, Allegheny, Calif.
Croesus Mining Co.
- Pelton, E. F.**, Tyrone, New Mexico.
Burro Mountain Copper Co.
- Perry, J. B.**, Yerington, Nev.
Pittsburg-Dolores Mining Co.
- Peters, F. S.**, Trail, B. C.
Le Roi Mines; Consolidated Mining & Smelting Co. of Canada.
- Peterson, L. F.**, Santaquin, Utah.
Eagle Copper Mining Co.
- Peterson, P. E.**, Jefferson Island, Mont.
Montana-Illinois Copper Mining Co.
- Pez, Alberto**, Tepezala, Aguascalientes, Mexico.
Compania Minera La Fortuna, S. A.
- Pfister, Frank**, Globe, Ariz.
Apache Consolidated Copper Co.
- Pfleger, W. F.**, Ludwig, Nev.
Yerington Bullion Mining Co.

- Philips, J. L.**, Inguaran, Michoacan, Mexico.
Compagnie D. Inguaran.
- Phillips, J. L.**, Bluefields, Nicaragua, C. A.
Eden Mining Co.
- Pierce, C. A.**, Patagonia, Ariz.
Ruby Copper Co.
- Pike, W. J.**, Tonopah, Nev.
Jim Butler Tonopah Mining Co.
- Pomeroy, R. E. H.**, McGill, Nev.
Smelter Supt., Nevada Consolidated Copper Co.
- Porter, S. R.**, Oatman, Ariz.
Murdock Mining & Milling Co.
- Potter, Ocha**, Houghton, Mich.
Superior Copper Co.
- Powning, C. C.**, Bagby, Calif.
White Gulch Mining Co.
- Pressler, L. P.**, Magdalena, New Mexico.
Ozark Smelting & Mining Co.
- Price, W. H.**, Butte, Mont.
Moonlight Mine, Anaconda Copper Mining Co.
- Price, W. R.**, Marysville, Mont.
Supt. Shannon Mine, Barnes-King Development Co.
- Proust, J. W., Jr.**, Dos Cabezos, Ariz.
Mascot Copper Co.
- Purcell, M. E.**, Trail, B. C.
Centre Star Mines, Consolidated Mining & Smelting Co. of Canada.
- Purdy, A. E.**, Fortuna, Calif.
Fortuna Copper Co.
- Purmort, Geo. H.**, Garfield, Colo.
Taylor Mountain Mining Co.
- Purnell, E. R.**, Helena, Mont.
Montana Copper-Silver Co.
- Quirk, Jas.**, Pioche, Nev.
Prince Consolidated Mining & Smelting Co.
- Rabb, E. M.**, Chloride, Ariz.
Needles Mining & Smelting Co.
Tom Reed Gold Mining Co., Oatman, Ariz.
- Raleigh, A. E.**, Tenabo, Nev.
Tenabo Mining & Smelting Co.
- Rammelmeyer, A.**, Hailey, Idaho.
Mascot Mining & Milling Co. Ltd. of Idaho.
- Rampton, L. S.**, Mackay, Idaho.
Alta Copper Mining Co.
- Ray, A. J.**, Butte, Mont.
c/o East Butte Copper Mining Co.
- Reardon, Dennis**, Clearwater, Idaho.
Clearwater Gold & Copper Mining Co.
- Reid, Paul G.**, Lovelock, Nev.
Mines Development Co. of Nevada.
- Reid, Shad.**, Apex, Colo.
Evergreen Mines Co.
- Reinmiller, John**, Keddie, Calif.
Engels Copper Mining Co.
- Reiter, E. D.**, Ellamar, Alaska.
Fidalgo-Alaska Copper Co.
- Rennie, Alex.**, Sutter Creek, Calif.
Sutter Creek Mining Co.

- Reynolds, C. W.**, Dolly Varden, Nev.
Victoria Copper Mines Co.
- Reynolds, J. M.**, 412 Dooly Blk., Salt Lake City, Utah.
Creole Mining Co.
- Rice, J. P.**, Oatman, Ariz.
Jerome-Oatman Mining Co.
- Richards, Jas. E.**, Houghton, Mich.
Isle Royale Copper Co.
- Richardson, F. C.**, Burke, Idaho.
Oom Paul Consolidated Mining Co.
- Richardson, R. H.**, Atlanta, Idaho.
Boise Rochester Mining Co.
- Ridley, F. W.**, Allouez, Mich.
Allouez Mining Co.
- Riser, Geo. C.**, McGill, Nev.
Mill Supt., Nevada Consolidated Copper Co.
- Roberts, E.**, Wallace, Idaho.
Western Union Mining Co.
- Roberts, W. H., Jr.**, Bisbee, Ariz.
Wolverine & Arizona Mining Co.
- Roelofs, Richard**, Cripple Creek, Colo.
Cresson Consolidated Gold Mining & Milling Co.
- Rogers, T. W.**, Redding, Calif.
Shasta Monarch Mining Co.
- Rogers, W. J.**, Empire Bldg., Seattle, Wash.
Mount Andrew Iron & Copper Co.
- Roland, G.**, Howardsville, Colo.
Hamlet Mining & Milling Co.
- Rood, V. S.**, Bingham Canyon, Utah.
Utah-Apex Mining Co.
- Roseberry, Ralph**, Montezuma, Colo.
Bessie-Cora Mining Co.
- Ross, A.**, Organ, New Mexico.
Memphis Mining Co.
- Rothwell, John E.**, Butte, Mont.
Mill Supt., East Butte Copper Mining Co.
- Ruby, W. W.**, Goldville, Nev.
Lynn Big Six Mining Co.
- Rule, J. Arthur**, Torreon, Viesca, Mexico.
Asst. Smelt. Supt., Compania Metalurgica De Torreon, S. A.
- Russell, F. M.**, Wallace, Idaho.
Alice Mining Co.
- Russell, L. J.**, Exchange Natl. Bldg., Colorado Springs, Colo.
c/o United Gold Mines Co.
- Rutherford, Forest**, Douglas, Ariz.
Smelter Supt., Copper Queen Consolidated Mining Co.
- Salisbury, George W.**, Jerome, Ariz.
Jerome Victor Extension Copper Co.
- Sanders, W. E.**, Eureka, Utah.
Alkali Mines Co.
- Scheerer, H. F.**, Box 1116, Tucson, Ariz.
Stratton Copper Co.
- Schloesser, A. R.**, Wickenburg, Ariz.
Grijalva Nueva Mining Co.
- Schmal, W. H.**, Sutter Creek, Calif.
South Eureka Mining & Milling Co.
- Schneider, H. L.**, Terrazas, Chihuahua, Mexico.
Smelter Supt., Rio Tinto Copper Co.

- Scholl**, Le Roy, 327 Pine Street, Williamsport, Pa.
Arizona National Copper Co.
- Schultz**, Wm., Ketchum, Idaho.
Golden Glow Mining Co.
- Scotland**, P. B., Morenci, Ariz.
Arizona Copper Co., Ltd.
- Scott**, Harry, Chilito, Ariz.
London Arizona Consolidated Copper Co.
- Scott**, Jos. H., Ouray, Colo.
Camp Bird, Ltd.
- Scott**, Wm., Millerton, Newfoundland.
Buchan's Mine.
- Scoville**, L. S., Las Vegas, Nev.
June Bug Development Co.
- Searls**, John, Steeple Rock, New Mexico.
American Exploration & Mining Co.
- Seeber**, Rex R., Winona, Mich.
Winona Copper Co.
Houghton Copper Co.
- Seideman**, R. W., Saltese, Mont.
Hugo Gold & Copper Mining Co.
- Seley**, F. C., Minera del Carmen, El Oro, Durango, Mexico.
Carmen Copper Co.
- Shaplye**, Cooper, Bishop, Calif.
Tungsten Mines Co.
- Sheridan**, N. C., Wallace, Idaho.
Rex Consolidated Mining Co.
- Sherman**, Fred'k. W., Park City, Utah.
Mill Supt., Daly West Mining Co.
- Sherman**, Gerald, Douglas, Ariz.
Supt. Mining Dept., Copper Queen Consolidated Mining Co.
- Sherwin**, J. W., Tonopah, Nev.
MacNamara Mining & Milling Co.
- Shields**, Jas. W., Hancock, Mich.
Mill Supt., Quincy Mining Co.
- Shilling**, J. D., Bingham Canyon, Utah.
Utah Copper Co.
- Shimmin**, J. T., Butte, Mont.
Mill Supt., Butte & Superior Mining Co.
- Simons**, Otto, Cable Cove, Ore.
Imperial Mining Co.
- Simons**, O. L., Sumpter, Ore.
Blue Mountain Mining Co.
- Simpkins**, Chas., Ainsworth, B. C.
Florence Silver Mining Co.
- Smith**, B. H., Tonopah, Nev.
Monarch Pittsburgh Mining Co.
- Smith**, C. B., Rye Patch, Nev.
Silver Bell & Alpha Consolidated Mines Co.
- Smith**, Chas. W., Alleghany, Calif.
Mill Supt., Croesus Mining Co.
- Smith**, D. C., Cripple Creek, Colo.
Jerry Johnson Gold Mining Co.
- Smith**, Frank W., 67 Milk St., Boston, Mass.
Safford Copper Co.
- Smith**, H. C., Bingham Canyon, Utah.
Supt. Magma Plant, Utah Copper Co.
- Smith**, O. B., Phoenix, B. C.
Granby Consolidated Mining, Smelting & Power Co., Ltd.

- Smith, T. W.**, Bullion, Nev.
Palisade Copper Co.
- Smith, Webb**, 409 Montgomery St., San Francisco, Calif.
Kennedy Mining & Milling Co.
- Smythe, H. V.**, North Pines, Ont., Canada.
Northern Pyrites Co.
- Snow, M. A.**, Park City, Utah.
Utah Ore Sampling Co.
- Snyder, Sol**, Alta, Utah.
Albion Mining Co.
- Snyder, S. F.**, Goldstrike, Utah.
Bee Bee Mining Co.
- Solomon, F. W.**, Miami, Ariz.
Mill Supt., Miami Copper Co.
- Sorenson, A. L.**, Mullan, Idaho.
Amazon-Dixie Mining Co.
- Spaulding, M. E.**, Prescott, Ariz.
Climax Mining Co.
- Spearman, Chas.**, Cobalt, Ont., Canada.
Adanac Silver Mines, Ltd.
- Spedden, H. S.**, Chewelah, Wash.
June Copper Co.
- Stacey, J. C.**, Cordova Mines, Peterboro Co., Ont., Canada.
Cordova Mines, Ltd.
- Stacey, Philip J.**, 423 Banigan Bldg., Providence, R. I.
Nevada-Calumet Copper Mining Co.
- Stallings, C. W.**, Bannack, Mont.
Bannack Gold Mining Co.
- Stanton, O. B.**, Kingman, Ariz.
Oro-Plata Mines.
- Stapp, D. W.**, Eureka, Calif.
Horse Mountain Copper Co.
- Start, Jas.**, Bingham Canyon, Utah.
Fortuna Mining Co.
- Staver, W. H.**, Ophir, Colo.
Ophir Range Gold Mining Co.
- Stephen, Walter M.**, Tendoy, Idaho.
Idaho-Seattle Mining Co.
- Stevens, Isaac N.**, Clifton, Ariz.
Chase Creek Copper Co.
- Stevens, O. G.**, Rochester, Nev.
Nenzel Crown Point Mining Co.
Rochester Elda Fino Mining Co.
- Stevens, W. S.**, Magdalena, New Mexico.
Mill Supt., Ozark Smelting & Mining Co.
- Stewart, G. A.**, Laurier, Wash.
Laurier Mining Co.
- Stewart, L. S.**, Idaho Springs, Colo.
Argo Mining, Drainage, Transportation & Tunnel Co.
- Stockett, N. A.**, Paragon, Idaho.
Paragon Consolidated Mining Co.
- Stoll, Thos.**, Osburn, Idaho.
United Lead Mining Co.
- Stone, Frank**, Landlock, Alaska.
Hemple Copper Mining Co.
- Stone, Fred**, Galena, Kan.
Black Hills Mining Co.
- Strachan, F. J.**, Cananea, Sonora, Mexico.
Mill Supt., Cananea Consolidated Copper Co., S. A.

- Stramler, A. P.**, Ario de Rosales, Ario, Michoacan, Mexico.
Ario Copper Co.
- Strawhun, R.**, Orient, Wash.
Orient Gold Mines, Ltd.
- Stricker, I. C.**, Yucca, Ariz.
Leviathan Mines Co.
- Stroelke, Fred.**, Ely, Nev.
Ely-Calumet Copper Co.
- Stubenbord, J. J.**, Atlanta, Nev.
Atlanta-Home Gold Mining Co.
- Sullivan, Dan P.**, Butte, Mont.
Original Mine, Anaconda Copper Mining Co.
- Sullivan, Jas. H.**, Crown King, Ariz.
Tuscumbia Mining & Milling Co.
- Swanson, A. G.**, Ophir, Utah.
Ophir Hill Consolidated Mining Co.
- Swanton, C. H.**, Romley, Colo.
Mary Murphy Gold Mining Co.
- Symmes, Whitman**, Virginia City, Nev.
Union Consolidated Mining Co.
- Symons, John**, Idaho Springs, Colo.
Stanley Mines Co.
- Talbot, Edw. L.**, Park City, Utah.
Daly West Mining Co.
- Tally, R. E.**, Jerome, Ariz.
United Verde Copper Co.
- Taylor, Chas.**, Atolia, Calif.
Atolia Mining Co.
- Taylor, J. C.**, Van Anda, B. C.
Little Billy Operating Co.
- Taylor, John B.**, Lincoln, Utah.
Great Divide Mines Co.
- Taylor, Roger**, Tacoma, Wash.
Tacoma Smelting Co.
- Taylor, Thos.**, Clarkdale, Ariz.
Smelter Supt., United Verde Copper Co.
- Terry, Wm. L.**, Eureka, Colo.
Sunnyside Gold Mines Co.
- Tharp, Jas. E.**, Florence, Ariz.
Florence Copper Mining Co.
- Thiers, L. I.**, Gleeson, Ariz.
Tejon Mining Co.
- Thomas, J.**, Tonopah, Nev.
Rescue-Eula Mining Co.
- Thomas, J. D.**, Blende, Colo.
Supt. Blende Smelter; American Smelting, Refining & Mining Co.
- Thompson, Fred H.**, Apex, Colo.
Pioneer Mining, Milling, Power & Tunnel Co.
- Thompson, J. F.**, Mine La Motte, Mo.
Mine La Motte Co.
- Thornton, Edw.**, Twin Buttes, Ariz.
Baxter Mine, American Smelting & Refining Co.
- Thum, Wm.**, East Chicago, Ind.
United States Metals Refining Co. of New Jersey.
- Tinker, E. B.**, Globe, Ariz.
Superior & Boston Copper Co.
- Todd, Wm.**, Nederland, Colo.
Wolf Tongue Mining & Milling Co.
- Tonkin, Herbert**, Butte, Mont.
Poulin Mine, Anaconda Copper Mining Co.

- Trankle, L. W.**, Yerington, Nev.
Black Diamond Copper Mining Co.
- Treadwell, J. C.**, Jimulco, Coah., Mexico.
Coahuila Mining & Smelting Co., Ltd.
- Tregonning, C. D.**, French Corral, Calif.
c/o South Yuba Mining & Smelting Co.
- Trenholm, H. R.**, Provo, Utah.
Rico Wellington Mining Co.
- Tucker, E. C.**, Takilma, Ore.
Waldo Smelting & Refining Co.
- Tulloch, R. J.**, Newhouse, Utah.
Mill Supt., South Utah Mines & Smelters.
- Tunnell, Herbert R.**, Butte, Mont.
Pennsylvania Mine; Anaconda Copper Mining Co.
- Turner, John R.**, Winnemucca, Nev.
Winnemucca Mountain Mining Co.
- Tyler, P. M.**, Breckenridge, Colo.
Rilla Mining Co.
- Uthoff, F. G.**, Hackberry, Ariz.
Nevada-Arizona Mines Co.
- Van Wagenen, Hugh R.**, Pioche, Nev.
Amalgamated Pioche Mines & Smelting Corp.
- Varker, John**, Butte, Mont.
Mountain View Mine, Anaconda Copper Mining Co.
- Vernon, J. A.**, Unsan, Korea.
Asst. Supt., Tabowie, Taracol, Candlestick, Chintui & Prospects.
Oriental Consolidated Mining Co.
- Vivian, G. G.**, Butte, Mont.
Smelter Supt., East Butte Copper Mining Co.
- Van Keuren, Mr.**, Boulder, Colo.
Sun Tungsten Co.
- Wade, M. Rogers**, Tyrone, New Mexico.
Azure Mining Co.
- Walker, E. W.**, Mass, Mich.
Mass Consolidated Mining Co.
- Wallinder, Arthur**, Kamloops, B. C.
Kamloops Copper Co.
- Walter, E. W.**, Bishop, Calif.
Rocky Point Consolidated Mines Co.
- Walton, B. M.**, Deloro Twp., Porcupine Dist., Ont., Canada.
Porcupine Premier Gold Mining Co., Ltd.
- Washburn, H. G.**, Flat River, Mo.
Federal Lead Co.
- Watts, F. W.**, Soulsbyville, Calif.
Black Oak Mines & Milling Co.
- Wayland, R. G.**, Douglas Island, Alaska.
Asst. Gen. Supt. of Alaska Mexican Gold Mining Co.
Alaska Treadwell' Gold Mining Co.
Alaska United Gold Mining Co.
- Weck, Chas. A.**, Yerington, Nev.
Bluestone Mining & Smelting Co.
- Weed, C. E.**, Lake Mine, Mich.
Lake Copper Co.
- Weisbaker, Chas.**, Eureka, Utah.
Eureka Hill Mining Co.
- Weringer, F. J.**, Woody, Calif.
Weringer Mines Co.

- Wetzel, T. A.**, Oatman, Ariz.
Gold Range Mining & Milling Co.
- Wheelock, Chas.**, Redding, Calif.
Shasta Copper Exploration Co.
- White, J. E.**, 516 Merritt Bldg., Los Angeles, Calif.
Yucca-Arizona Copper Co.
- Wichman, F. M.**, McCornick Bldg., Salt Lake City, Utah.
Bingham-New Haven Copper & Gold Mining Co.
- Wilcox, Thos. H.**, Ontonagon, Mich.
White Pine Copper Co.
- Wilkin, G. S.**, Moscow, Utah.
Moscow Mining & Milling Co.
- Wilkinson, J. S.**, Chacala, Durango, Mexico.
Amazon Gold Co.
- Wilkinson, T. R.**, Tacoma, Wash.
Supt. of Refinery, Tacoma Smelting Co.
- Williams, Ophir**, Utah.
Cliff Mining Co.
- Williams, Edw.**, Nighthawk, Wash.
Favorite Gold & Copper Mining Co.
- Williams, F. L., Jr.**, Park City, Utah.
Daly West Mining Co.
- Williams, Wakeley A.**, Grand Forks, B. C.
Smelt. Supt., Granby Consolidated Mining, Smelting & Power Co., Ltd.
- Willis, Harry T.**, Central City, Colo.
Gilpado Mining Co.
- Wilson, Frank**, Lincoln, Nev.
Nevada Lincoln Mining Co.
- Windsor, R. P.**, Cripple Creek, Colo.
Elkton Consolidated Mining & Milling Co.
- Winther, A. S.**, Bingham, Utah.
Utah Consolidated Mining Co.
- Wolfe, E. A.**, Chewelah, Wash.
United Copper Mining Co.
- Wood, Jas.**, Douglas, Ariz.
Smelter Supt., Calumet & Arizona Mining Co.
- Woods, Thos. H.**, Telluride, Colo.
Mill Supt., Camp Bird, Ltd.
- Woodward, F. A.**, Copper Hill, Ariz.
Iron Cap Copper Co.
- Word, W. F.**, Helena, Mont.
Helena Mining Bureau, Inc.
- Wren, A. A.**, Ray, Ariz.
Supt. of Drilling, Ray Hercules Copper Co.
- Wright, Albert P.**, Mancayan, Lepanto, Luzon, Philippines.
Lepanto Mining Co., Inc.
- Young, E. L.**, French Gulch, Calif.
Hazel Gold Mining Co.
- Young, E. P.**, 1020 Blake Ave., Glenwood Springs, Colo.
Pine Martin Mining Co.
- Zabriskie, Chas.**, Eureka, Utah.
Iron Blossom Copper Mining Co.
- Zane, O. P.**, Bisbee, Ariz.
Empire State Mining Co.
- Zeigler, W. L.**, Osborne, Idaho.
Silverado Mining Co.

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CHAPTER XI

GEOGRAPHICAL LIST OF ALL MINING COMPANIES, ARRANGED BY STATES (DISTRICTS OR TOWNS)

UNITED STATES

American Metal Co., Ltd. (The).
American Smelters Securities Co.
American Smelting & Refining Co.
American Zinc, Lead & Smelting Co.
American Zinc Ore Separating Co.
Anaconda Copper Mining Co.
Development Company of America.
Empire Zinc Company of Colorado.
General Development Co.
Girard Development Co.
Guggenheim Exploration Co.
International Metals Selling Co.
International Nickel Co.
International Smelting Co.
Metallurgical Company of America.
Phelps Dodge & Co.
United Copper Co.
United States Smelting, Refining & Mining Co.
United States Smelting, Refining & Mining Exp. Co.
Virginia Zinc & Chemical Corporation, Ltd.

ALASKA

Alaska Consolidated Mining & Smelting Co., Sulzer.
Alaska Copper & Coal Co., Copper Centre.
Alaska Copper Corporation, nr. Strelna.
Alaska Ebner Gold Mines Co., Juneau.
Alaska Gastineau Mining Co., Juneau.
Alaska Gold Belt Mining Co., Juneau.
Alaska Gold & Copper Mining Co., Iliamna.
Alaska Gold Exploration & Development Co., Knik dist.
Alaska Gold Mines Co., Juneau.
Alaska Free Gold Mining Co., Willow Creek dist.
Alaska-Iliamna Copper Co., Iliamna.
Alaska Industrial Co., Sulzer.
Alaska Juneau Gold Mining Co., Juneau.
Alaska Metals Co., Bruce, Prince of Wales Island.
Alaska Mexican Gold Mining Co., Douglas Island.
Alaska Treadwell Gold Mining Co., Douglas Island.
Alaska United Copper Exploration Co., Dan Creek.
Alaska United Gold Mining Co., Dan Creek.
Alaska Westover Copper Co., Chitina.
Alice Mining Co., Valdez.

Beatson Copper Co., Latouche.
Beaver Mountain Mining Co., Sulzer.

Cameron-Johnson Gold Mining Co., Valdez.
Chichagoff Mining Co., Chichagoff Island.
Chisna Consolidated Mines Co., Landlock.
Cymru Copper Co., Baldwin.

Dan Creek Gold & Copper Co., Nizina.

Eagle River Mining Co., Echo Harbor.
Ellamar Mining Co., Ellamar.

Fidalgo-Alaska Copper Co., Ellamar.

Galena Bay Mining Co., Valdez.
Gold Bullion Mining Co., Willow Creek dist.
Gold King Mining Co., Valdez.
Granite Gold Mining Co., Valdez.
Great Britain Group, South Valdez Island.
Great Northern Development Co., Phillips.

Hemple Copper Mining Co., Landlock.
Houghton-Alaska Exploration Co., McCarthy Creek.
Hydah (Haidah) Copper Co., Kasaan P. O., Prince of Wales Island.
Hubbard-Elliott Copper Co., Elliott Creek.

Independence Gold Mining Co., Seward.
It Mining Co., Ketchikan.

Jualin Alaska Mines Co., Juneau.

Kansas Copper Co., Copper Centre.
Kenai-Alaska Gold Mining Co., Seward.
Kennecott Copper Corporation, Kennecott and Latouche.

Lakinaw Tagish Co., Moira Sound.
Landlock Bay Copper Mining Co., Landlock.
Latouche Copper Mining Co., Latouche.
Latouche Island Copper Mining Co., Ltd., Latouche.

Mother Lode Copper Mines Co. of Alaska, Kennecott.
Mount Andrew Iron & Copper Co., Kasaan Peninsula, Prince of Wales Id.

Nestor Mining Co., Hadley.
Northern Light Development Mining Co., Prince William Sound.
Northland Copper Gold Group, Ketchikan.
North Midas Copper Co., Strelina.
Niblack Copper Co., Niblack.

Pandora Syndicate, Knights Island.

Ramsey-Rutherford Gold Mining Co., Valdez.
Ready Bullion Copper Co., Juneau.
Regal Mines Co., Kennecott.
Reynolds-Alaska Development Co., Latouche.
Rush & Brown Group, Kasaan.

Sea Coast Mining Co., Valdez.
Seattle Alaska Copper Co., Latouche.
Standard Copper Mines Co., Landlock.

Three Man Mining Co., Landlock Bay.

United Metals Co., Coppermount.

Victory Copper Mining Co., Ketchikan.
 W. A. Dickey Copper Co., Ellamar.
 Willow Creek Mines Co., Willow Creek dist.
 Yukon Gold Co., Yukon Territory.

ARIZONA

Acme Mining & Reduction Co., Tucson.
 Advance Mining Co., Fort Grant.
 Ajo Consolidated Copper Co., Ajo.
 Aladdin Mining Co., Poland.
 Alta Mining & Smelting Co., Superior.
 Alvin Development Co., Salome.
 American Boy Mine, Patagonia.
 American Celtic Copper Co., Clifton.
 Apache Consolidated Copper Co., Globe.
 Apex Group, Hayden.
 Argo Mines Co., Oatman.
 Arizona Belmont Mining Co., Silver Bell.
 Arizona California Mining Co., Prescott.
 Arizona Celtic Copper Co., Clifton.
 Arizona Commercial Mining Co., Globe.
 Arizona Consolidated Copper Mines, Ltd., Clifton.
 Arizona Copper Co., Ltd. (The), Clifton.
 Arizona Copper Belt Mining Co., Constellation.
 Arizona Copperfields, Inc., Wallapai dist.
 Arizona Copper Gold Mines Co., Cherry.
 Arizona Copper Mining Co., Tucson.
 Arizona Copper Shipping Mines Co., Dragoon.
 Arizona-Eastern Mining Co., Kingman.
 Arizona Empire Copper Mines Co., Parker.
 Arizona Gold & Copper Mining Co., Gleeson.
 Arizona Gold Star Mining Co., Oatman.
 Arizona Hancock Copper Co., Superior.
 Arizona Hercules Copper Co., Ray.
 Arizona Merger Gold & Copper Co., Mayer.
 Arizona & Michigan Development Co., Johnson.
 Arizona National Copper Co., Pinto Creek.
 Arizona Smelting Co., Humboldt.
 Arizona-Southwestern Copper Co., Yucca.
 Arizona Success Mining Co., Vicksburg.
 Arizona Tellurium Mines Co., Kingman.
 Arizona Tom Reed Gold Mines Co., Oatman.
 Arizona United Mining Co., Johnson.
 Arizona Venture Corporation, Kingman.
 Arizona Mining Co., Wenden.
 Arkansas & Arizona Copper Co., Jerome.
 Aztec Mines Co., Poland.
 Badger-Hall Mining Co., Paradise.
 Bagdad Copper Co., Bagdad via Hillside.
 Ball Copper Co., Winkelman.
 Ballard Group, Jerome.
 Barney Copper Co., Globe.
 Beemer Consolidated Gold & Copper Co., Mt. Union.
 Belcher Mining Co., Big Bug dist.
 Big Blue Mining Co., Wickenburg.
 Big Jim Gold Mining Co., Oatman.

Big Ledge Development Co., Humboldt.
 Big Pine Consolidated Mining Co., Prescott.
 Big Seven Group, Harrington.
 Bisbee & Duluth Mining & Development Co., Bisbee.
 Bisbee-Sonora Development Co., Paradise.
 Black Prince Copper Co., Johnson.
 Black Range Mining Co., Oatman.
 Black Rock, Ltd., Wickenburg.
 Black Warrior Mine, Black Warrior.
 Blanche Rose Mining Co., Twin Buttes.
 Bland Mine, Patagonia.
 Black Chief Copper Co., Dewey.
 Block Mines Co., Prescott.
 Blue Bell Mine, Mayer.
 Blue Bell Mining & Reduction Co., Swansea.
 Bonnie Mining Co., Prescott.
 Boston & Arizona Mines Co., Old Hat Mining dist.
 Boston & Jerome Copper Co., Jerome.
 Boundary Cone Gold Mines Co., Oatman.
 Bowyer Gold & Copper Co., Bouse.
 Bradford Mine, Patagonia.
 Brooklyn Arizona Mining Co., Mayer.
 Brown Whitlow Group, near Superior.
 Brownell-Arizona Mining & Smelting Co., Casa Grande.
 Buckeye Copper & Gold Mining Co., Turkey.
 Bunker Hill Mines Co., Tombstone.
 Bush Baxter Mine, Twin Buttes.
 Butte & Arizona Copper Mining Co., Hereford.

 Cababi Mining Co., Camp Cababi, via Tucson.
 Calumet & Arizona Mining Co., Warren.
 Calumet & Bisbee Development Co., Bisbee.
 Calumet Copper Creek Mining Co., Copper Creek dist.
 Calumet & Jerome Copper Co., Jerome.
 Carney Mining Co., Mesa.
 Carter Gold Mining Co., Oatman.
 Casanega Daly Mining & Reduction Co., Tyndall dist.
 Casey Jones Mining Co., Oatman.
 Cash Mine, Prescott.
 Castle Copper Co., Prescott.
 Castle Dome Development Co., Miami.
 C. B. S. Mining Co., Globe.
 Central Mining & Development Co., Winkelman.
 Centurion Arizona Mining Co., Dragoon.
 Chaparral Mining Co., Chaparral.
 Chase Creek Copper Co., Clifton.
 Cherry Creek Mines Co., Cherry.
 Chesterfield Copper Co., Twin Buttes.
 Chief Group, Patagonia dist.
 Clara Consolidated Gold & Copper Mining Co., Swansea.
 Clarissa Mining & Milling Co., Oatman.
 Cleopatra Copper Co., Jerome.
 Climax Mining Co., Prescott.
 Cobriza Mines Development Corporation, Johnson.
 Cochise Copper Co., Johnson.
 Cochise Development Co., Bisbee.
 Cole Development Co., Globe.
 College Mine, Wickenburg.
 Colonial Copper Co., Ajo.
 Commercial Mining Co., Prescott.
 Commonwealth Mining & Milling Co., Pearce.

Cone Mining & Milling Co., Oatman.
 Congress Consolidated Mines Co., Ltd. (The), Congress.
 Consolidated Arizona Smelting Co., Mayer.
 Consolidated King Development & Columbia Copper Mining Co., Jerome.
 Continental Copper & Gold Mining Co., Santa Maria dist.
 Copper Butte Mines, Phoenix.
 Copper Canyon Mine, Kingman.
 Copper Chief Mines Co., Bouse.
 Copper Chief Mining Co., Jerome.
 Copper Giant Mine, Hackberry.
 Copper Hoard Mining Co., Chewelah.
 Copper Queen Consolidated Mining Co., Bisbee.
 Copper Queen Gold Mining Co., Humboldt.
 Copper Reef Consolidated Mines, Stanley Butte dist.
 Copper & Silver Zone Mines, Globe.
 Copper State Mining Co., Copper Creek dist.
 Copperfield Porphyry Copper Mining Co., Inc., Wallapai dist.
 Copperox Mining Co. of Arizona, Courtland.
 Cordova Copper Co., Globe.
 Coronado Mine, near Florence.
 Coronado Mining Co., Metcalf.
 Crown City Gold Mines Co., Oatman.
 Cunningham Pass Copper Mining Co., Wenden.
 Cuprite Copper Co., Clifton.

Daly Mines Co., Bouse.
 Denn-Arizona Copper Co., Bisbee.
 Detroit Copper Mining Co. of Arizona, Morenci.
 Dolphin Mine, Poland.
 Dome Mining Co., Oatman.
 Douglas Copper Co., Ray.
 Duluth & Chiricahua Development Co., Paradise.
 Dundee-Arizona Copper Co., Jerome.
 Duquesne Mining Co., Globe.
 Duquesne Mining & Reduction Co., Duquesne.

Eagle Copper-Gold Mining Co., Wickenburg.
 Eagle Copper Mining Co., Morenci.
 Eagle Gold & Copper Mining Co., Morenci.
 Eagle Mountain Copper Co., Kelvin.
 El Tiro Copper Co., El Tiro.
 Elephant Head Mining & Milling Co., Santa Rita Mountains.
 Empire Copper & Gold Mining Co., near Dragoon and Johnson.
 Empire State Mining Co., Bisbee.
 Enterprize Mining, Reduction & Improvement Co., Maynard dist.
 Equator Mining & Smelting Co., Jerome.
 Eureka Gold & Copper Mining Co., Jerome.

Fairview Mining Co., Dragoon.
 Fessenden Gold Mines Co., Oatman.
 Florence Copper Mining Co., Florence.
 Ford Mining Co., Junction.
 Fortuna Gold & Copper Co., Cave Creek.
 Fortuna Mines Corporation, Fortuna.
 Fortuna Mining Co., Superior.
 Fortune Mining Co., Big Bug dist.
 Four Metals Smelter & Mining Co., Patagonia.
 Fremont Mining & Milling Co., Wickenburg.
 Furlough Development Co., Big Horn dist.

German-American Pioneer Consolidated Co., Kingman.
 German Copper Co., Globe.

Gibson Copper Co., Bellevue.
 Gila Cañon Copper Co., Ray.
 Gila Copper Sulphide Co., Christmas via Winkelman.
 Gila Monster Copper Co., Kelvin.
 Gila Mountain Copper Co., Lone Star dist.
 Gilt Edge Mines Co., Oatman.
 Globe & Lost Gulch Silver-Copper Mines Co., Miami.
 Globe Mining Co., Globe.
 Golconda Consolidated, Golconda.
 Golconda Extension Mining Co., Golconda.
 Golconda Ledge Co., Golconda.
 Golconda Zinc Mine, Golconda.
 Gold Bar Mining Co., Wickenburg.
 Gold Buttes Mining & Milling Co., Twin Peaks.
 Gold Cliff Exploration Co., Oatman.
 Gold Key Mining Co., Oatman.
 Gold Ore Mining Co., Oatman.
 Gold Range Mining & Milling Co., Oatman.
 Gold Road Bonanza Mining Co., Gold Road.
 Gold Road Mines Co., Gold Road.
 Golden Bell Mining Co., Kelvin.
 Graham County Copper Co., Cedar Springs.
 Grand Gulch Mining Co., Bentley dist.
 Grand Reef Mine, Aravaipa dist.
 Grand Traverse & Arizona Mining Co., Cave Creek.
 Great Western Copper Co., Courtland.
 Great Western Gold & Silver Co., Dragoon.
 Green Monster Mining Co., Jerome.
 Grijalva Nueva Mining Co., Wickenburg.
 Hackberry Mine, Peacock dist.
 Hale Mining & Milling Co., Constellation.
 Haney Copper Co., Ramsgate.
 Happy Jack Mining & Reduction Co., Patagonia.
 Hardshell Flux Mining & Development Co., Patagonia.
 Harris Copper Co., Tip Top dist.
 Hartford-Arizona Copper Mining Co., Hamburg.
 Hauxhurst Mine, Wickenburg.
 Havalina Mining Co., Duqueshe.
 Hayes & Gracey Syndicate, Tombstone.
 Helvetia Copper Co., Helvetia.
 Higgins Leasing Co., Bisbee.
 Hilltop Mines, Dos Cabezos.
 Home Copper Co., Morenci.
 Hosey Mine, near Patagonia.
 Hull Copper Co., Jerome.
 Humboldt Consolidated Mines Co., McCabe.
 Humboldt Ore Co., Humboldt.
 Huron Gold Co., Huron.
 Imperial Copper Co., Silver Bell.
 Inland Copper Co., Planet.
 Inspiration Consolidated Copper Co., Miami.
 Inspiration Extension Copper Co., Miami.
 Inspiration Needles Copper Co., Miami.
 International Copper Mining Co., Mayer.
 International Mining Co., Ray.
 Iron Cap Copper Co., Globe.
 Iron Queen Mining & Smelting Co., Mayer.
 Ivanhoe Consolidated Mines Co., Oatman.
 Ivanhoe Mine, Patagonia.

Jerome-Oatman Mining Co., Oatman.
Jerome Superior Copper Co., Jerome.
Jerome Verde Copper Co., Jerome.
Jerome-Victor Extension Copper Co., Jerome.
Johnson Copper Development Co., Johnson.
Juanita Mining & Milling Co., Prescott.
Juanita Gold & Copper Co., Parker.

Kay Copper Co., Cave Creek.
Kelvin-Sultana Copper Co., Kelvin.
Kelvin Tunnel Site & Mining Co., Kelvin.
Keystone Consolidated Mining Co., Mineral Park.
Keystone Copper Mining Co., Johnson.
Keystone Development Co., Casa Grande.

La Anozira Gold Mining Co., Kingman.
La Belle Mining Co., Vicksburg.
La Exposicion Mining Co., Wickenburg.
Lake Superior & Arizona Mining & Smelting Co., Superior.
Lake Superior & Western Mining Co., Prescott.
Lazy Boy Gold Mines Co., Oatman.
Leadville Mining Co., Courtland.
Leonard Copper Co., Gleeson.
Leviathan Mines Co., Cedar dist.
Lexington-Arizona Mining Co., Old Trails.
Linden Group, Groom Creek.
Little Johnnie Mine, Prescott.
L. & N. Group, Maricopa county.
Logos Mines Co., Mayer.
London Arizona Consolidated Copper Co., Chilito.
Lone Star Consolidated Copper Co., Solomonville.
Lookout Copper Co., Prescott.
Los Angeles Gem Co., Kingman.
Lost Treasure Mining Co., Gold Road.
Louis d'Or Gold Mining Co., Miami.
Lucky Boy Mining & Milling Co., Oatman.
Lucky Gold & Copper Mining Co., Kelvin.
Lucky Sam Mining Co., Oatman.

Madera Mining Co., Arivaca.
Magina Copper Co., Superior.
Majestic Copper Co., Oracle.
Major Mining & Milling Co., Phoenix.
Mammoth Collins Mine, Shultz.
Manhattan Development Co., Paradise.
Manitou Hill Copper Co., Globe.
Mansfield Mining & Smelting Co., Patagonia.
Maricopa Mines Co., Morristown.
Mars Consolidated Co., Wickenburg.
Mascot Copper Co., Dos Cabezas.
Mascot Mining Co., Willcox.
Maverick Copper Co., Florence.
McKinley Mining & Development Co., Prescott.
McMahon Group, Zonia.
McMillen-Stonewall Mining Co., Globe.
Miami Copper Co., Miami.
Miami Needles Copper Co., Miami.
Michigan & Arizona Development Co., Helvetia.
Middlemarch Copper Co., Middlemarch.
Midnight Mine, Chloride.
Mildred Gold Mining Co., Congress Junction.

Mineral Hill Consolidated Copper Co., Tucson.
 Mingus Mountain Copper Co., Ltd., Jerome.
 Monarch Mining & Smelting Co., Wickenburg.
 Monroe Copper Mine, Prescott.
 Montana Arizona Copper Co., Wenden.
 Monte Cristo Mining & Milling Co., Constellation.
 Monterey Mining, Smelting & Refining Co., S. A., Monterey.
 Morning Glory Mine, Patagonia.
 Mumme Mining Co., Patagonia.
 Murdock Mining & Milling Co., Oatman.

Naco Consolidated Copper Co., Turkey.
 National Consolidated Mining Co., Nogales.
 Navy Group Mining & Milling Co., Oatman.
 Nebraska & Arizona Copper Co., Paradise.
 Needles Mining & Smelting Co., Chloride and Kingman.
 Nellie Mining Co., Old Trails.
 Nekon Mining Co., Crown King.
 Nevada-Arizona Mines Co., Hackberry.
 New Cornelia Copper Co., Ajo.
 New Dominion Mines Co., Globe.
 New England Clifton Copper Co., Clifton.
 New Mescal Mining Co., Jerome.
 New Planet Copper Mining Co., Swansea.
 New State Mining & Reduction Co., Amadoville.
 New York-Arizona Gold & Copper Co., Morenci.
 Newbury Mining Co., Florence.
 Niagara Copper Co., Bagdad.
 North Mountain Mining Co., Price.

Oatman Crescent Mining Co., Oatman.
 Oatman Gold Mining & Milling Co., Oatman.
 Oatman North Star Mines Co., Oatman.
 Oatman Pioneer Mines Inc., Oatman.
 Oatman Southern Mining & Milling Co., Oatman.
 Oatman Syndicate Mining Co., Oatman.
 Oatman United Mines Co., Oatman.
 Octave Mines Co., Congress Junction.
 Ohio Mines Co., Chaparal.
 Oklahoma Copper Co., Florence.
 Old Dominion Copper Mining & Smelting Co., Globe.
 Old Vesuvius Mine, Kirkland.
 Old Yuma Mine, Tucson.
 Oregon-Arizona Copper Co., Superior.
 Orion Mining & Milling Co., Oatman.
 Oro Belle Development Co., Crown King.
 Oro Cobra Mining Co., Wenden.
 Oro Grande Mines Co., Wickenburg.
 Oro Old Glory Mine, Nogales.
 Oro Plata Mine, Kingman.
 Overland Mining Co., Winkelman.
 Owl Head Copper Co., Red Rock.
 Oxide Copper Co., Silver Bell.

Pacific Copper Mining Co., Crown King.
 Palo Verde Copper Co., Phoenix.
 Paradise Mining Co., Paradise.
 Patagonia Mines & Development Co., Patagonia.
 Pawnee Mining Co., San Simon.
 Peabody Consolidated Copper Co., Johnson.
 Pinal Development Co., Troy.
 Pioneer Mining & Smelting Co., Tucson.

Pittsburgh Jerome Copper Co., Jerome.
Pittsburg Mining & Milling Co., Oatman.
Plumas Eureka Mines Co., Johnsville.
Pocahontas Copper Queen Mining Co., Mayer.
Poland Mining Co., Prescott.
Polaris Mining & Milling Co., Clifton.
Portage Lake & Bisbee Mining Co., Bisbee.
Powers Gulch Development Co., Globe.
Prince Albert Mining & Milling Co., Groom Creek.
Prudential Copper Mining Co., Prescott.

Quaker Gold Mines Co., Prescott.

Radium Mines Co., Globe.
Rainbow Mountain Mining Co., Chloride.
Randolph-Gemmill Development Co., Prescott.
Ray-Arizona Copper Co., Kelvin.
Ray Consolidated Copper Co., Ray.
Ray Hercules Copper Co., Ray.
Record Lode Mining Co., Oatman.
Record Mines Co., Bouse.
Red Mountain Copper Mining Co., Mowry.
Red Mountain Development Co., Dragoon.
Red Rover Copper Co., Phoenix.
Redemption Copper Mining & Milling Co., Chloride.
Reward-Arizona Mine, Tucson.
Richards Copper Co., Jerome.
Rosalie Copper Co., Mayer.
Rosemont Copper Co., Rosemont.
Rowley Copper Mines Co., Gila Bend.
Ruby Copper Co., Patagonia.
Ruby Gold & Copper Co., Parker.

San Simon Copper Co., Paradise.
Santa Rita Copper Mining & Smelting Co., Arivaca.
Saratoga Mining Co., Crown King.
Sasco Smelter (American Sm., Ref. & Mng. Co.), Sasco.
Shamrock Mining Co., Vicksburg dist.
Shannon Copper Co., Metcalf.
Shattuck-Arizona Copper Co., Bisbee.
Shea Copper Co., Jerome.
Shill Gold Mining Co., Humboldt.
Silver Keystone Co., Chloride.
Silver King of Arizona Mining Co., Superior.
Silver Reef Mining & Smelting Co., Vekol.
Slocum Copper Co., Phoenix.
Sombrero Development Co., Globe.
Southern Arizona Mining Co., Patagonia.
Southern Arizona Smelting Co., Silver Bell.
Southwestern Copper Co., Yucca.
Southwestern Miami Development Co., Globe.
Southwestern Leasing & Development Co., Black Warrior.
Sterling Copper Co., Dos Cabezas.
Stevens Copper Mining Co., Metcalf.
Stoddard Milling Co., Stoddard.
Stoddard Mines Co., Stoddard.
Stratton Copper Co., Catalina Mountains.
Sturdy Gold Mining Co., Montgomery.
Sullivan Copper Development Co., San Simon.
Sultana-Arizona Copper Co., Kelvin.
Sun Dial Gold Mining Co., Oatman.

Sunnyside Mining Co., Oatman.
 Superior & Boston Copper Co., Globe.
 Superior & Globe Copper Co., Globe.
 Superior & Pittsburgh Copper Co., Warren.
 Superstition Consolidated Mining Co., Pioneer dist.
 Swansea Consolidated Gold & Copper Mining Co., Swansea.
 Swastika Development Co., Prescott.

Table Mountain Copper Co., Kelvin.
 Tank Pass Consolidated Mining Co., Wenden.
 Tejon Mining Co., Gleeson.
 Telluride Chief Mining Co., Kingman.
 Telluride Mining, Milling & Development Co., Oatman.
 Tennessee Mine, Chloride.
 Teter-Stone Azurite Mining Co., Dragoon.
 Three R. Mines, Patagonia.
 Tiger Gold Mining Co., Crown King.
 Times Mining Co., Oatman.
 Tip Top Consolidated Mining Co., Prescott.
 Tip Top Copper Co., Helvetia.
 Tom Reed Gold Mining Co., Oatman.
 Tom Reed, Jr., Mining Co., Oatman.
 Tomboy Group of Mines, Wickenburg.
 Torette Group, Constellation.
 Tortillita Copper Co., Redrock.
 Trench Consolidated Mines Co., Patagonia.
 Troy Arizona Copper Co., Troy.
 Tucson Consolidated Copper Co., Tucson.
 Tuscumbia Mining & Milling Co., Crown King.
 Twin Buttes Mining & Smelting Co., Twin Buttes.

Union Basin Mining Co., Golconda.
 United Eastern Mining Co., Oatman.
 United Globe Mines, Globe.
 United Mines Co. of Arizona, Bouse.
 United Northern Mines Co., Oatman.
 United States Continental Mines Co., Walker.
 United Verde Copper Co., Jerome.
 United Verde Extension Mining Co., Jerome.
 United Western Mines Co., Oatman.
 Utah-Arizona Gold & Copper Mining Co., Chloride.

Valenzuela Copper Mining Co., Benson.
 Vekol Mining Co., Vekol.
 Venture Hill Mining Co., Jerome.
 Verde Combination Copper Co., Jerome.
 Verde Grande Copper Co., Jerome.
 Verde Queen Copper Co., Jerome.
 Verde Queen Mining Co., Pantano.
 Viceroy Mining Co., Patagonia.
 Victor & Belle Crown Mining Co., Wenden.
 Vivian Mining Co., Oatman.
 Vulture Mines Co., Wickenburg.

Walnut Creek Mining & Milling Co., Kingman.
 Wandering Jew Mine, Alto.
 Wardwell & Osborne Copper Mines Co., Well, near Parker.
 Warren Realty & Development Co., Warren.
 Warrior Copper Co., Black Warrior, near Globe.
 Warrior Development Co., Black Warrior, near Globe.
 Wayne Development Co., Quijotoa, via Welden.

Wendendale Gold Mining Co., Wenden.
 West Gold Road Mining Co., Oatman.
 Whitcomb Mining & Milling Co., Tucson.
 Willie Rose Co., Triangle Springs.
 Wolverine & Arizona Mining Co., Bisbee.
 Woodbury Copper Co., Phoenix.
 World's Fair Mine, Patagonia.
 Yaeger Canyon Copper Co., Jerome.
 Yavapai Consolidated Gold, Silver & Copper Co., Crown King.
 Yavapai Metals Mining & Reduction Co., Humboldt.
 Young Mines Co., Ltd., Mesa.
 Y. P. Mining Co., Prescott.
 Yucca-Arizona Copper Co., Yucca.
 Yucca Tungsten Co., Yucca.
 Yuma Consolidated Mine, Tucson.

CALIFORNIA

Afterthought Copper Co., Ingot.
 American Mining Co., Redding.
 Andy Fitz Mining & Milling Co., Downiesville.
 App Mine, Jamestown.
 Argonaut Consolidated Mining Co., Jackson.
 Argonaut Mining Co., Jackson.
 Arps Group, Baird, Shasta county.
 Assets Realizing Mines Corporation, Ironwood dist., Riverside count
 Atolia Mining Co., Atolia.

Balaklala Central Mining & Smelting Co., Coram.
 Balaklala Consolidated Copper Co., Kimberly.
 Balaklala Copper Co., Coram.
 Barbarossa Mine, Loraine.
 Belgium-Bohemian Mining Co., Etna Mills.
 Bendigo Mines Co., Vidal.
 Big Casino Gold Mining Co., Big Oak Flat.
 Big Cliff Mining Co., Etna Mills.
 Bishop Creek Gold Mine, Bishop.
 Black Hawk Mine, Randsburg.
 Black Oak Mines & Milling Co., Soulsbyville.
 Blazing Star Mine, West Point.
 Blue Ledge Mine, Hutton.
 Bobs Farm Mining Co., Trinity Reserve, Trinity county.
 Borealis Consolidated Mines Co., Auburn.
 Brooklyn Mining Co., Dale.
 Brown Bear Mining Co., Deadwood.
 Brunswick Consolidated Gold Mining Co., Grass Valley.
 Bully Cave Co., Winthrop.
 Bully Hill Copper Mining & Smelting Co., Winthrop.
 Bunker Hill Consolidated Mining Co., Amador City.

Calaveras Copper Co., Copperopolis.
 California & Mass. Copper Mines Co., Red Bluff.
 Calumet & California Mining Co., Washington.
 Campo Seco Mines, Camp Seco.
 Canyon Mines Corporation, Gorge.
 Carbonate Lead Mines Co., Carbonate Camp, via Zabriskie.
 Central Eureka Mining Co., Sutter Creek.
 Cerro Gordo Mines Co., Keeler.

Chicago Copper Ref. Co., Red Bluff.
Cocopah Copper Co., Ivanpah.
Consolidated Amador Mining Co., Sutter Creek.
Consolidated Mines Co., Randsburg.
Contact Mining & Milling Co., Trimmer.
Conzetti Mine, Cecilville.
Cooper Mt. Summit Consolidated Mine, Genesee.
Copper Hill Mine, Jackson.
Copper Queen Mine, Portola.
Copper Mountain Consolidated Mining Co., Redding.
Corona Mining & Milling Co., Death Valley (Inyo county.)
Croesus Mining Co., Alleghany.
Curtz Consolidated Mines Co., Markleville.

Dairy Farm Mining Co., Van Trent.
Defender Mine, Volcano.
Delta Consolidated Gold Mines Co., Delta.
Dupont Copper Mines Co., Trinity.
Dutch-Sweeney Mining Co., Quartz, via Jamestown.

Eagle Copper Co., Taylorsville.
Eagle Mine, Genesee.
Engels Copper Mining Co., Taylorsville.
Enterprise Gold Mining Co., East Fork dist.
Estelle Mining Co., Keeler.
Excelsior Consolidated Mining Co., Cisco.

First National Copper Co., Coram.
Five Bears Mining Co., Genesee.
Five Pines Mining Co., Minersville.
Fortuna Copper Co., Fortuna.
Fremont Consolidated Mining Co., Amador City.
Fresno Copper Co., Ltd., Clovis.
Friday Lowden Copper Co., Redding.
Furnace Creek Copper Co., Greenwater.

Genesee Valley Copper Co., Genesee.
Giant Ledge Gold & Copper Co., Barnwell.
Gladstone Mine, French Gulch.
Globe Consolidated Lease, Inc., Dedrick.
Golden Center Mining Co., Grass Valley.
Golden Jubilee Mine, Carville.
Golinsky Mining Co., Kennett.
Grass Valley Consolidated Gold Mines Co., Grass Valley.
Greenback Copper Co., Woody.
Green Horn Mountain Copper Co., Shasta county.
Green Mountain Copper Mines, Raymond.
Gwin Mine Development Co., Gwin Mine.

Harvard Mine, Inc., Jamestown.
Hazel Gold Mining Co., French Gulch.
Hess Mining Co., Alturas.
Hornitos Gold Mining Co., Hornitos.
Hope Mines Development Co., Sonora.
Horse Mountain Copper Co., Eureka.
Humboldt Copper Mining Co., Eureka.

Indiana & Last Chance Group, Copley.
Inyo Copper Mines Corporation, Keeler.
Inyo Gold Mining Co., Elko.
Iron Mountain Copper Co., Blythe City.
Ironsides Mine, Yreka.

Isabella Copper Mining Co., Etna Mills.
Island Copper Co., Island Mountain.

Jamestown Exploration Co., Jamestown.
Jessie Belle Mining, Milling & Smelting Co., Mariposa county.
Joe Creek Copper Co., Hutton.
Jumbo California Gold Mines Co., Stent.

Kate-Hardy Mines Co., Forest.
Kennedy Mining & Milling Co., Jackson.
Keystone Mining Co., Amador City.
Kings Quicksilver Mining Co., Ltd., Kings county.
King Solomon Mine, Liberty Dist., Siskiyou county.
King Solomon Leasing Co., Johannesburg.

Lightner Gold Mining Co., Angels Camp.
Little Bully Hill Mining & Smelting Co., Winthrop.
Loretto Copper Mining Co., Big Pine.
Louisiana Development Co., Tuolumne.
Lucile Gold & Copper Mining Co., Kelso.

Madera Enterprise Mines Co., Grubgulch.
Mad Mule Mining Co., Stella.
Mammoth Consolidated Mining Co., Bakersfield.
Mammoth Copper Mining Co. of Maine, Kennett.
Mariposa Commercial & Mining Co., Mariposa.
McAlpine Mines Co., Coulterville.
Melones Mining Co., Melones.
Mexican Smelting & Refining Co., Siskiyou county.
Modoc Mines Co., Highgrade.
Mojave Tungsten Co., San Bernardino county.
Mount Gaines Gold Mining Co., Hornitos.
Mountain Copper Co., Ltd., Keswick.
Mountain King Mining Co., Mountain King.
Mountain Monarch Gold Mining Co., Shasta.
Mountain Silver, Lead & Zinc Co., Palomas Dist., Sierra county.

Napoleon Mine, Copperopolis.
Nassau Copper Co., Copperopolis.
Native Copper Mining Co., Monterey county.
Needles Mining & Smelting Co., Needles.
New Providence Gold Mining Co., Tuolumne.
New Idria Quicksilver Mining Co., Jamestown.
Norwegian Consolidated Mining Co., Melones.
North Fork Mining Co., Forest.
North Star Mines Co., Grass Valley.
Nyman Consolidated Mines Co., Jamestown.

Oceanic Quicksilver Mine, Cambria.
Oriental Gold Mining Co., Alleghany.
Original Amador Consolidated Mines Co., Amador.
Original Mining & Milling Co., Merced.
Oro Belle Mines Co., Hart, via Goffs.
Oro Fino Mining Co., Ophir.

Pacific Mines Corporation, Stagg.
Patriquin Quicksilver Mine, Parkfield.
Penn Mining Co., Camp Seco.
Pioneer Chief Gold Mining Co., San Andreas.
Pittsburg Liberty Mine, Masonic.
Pittsburgh & Mount Shasta Gold Mining & Milling Co., Redding.
Pittsburg-Silver Peak Mining Co., Sonora.

Plymouth Consolidated Gold Mining, Ltd., Plymouth.
Pocohontas Mining Co., Lewis.

Quicksilver Investment Co., New Almaden.
Quicksilver Mining Co., New Almaden.
Quimby Mining Co., Quimby Creek.

Redwood Copper Queen Mining Co., Cloverdale.
Republic Smelting Corporation, Calzona.
Reward Gold Mines Syndicate, Manzanar.
Rocky Point Consolidated Mines Co., Bishop.
Royal Gold Mines Co., Copperopolis.
Ruby Copper Mining Co., Korbelt.
Ruby King Copper Co., Ladogo.

Sacramento Valley Copper Co., Greenwood.
Sagamore Mining Co., Purdy.
Saint Johns Mines Co., Vallejo.
Salt Lake-California Copper Co., Smith River.
Sarita Mining Co., Masonic.
Selby Smelting & Lead Co., Selby.
Shasta Belmont Mining Co., Winthrop.
Shasta Copper Exploration Co., Kennett.
Shasta May Blossom Copper Co., Consolidated, Del Mar.
Shasta Monarch Mining Co., Whiskeytown.
Shasta National Copper Co., Kennett.
Shenandoah Mines Co., El Dorado.
Sierra Alaska Mining Co., Pike.
Sierra Range Copper Co., Genesee.
Sixteen To One Mile, Alleghany.
Skidoo Mines Co., Skidoo.
South American Development Co., Sonora.
Southern Eureka Mining Co., Greenville.
South Eureka Mining & Milling Co., Sutter Creek.
South Yuba Mining & Smelting Co., Nevada City.
Spence Mineral Co., Spenceville.
Standard Amalgamated Exploration Corporation, Esmeralda.
Standard Tungsten Co., Tungsten City, via Bishop.
Steifer Mining Co., P. B., Coutolenc.
Stowell Mine, Kennett.
Sutter Creek Mining Co., Sutter Creek.

Tahoe Copper Mine, Greenwood.
Tecopa Consolidated Mining Co., Tecopa.
Trail Creek Mining Co., Callahan.
Treasure Mining Co., Amador City.
Trinity Copper Co., Kennett.
Trinity Gold Mining & Reduction Co., Carrville.
Tungsten Mines Co., Bishop.
Tuscarora Mining & Milling Co., Vidal.

Ubehebe Copper Mines & Smelter Co., Lone Pine.
Union Development Co., Calaveras county.
Union Hill Mining Co., Grass Valley.
United Greenwater Copper Co., Dale, via Amboy.
United States Exploration Co., Granite Basin.
Utica Gold Mining Co., Angels Camp.

Victor Power & Development Co., Harrison Gulch, Shasta county.
Virginia Quartz Mine, Bagby.

Walker Mining Co., Portola.
Weringer Mines Co., Oil Center.

White Gulch Mining Co., Bagby.
 Willow Valley Mining Co., Nevada City.
 Wilshire Bishop Creek Co., Bishop.
 Yellow Astor Mining & Milling Co., Randsburg.

COLORADO

Cripple Creek Dist.

Acacia Gold Mining Co.
 Ajax Gold Mining Co.
 Albert Beacon Gold Mining Co.
 All Right Mining Co.
 Aloha Gold Mining Co.
 Anchoria Leland Mining & Milling Co.
 Banner Gold Mining Co.
 Blue Flag Gold Mining Co.
 Bob Lee Consolidated Mining Co.
 Christmas Gold Mining Co.
 C. K. & N. Mining Co.
 C. O. D. Cons. Gold Mining & Development Co.
 Consolidated Mines & Reduction Co.
 Cresson Consolidated Gold Mining & Milling Co.
 Cripple Creek Deep Leasing Co.
 Cripple Creek General Mining & Exploration Co.
 Cripple Creek Gold Mining Co.

Dante Gold Mining Co.
 Deerhorn Mine.
 Dexter Gold Mining Co.
 Dig Gold Mining Co.
 Doctor Jack Pot Mining Co.

El Paso Consolidated Gold Mining Co.
 Elkton Cons. Mining & Milling Co.
 Ella W. Mine.

Fauntleroy Gold Mining Co.
 Findley Mines Co.
 Flower of the West Gold Mining Co.

Gold Bond Consolidated Mines Co.
 Gold Dollar Consolidated Mining Co.
 Gold King Mining Co.
 Gold Sovereign Mining & Tunnel Co.
 Granite Gold Mining Co.

Henry Adney Gold Mining Co.
 Hondo Mining & Milling Co.

Isabella Mines Co.

Jennie Sample Gold Mining Co.
 Jerry Johnson Gold Mining Co.
 Joe Dandy Leasing Co.

Kishman Leasing Co.
 Kittie Lane Gold Mining Co.
 Komet Mining Co.

Last Dollar Mining & Development Co.
 Laura Lee Mining & Leasing Co.
 Leland Mining & Development Co.
 Lexington Gold Mining Co.

Mary McKinney Mining Co.
 Mary Nevin Gold Mining Co.
 Maryana Mining & Leasing Co.
 Milltown Extension Gold Mining Co.
 Modoc Mining & Milling Co.

Oston Leasing Co.

Pharmacist Gold Mining Co.
 Portland Gold Mining Co.
 Prince Albert Mine.

Queen Gold Mining Co.

Raven & Beacon Hill Gold Mining Co.
 Requa-Savage Gold Mining Co.
 Ruby Mining & Milling Co.

School Section Leasing Co.
 Seemann Investment & Finance Co.
 Stratton Cripple Creek Mining & Development Co.
 Stratton's Independence, Ltd.
 Strong Gold Mining Co.

Tenderfoot Hill Consolidated Mining Co.

Union Leasing Co.
 United Gold Mines Co.
 United States Mining Co.
 U. S. Reduction & Refining Co.

Victor Gold Mining Co.
 Vindicator Consolidated Gold Mining Co.

War Eagle Consolidated Mines Co.

Yellow Bird Gold Mining Co.

Miscellaneous Districts.

Accord Mining & Milling Co., Georgetown.
 Alco Mining & Milling Co., Idaho Springs.
 Alice Gold Mills Corporation, Idaho Springs.
 Allgrove Mining & Milling Co., Nederland.
 Almaden Mines Co., Idaho Springs.
 Altezuma Gold Mining & Milling Co., Montezuma.
 American Mine, Breckenridge.
 American Mines Co., Boulder.
 American Nettie Mine, Ouray.
 Anti-Periodic Group, Silverton.
 Apex Copper Co., Hayman.
 Arapahoe Mining & Milling Co., Idaho Springs.
 Argo Mining, Drainage, Transportation & Tunnel Co., Idaho Springs.
 Argo Mining & Tunnel Co., Idaho Springs.
 Argo Reduction & Ore Purchasing Co., Idaho Springs.
 Aspen Mine Co., Silverton.
 Atlas Mining & Milling Co., Ouray.
 Augusta Metal Mining Co., Crested Butte.
 A. Y. & Minnie Mining & Milling Co., Leadville.
 Aztec Mines Co., Central City.

Baca Mining Co., Creston.
 Bachelor Khedive Mines Co., Ouray.
 Banker Mine, Leadville.
 Barstow Mine, Ouray.
 Bates Leasing Co., Central City.
 Bengal Tiger-Gordon Mine, Twin Lakes.
 Bessie-Cora Mining Co., Montezuma.
 Bezant Gold Mining Co., Central City.
 Big Five Mining Co., Idaho Springs.
 Big Five Tunnel, Ore Red. & Transportation Co., Idaho Springs.
 Big Thompson Mine, Elkton.
 Black Bear Mining Co., Telluride.
 Black Cloud Mining Co., Salina.
 Blistered Horn Mine, Tin Cup.
 Boren Gulch Mining Co., La Plata.
 Boston Mine Leasing Co., Idaho Springs.
 Boston-Sierra Madre Mine Industry Co., Columbine.
 Boulder Tungsten Production Co., Nederland.
 Brant Gold & Copper Co., Pitkin.
 Brant Independent Mining Co., Pitkin.
 Brown Mountain Smelting Co., Ouray.

Calhoun Consolidated Mines Co., Central City.
 Camp Bird, Ltd., Telluride.
 Camp Bird Mining, Leasing & Power Co., Pitkin.
 Capital Mining & Tunnel Co., Georgetown.
 Caribou Mines & Mills Co., Cardinal.
 Carter Mining Co., Ohio City.
 Cashier Gold Mining & Reduction Co., Central City.
 Centennial Mine, Georgetown.
 Coldwater Copper Mining Co., Pearl.
 Colonel Sellers Mine, Leadville.
 Colorado & Connecticut Gold Mining Co., Lake City.
 Colorado Metals & Chemical Co., Eldora.
 Colorado Mining Land & Development Co., Hillside.
 Colorado Superior Mining Co., Telluride.
 Congress Gold & Copper Co., Ouray.
 Consolidated Copper Mining, Milling & Smelting Co., Eldora.
 Continental Mines, Power & Reduction Co., Lombard.
 Copper Hill Mining Co., La Plata.
 Cripple Creek Drainage & Tunnel Co., Colorado Springs.
 Crown Prince Consolidated Mining Co., Empire.
 Cumbre Mining Co., Breckenridge.

Day Star Mines Co., Pitkin.
 Degge Clarke Tungsten Mill, Nederland.
 Detroit & Colorado Mining Co., Silverton.
 Down Town Mines Co., Leadville.
 Doyle Consolidated Mines Co., Mancos.
 Dubuque Mining & Tunnel Co., Idaho Springs.
 Dunkin Mining Co., Breckenridge.
 Durango Smelter, Durango.

Eagle Mining & Milling Co., Belden.
 Equity Creede Mining Co., Creede.
 Evergreen Mines Co., Apex.

Fanny Fern Mining Co., Lake City.
 Fanny Rawlings Mining Co., Breece Hill.
 Farwell Mountain Copper Co., Hahn's Peak dist.
 Fourth of July Mining & Milling Co., Eldora.

Frank Hough Mining Co., Lake City.
 Frisco Mines & Tunnel Co., Animas Forks.
 Frontenac Cons. Mines, Ltd., Central City.
 Garbutt Leasing Co., Leadville.
 Gem Consolidated Mines Co., Idaho Springs.
 Genessee Vanderbilt Mine, Red Mountain.
 Georgetown Tunnel & Transportation Co., Georgetown, Colo.
 Giant Eclipse Consolidated Co., Salida.
 Gilpado Mining Co., Central City.
 Gilpin-Eureka Mining Co., Central City.
 Gilpin Orion Gold Mining Co., Central City.
 Gilt Edge Mines & Smelting Co., Idaho Springs.
 Globe Smelting & Refining Co., Denver.
 Gold Cup Mining Co., Central City.
 Gold Hill United Mines Co., Villagrove.
 Gold King Leasing Co., Gladstone, via Silverton.
 Gold Queen Mining Co., St. Elmo.
 Golden Cycle Mining & Reduction Co., Colorado City.
 Granite Tunnel Co., Granite.
 Great Western Mine, Lake George.
 Griffith Consolidated Mine, Salida.
 Hahn's Peak Gold Mining & Milling Co., Hahn's Peak.
 Hahnwald Leasing Co., Pitkin.
 Hamlet Mining & Milling Co., Howardsville.
 Hampton Consolidated Mines Co., Russell Gulch.
 Hanna Mining & Milling Co., Capitol City.
 Hearne Gold & Copper Co., Central City.
 Hecla-Granite Mining Co., Turret.
 Henrietta Mining & Milling Co., Silverton.
 Hinsdale Tunnel & Reduction Co., Lake City.
 Hoosac Tunnel & Mining Co., Idaho Springs.
 Humboldt Mines Co., Mt. Sneffels dist.
 Ibex Mining Co., Leadville.
 Idaho Bride Mining & Milling Co., Idaho Springs.
 Idaho Mng., Red. & Transportation Co., Idaho Springs.
 Imperial Consolidated Mining Co., Georgetown.
 Ingalls Leasing Co., Quartz Hill, Gilpin county.
 Iowa Tiger Mining Co., Silverton.
 Iron Silver Mining Co., Leadville.
 Japan-Flora Mines & Tunnel Co., Telluride.
 Jewell Mines & Reduction Co., Pitkin.
 Katinka Gold Mining Co., Guyot Hill.
 Kennedy Gold Mining & Milling Co., Georgetown.
 Keystone Cons. Mining & Milling Co., Magnolia.
 King Solomon Tunnel & Development Co., Frisco.
 Kittimac Mines Co., Silverton.
 La Sal Copper-Silver Mining Co., Paradox.
 Lake George Development Co., Lake George.
 Lake Mine, Central City.
 Lake Superior Ophir Mining Co., Ophir.
 Lewis Mine Co., Telluride.
 Liberty Bell Gold Mining Co., Telluride.
 Lillian Mine, Central City.
 Lincoln Group Mines Co., Idaho Springs.
 Little Giant Gold Mining & Milling Co., Lawson.
 London Mining & Reduction Co., Alma.
 Luema Mining Co., Leadville.

Marie Mining Co., Breckenridge.
 Marion Mines & Mills Co., Westcliff (Hardscrabble dist.)
 Marshall & Russell Gold Mng., Mlg. & T. Co., Empire.
 Mary Murphy Gold Mining Co., Romley.
 Memphis & Idaho Springs Gold M. & M. Co., Idaho Springs.
 Michigan Mining & Milling Co., Kokomo.
 Mid-Colorado Mines Co., Georgetown.
 Mollie Groves Mining & Milling Co., Parshall.
 Morning Glory Mine, Pitkin.
 Mt. Champion Mining Co., Leadville.
 Mountain Mining Co., Salida.
 Mutual-Co-Operative Mining Co., Salina.

National Bell Mine, Ouray.
 National Radium Institute, Paradox Valley.
 National Radium Products Co., Grand Junction.
 Nederland-Beaver Tungsten Mining Co., Nederland.
 New England Exploration Co., The, Telluride.
 New Era Mines, Idaho Springs.
 New Marian Consolidated Mining Co., Colorado.
 New Monarch Mining Co., Leadville.
 Nisi Prius Consolidated Mining Co., Leadville.

Ohio & Colorado Smelting & Refining Co., Salida.
 Old Hundred Mining Co., Silverton.
 Old Town Mng., Mlg. & Transportation Co., Russell.
 Oneida-Stagg Mining & Milling Co., Idaho Springs.
 Onondaga Mines Co., Georgetown.
 Ophir Range Gold Mining Co., Ophir.
 Opportunity Consolidated Gold Mining Co., Central City.
 O'Reilly Gold Mining Co., Breckenridge.
 Ouray Smelting & Refining Co., Ouray.

Paragon Mining Co., La Plata.
 Parker Group of Mines, Silverton.
 Peerless Mining & Milling Co., Salida.
 Pelican Mining & Milling Corporation, Lake City.
 Pennsylvania Mining Power & Reduction Co., Idaho Springs.
 Philadelphia Mines Co., Montezuma dist.
 Pine Martin Mining Co., Red Cliff.
 Pioneer Mng., Mlg., Power & Tunnel Co., Apex.
 Ponsardin Mine, Leadville.
 Pozo Gilpin Mining Co., Idaho Springs.
 Precious Metals Corporation, Silverton.
 Primos Mining & Milling Co., Lakewood.
 Progress Mining & Milling Co., Leadville.
 Puritan Mine, Lincoln dist.
 Puzzle Leasing Co., Breckenridge.

Radium Company of America, Paradox Valley.
 Rare Metals Co., Nederland.
 Rawley Mining Co., Bonanza.
 Rico-Argentine Mining Co., Rico.
 Rico Consolidated Mines Co., Rico.
 Rico Mining Co., Rico.
 Rico Wellington Mining Co., Rico.
 Rilla Mining Co., Breckenridge.
 Rio Dolores Mining Co., Rico.
 Ross Mining & Milling Co., Silverton.

St. Johns Mines (Colorado) Ltd., Montezuma and Leadville.
 St. Paul Mining & Reduction Co., Silverton.

- Salida Copper Co., Salida.
 San Antonio Mining Co., Red Mountain dist.
 Santiago Con. Mining, Milling & Tunnel Co., Georgetown.
 Saratoga Mining Co., Russell Gulch.
 Seaton Mining & Milling Co., Idaho Springs.
 Sedalia Copper Co., Salida.
 Shafter Mining Co., Idaho Springs.
 Silver Lake Mines, Silverton.
 Slick Brothers Mining & Milling Co., Ouray.
 Small Hopes-Boreel Mining Co., Leadville.
 Smuggler Union Mining Co. (The), Telluride.
 Southern Exploration & Mining Co., Silverton.
 Specie Payment Gold Mining Co., Idaho Springs.
 Spring Gulch Mining & Milling Co., Ward.
 Square Deal Gold Mining Co., Central City.
 Standard Chemical Co., Paradox Valley.
 Standard Gold-Copper Mining & Milling Co., Pass Creek.
 Stanley Mines Co., Idaho Springs.
 Sun Tungsten Co., Boulder.
 Sunnyside Gold Mines Co., Eureka.
 Swarthmore Consolidated Mining Co., Cardinal.
 Silver Plume Reduction Co., Silver Plume.
 Rocky Mountain Goldfield Mining Co., St. Elmo.

 Taylor Mountain Mining Co., Garfield.
 Tek Mining, Milling & Leasing Co., Idaho Springs.
 Tennessee Mining & Milling Co., Empire.
 Tepee Mining & Development Co., Alamoso.
 Terrible Dunderberg Mining & Power Co., Silver Plume.
 Third Venture Mining Co., Leadville.
 Tomboy Gold Mines Co., Ltd., Telluride.
 Topeka Consolidated Mining Co., Central City.
 Tucson Mine, Leadville.
 Tungsten Exploration Co., Lakewood.
 Tungsten Girl Co., Ward.
 Twin Lakes Mining & Milling Co., Twin Lakes.

 United Lead Co.
 U. S. Gold Corporation, Boulder.
 United States Zinc Co., Pueblo.
 U. P. R. Milling & Mines Co., Central City.

 Vasco Mining Co., Nederland dist.
 Vernon Mining Co., Red Mountain dist.
 Vindicator Mines & Tunnel Co., Idaho Springs.
 Vulcan Mines & Smelter Co., Iola.

 Waldorf Consolidated Mining Co., Georgetown.
 Wanakah Mining Co., Ouray.
 Washington Mine, Breckenridge.
 Weller Gold Mining Co., Telluride.
 Wellington Mines Co., Breckenridge.
 Western Mining Co., Leadville.
 Western Slope Copper Mining & Smelting Co., Grand Junction.
 Western Tungsten Mines Co., Nederland.
 Western Zinc Oxide Co., Leadville.
 Wolf Tongue Mining & Milling Co., Nederland.
 Wolfstone Mine, Leadville.

 Yak Mining, Milling & Tunnel Co., Leadville.
 Yukon Mines Co., Parlin.

CONNECTICUT

New Haven Copper Co., Seymour.
Tungsten Company of America, Trumbull.

CUBA

Cuba Copper Co., El Cobre, Santiago de Cuba.
Los Cerros Copper Co., Fomento, Prov. de Santa Clara.
Matahambre Mine, Pinar del Rio.

GEORGIA

Lincoln Gold & Copper Mining Co., Metasville.
Virginia Zinc & Chemical Corporation, Ltd.

IDAHO**Coeur D'Alene District.**

Advance Mining Co.
Aeolian Copper Consolidated Mining Co., Ltd.
Alameda Mining Co.
Alice Mining Co.
Amazon Dixie Mining Co.
American Commander Mining & Milling Co.
Amy-Matchless Mining & Milling Co.
Antimony-Silver Mining Co.
Atlanta Mining Co.
Aurora-Sampson Mining Co.

Basin Mining Co.
Bear Top Mine.
Belmont-Banner Mining Co.
Belmont Mining Co., Ltd.
Benton Mining Co.
Best Chance Mining Co., Ltd.
Big Creek Leasing Co.
Bill Buck Mining Co., Ltd.
Black Bear Consolidated Mining Co., Ltd.
Black Hawk Mining & Development Co., Ltd.
Blaine & Emmet Mining Co., Ltd.
Bunker Hill & Sullivan Mining & Concentrating Co.

Caledonia Mining Co.
Callahan Mining Co.
Carbonate Center Mining Co.
Carbonate Hill Mining Co.
Carney Copper Co., Ltd.

Champion Copper Mining Co.
Chicago-Boston Mining Co.
Clarinda Copper Mining Co.
Clearwater Gold & Copper Mining Co.
Coeur d'Alene Antimony Mining Co.
Coeur d'Alene Consolidated Mining Co.
Colonial Mining & Milling Co.
Columbia Copper Mining Co.
Comet Gold & Copper Mining Co., Ltd.
Comet Mining & Milling Co.
Comstock Copper Mining Co., Ltd.
Consolidated Interstate Callahan Mining Co.
Constitution Mining & Milling Co.
Copper King Mining & Smelting Co.
Copper Prince Consolidated Mining & Milling Co.
Copper Queen Mining & Milling Co., Ltd.
Custer Consolidated Mining Co.

East Caledonia Mines Co.
East Coeur d'Alene Mining Co.
East Snowstorm Mining Co.
Excelsior Mining Co.

Federal Mining & Smelting Co.
Florence Mining & Milling Co.
Fox Copper Mining & Milling Co.

Gertie Mining Co.
Giant Ledge Mining Co.
Gold Hunter Mining & Smelting Co.
Gold Leaf Consolidated Mining Co.
Gray Copper Mining Co., Ltd.
Great Eastern Mining Co., Ltd.
Great Western Mining Co.
Green Hill Cleveland Mining Co.

Hamburg-American Copper Mining & Milling Co.
Hecla Mining Co.
Hercules Mining Co.
Highland Surprise Consolidated Mining Co.
Hilarity Mining Co.
Horst-Powell Copper Mining Co.
Hypotheek Mining & Milling Co.

Ibex Mining Co.
Idaho Copper Mining Co., Ltd.
Idaho Giant Mining Co.
Idaho & Los Angeles Mining & Milling Co.
Idaho Montana Mining Co., Ltd.
Idaho Nevada Exploration, Ltd.
Idaho Northern Mineral Co.
Idora Mining Co., Ltd.
Imperial Mining Co.
Independence Lead Mines Co.
Independent Copper Mining & Milling Co.
Ivanhoe Mining Co.

Jack Waite Mining Co., Ltd.
Jumbo Mining Co.

Kellogg Sunnyside Mining Co.
Keystone Mines Corporation.

Laclede Mining Co.
 Leslie Copper Mining Co.
 Lewis & Clark Mining Co.
 Lombardy Mining & Milling Co.
 Lucky Calumet Copper Mining Co., Ltd.
 Lucky Friday Mining Co.
 Lucky Swede Gold & Copper Mining Co.

Marsh Mines Co.
 Marsh Mines Consolidated Co.
 Midway Summit Mining & Milling Co., Ltd.
 Military Mining & Milling Co., Ltd.
 Mineral Farm Mining Co., Ltd.
 Missoula Copper Mining Co.
 Montana-Idaho Copper Co.
 Moonlight Mining Co.

Nabob Mining Co.
 National Copper Mining Co., Ltd.
 Nellie Mining Co.
 Nevada Stewart Mining Co.
 Nipsic Mining Co., Ltd.
 Nonpareil Copper Mining Co.
 North American Mining Co., Ltd.
 Northern Light Mining & Milling Co.

Old Veteran Mining Co.
 Ontario Mining Co.
 Oom Paul Consolidated Mining Co.

Pandora Copper Mining Co., Ltd.
 Paragon Consolidated Mining Co.
 Patuxent Mine.
 Phedora Silver-Lead Mining Co.
 Phoenix Mining & Milling Co., Ltd.
 Pine Creek Development Co.
 Pine Creek Mining Co.
 Pittsburgh Lead Mining Co.
 Placer Creek Mining & Milling Co.
 Princemont Mining Co.
 Puritan Mining Co.

Rainbow Mining Co.
 Rainbow Mining & Milling Co., Ltd.
 Ray Jefferson Mining Co.
 Red Monarch Consolidated Mining Co.
 Reindeer Queen Mining Co.
 Rex Consolidated Mining Co.
 Riverside Mining Co.
 Roberta Mining & Milling Co.

Saint James Mining & Milling Co.
 Silver Cliff Gold & Copper Mining Co., Ltd.
 Silver Moon Mining Co., Ltd.
 Silver Mountain Mining Co., Ltd.
 Silverado Mining Co.
 Snowshoe Mining Co.
 Snowstorm Apex Mining Co.
 Snowstorm Extension Copper Mining Co.
 Sonora Mining & Milling Co.
 Stanley Mining Co.
 Star Antimony Co.

Success Mining Co.
Snowstorm Mining Co.

Teddy Mining & Milling Co., Ltd.
Tamarack & Custer Consolidated Mining Co.
Terrible Edith Mine.
Tucker Mining & Milling Co.
Tuscumbia Mining Co.

United Lead Mining Co.

Vienna-International Mining Co.

Wallace Mining, Milling & Realty Co.
Warhoop Mining Co.
West Hunter Mining Co.
West Nine Mile Mining Co.
Western Union Mining Co.
Wisconsin Mining Co.
Wonderful Mining Co., Ltd.

Yankee Boy Mining Co.

Miscellaneous Districts.

Allie Mining Co., Ltd., Gilmore.
Alta Copper Mining Co., Mackay.
American Mining Co., Ltd., Landore.

Banner Mining & Milling Co., Silver City.
Black Pine Mining Co., Elk City.
Blue Grouse Mine, Orogrande.
Blue Jacket Copper Co., Ltd., Landore.
Blue Jacket Mining Co., Lucile.
Boise Rochester Mining Co., Atlanta.
Bonanza Mining Co., Montpelier.
Boston-Idaho Mining Co., Ketchum.
Bullion Mining Co., Ltd., Borax.

Caribou Gold Mines, Mt. Pisgah.
Carman Creek Mining Co., Salmon City.
Champion Mining Co., Mackay.
Clayton Mining & Smelting Co., Clayton.
Copper Queen Mine, Tendoy.
Copper Queen Mining & Smelting Co., Salmon.
Copper & Uranium Mining Co., Clyde.
Croesus Gold & Copper Mining Co., Hailey.
Croesus Mine, Hailey.
Custer Slide Mng. & Dev. Co., Yankee Fork dist., Custer county.

Deer Creek Mining & Milling Co., Forest.
Duluth Lemhi Mining Co., Baker.

Empire Copper Co., Mackay.

Fort Hall Mining Co., Ltd., Pocatello.

Garfie'd Mining & Milling Co., Harvard.
Gilmore Mining Co., Gilmore.
Gold Hill & Iowa Mines Co., Quartzburg.
Golden Glow Mining Co., Ketchum.

Hartwig Mining Co., Pollock.

Idaho Antimony Mining Co., Cascade.
Idaho Continental Co., Port Hill.
Idaho Exploration Co., Hailey.
Idaho Gold Coin Co., Landore.
Idaho-Montana Amalgamated Mining Co., Bonners Ferry.
Idaho Seattle Mining Co., Tendoy.
Idaho Tungsten Co., Ima.
Ima Consolidated Mining & Milling Co., Ima.
Independence Mine, Ketchum.

Lakina Copper Co., Lowman.
Latest Out Mining & Smelting Co., Gilmore.
Latah Copper Mining Co., Ltd., Potlatch.
Lawrence Mining & Milling Co., Clarke Fork.
Lead King Mining Co., Boise.
Little North Fork Copper Mng. & Mlg. Co., Ltd., Little North Fork.
Lost Packer Mining Co., Ivers.
Lost Packer Mining & Smelting Co., Ivers.
Lucky Boy Gold Mining Co., Idaho City.

Mascot Mining & Milling Co., Hailey.
McKinley Gold Mines Co., Idaho City.
Melcher Mining & Milling Co., Albion.
Merger Mining Co., Ltd., Harvard.
Mineral Zone Mining Co., Elk City.
Minnie Moore Mines Co., Bellevue.
Mudersbach Mine, Boise.

National Copper Mines Co., Cuprum.
National Mining & Development Co., Placerville.
Nellie Bloom Mining Co., Horse Shoe Bend.
Northwestern Mining Co., Lucile.

Olivia Group, Dixie.
Oxford Copper Mining Co., Pierce.

Panther City Mining Co., Salmon River dist.
Pittsburgh Idaho Co., Ltd., Gilmore.
Pittsburgh Idaho Mining & Milling Co., Gilmore.
Pocatello Gold & Copper Mining Co., Pocatello.
Ponderay Smelter, Sandpoint.

Ramshorn Mine, Bay Horse.
Red Bird Mining & Smelting Co., Clayton.
Red Ledge Copper Mine, Landore.

Seven Devils Copper Co., Landore.
Silver City Mining Co., Silver City.
Smoky Bullion Group, Hailey.
Southern Idaho Development Co., Pocatello.
Steckner Gold Mining Co., Orogrande.
Sierra Nevada Consolidated Mining Co., Virginia.

Una Mining Co., Orogrande.
United Gold Mining Co., Boise.
Unity Gold Mines Co., Boise.
Utah Bellevue Mines Co., Bellevue.

Virginia Consolidated Gold Mining Co., Baker.

Weimer Copper Co., Dubois.
West Coast Mines Co., Boise.
White Knob Copper & Development Co., Ltd., Mackay.
Wilbert Mining Co., Ltd., Dome dist., Blaine county.

ILLINOIS

American Zinc Co., of Illinois.

Burr Mining Co., Galena.

INDIANA

International Lead Refining Co., East Chicago.

KANSAS

Black Hill Mining Co., Galena.

Joplin Ore & Spelter Co., Pittsburg.

Ozark Smelting & Mining Co., Coffeyville.

MARYLAND

Baltimore Copper, Smelting & Rolling Co., Baltimore.
Bare Hill Mines, Mount Washington, Baltimore county.

Great Falls Mine, Montgomery county.

United Mining, Milling & Copper Smelting Co., New London.

MASSACHUSETTS

New England Mining Co., Charlemont.

MICHIGAN

Adventure Consolidated Copper Co., Greenland.

Ahmeek Mining Co., Kearsarge.

Algolah Mining Co., Lake Mine.

Allouez Mining Co., Allouez.

Ashbed Mining Co., Copper Falls.

Atlantic Mining Co., Painesdale.

Baltic Mining Co., Baltic.

Bohemia Mining Co., Lake Mine.

Boston & Lake Superior Mineral Land Co., Houghton.

Calumet & Hecla Mining Co., Calumet.

Cass Copper Co., Victoria.

Centennial Copper Mining Co., Calumet.

Champion Copper Co., Painesdale.

Cherokee Copper Co., Lake Mine.

Clark Mine, Copper Falls.

Cliff Mining Co., Phoenix.
Contact Copper Co., Houghton.
Copper Crown Mining Co., Victoria.
Copper Range Co., Painesdale.
Copper Range Consolidated Co., Painesdale.
Copper Range Railroad Co., Houghton.

Detroit & Lake Superior Copper Co., Hancock.
Douglas Copper Co., Allouez.

Elm River Copper Co., Winona.

Franklin Junior Mine, Demmon.
Franklin Mining Co., Demmon.
Frontenac Copper Co., Keweenaw Co.

Globe Mining Co., Atlantic Mine.
Gratiot Mining Co., Mohawk.

Hancock Consolidated Mining Co., Hancock.
Houghton Copper Co., Houghton.
Hulbert Mining Co., Houghton.
Humboldt Copper Co., Copper Falls.
Hussey-Howe Mining Co., Ontonagon county.

Indiana Mining Co., Houghton.
Island Copper Co., Isle Royale.
Isle Royale Copper Co., Houghton.

Keweenaw Copper Co., Mandan.
Keweenaw Land Association, Ltd.

La Salle Copper Co., Calumet.
Lake Copper Co., Lake Mine.
Lake Milling, Smelting & Refining Co., Calumet.
Lake Shore Mining Co., Green.
Lake Superior Development Co., Keweenaw county.
Lake Superior Smelting Co., Dollar Bay.
Laurium Mining Co., Calumet.

Mass Consolidated Mining Co., Mass.
Mayflower Mining Co., Calumet.
Meadow Mining Co., Copper Falls.
Michigan Copper Mining Co., Rockland.
Michigan Smelter Co., Houghton.
Minong Copper Co., Isle Royale.
Mohawk Mining Co., Mohawk.
Mulock Mine, Matchwood.
Natick Copper Co., Copper Falls.
National Mining Co., Rockland.
Native Copper Co., Delaware Mine.
Naumkeag Copper Co., Houghton.

New Arcadian Copper Co., Houghton.
New Baltic Copper Co., Houghton.
North Lake Mining Co., Houghton.

Ojibway Mining Co., Ojibway.
Old Colony Copper Co., Houghton.
Oneco Copper Mining Co., Hancock.
Onondaga Copper Co., Ontonagon.
Osceola Consolidated Mining Co., Osceola.

Pacific Copper Co., Houghton.
 Phoenix Consolidated Copper Co., Phoenix.
 Quincy Mining Co., Hancock.
 Rhode Island Copper Co., Demmon.
 St. Louis Copper Co., Calumet.
 St. Mary's Mineral Land Co., Houghton.
 Seneca Mining Co., Calumet.
 Sheldon & Columbian Copper Co., Houghton.
 South Range Mining Co., Houghton.
 South Side Mining Co., Houghton.
 Superior Copper Co., Houghton.
 South Lake Mining Co., Houghton.
 Tamarack Mining Co., Calumet.
 Tamarack-Osceola Copper Mining Co., Dollar Bay.
 Toltec Mine, Greenland.
 Torch Lake Mining Co., Houghton.
 Tremont & Devon Mining Co., Ltd., Victoria.
 Trimountain Mining Co., Trimountain.
 Union Copper Land & Mining Co., Houghton.
 Victoria Copper Mining Co., Victoria.
 Washington Copper Mining Co., Delaware.
 West Minnesota Mining Co., Ontonagon county.
 Wetterhorn Land Co., Ontonagon Co.
 Whealkate Mining Co., Houghton.
 White Pine Copper Co., Ontonagon.
 White Pine Extension Copper Co., Pinex, near Ontonagon.
 Wilmot Mining Co., Ontonagon.
 Winona Copper Co., Winona.
 Wolverine Copper Mining Co. Kearsarge.
 Wyandot Copper Co., Winona.

MINNESOTA

Great Northern Copper Co., Hinckley.
 J. Bennet Smith Mining Co., Pine City.

MISSOURI

Amalgamated Zinc & Lead Co., Granby.
 Anna Lee Mining Co., Newton county.
 Anxious Six Mining Co., Joplin.
 Athletic Mining Co., Duenweg.
 A. T. S. Mining Co., Joplin.
 A. W. C. Mining Co., Joplin.
 Bertha A. Mining Co., Webb City.
 Bob McGee Mining Co., Duenweg.
 Boston Duenweg Mining Co., Webb City.

Bradley Lead & Zinc Co., Joplin.
Burton Mining Co., Jasper county.

Carmean & Squires Mining Co., Webb City.
Cave Springs Lead & Zinc Co., Cave Springs.
Center Creek Mining Co., Webb City.
Central Lead Co., Flat River dist.
Century Mining Co., Neck City.
Century Zinc Co., Joplin.
Chicago Mines Co., Webb City.
Clark Mining Co., Springfield.
Coahuila Lead & Zinc Co., Duenweg.
Connecticut Zinc Corporation, Joplin.
Continental Zinc Co., Joplin.
Cygni Mining Co., Webb City.

Dallas Mining Co., Cail Junction.
Delta Lead & Zinc Co., Spring City.
Desloge Consolidated Lead Co., Desloge.
Doe Run Lead Co., Flat River dist.
Duenweg Lead & Zinc Co., Webb City.

Eagle-Picher Lead Co., Picher.

Federal Lead Co., Flat River.
Flannery Zinc Co., Sarcxie.
Franklin Mining Co., Webb City.

Gilt Edge Mining Co., Joplin.
Golden Rule Mining & Milling Co., Granby.
Granby Mining & Milling Co. of Missouri, Granby.

Hartford Mining Co., Joplin.
Hurry-Up Mining Co., Webb City.

Ice Plant Mining Co., Carthage.
Incline Mining Co., Webb City.

Jasper County Land & Mining Co., Carterville.
Joplin-Kentucky Lead & Zinc Co., Joplin.

Kansas City-Joplin Mining Co., Joplin.
Kenefick Zinc Corporation, Joplin and Webb City.
Kentucky Lead & Zinc Co., Joplin.

Little Mary Mining Co., Webb City.
Lone Elm Mining & Development Co., Joplin.
Lower Level Mining Co., Sarcxie.
Longacre-Chapman Mining Co., Joplin.
Lucky Abe Mining Co., Joplin.
Lucky George Mining Co., Joplin.
Lucky Tiger Mining Co., Neck City.

Marjorie-Stewart Mining Co., Porto Rico.
Media Mining Co., Webb City.
Mine La Motte Co., Mine La Motte.
Missouri Copper Mountain Mining Co., Sullivan.

Napoleon Mining Co. Joplin.
National Zinc & Lead Co., Webb City and Neck City.
New England Zinc Corporation, Joplin.
North American Zinc Co., Wentworth.
Nymo Zinc & Lead Co., Inc., Joplin.

O. F. & L. Mining Co., Duenweg.
Oronogo Mutual Mining Co., Oronogo.
Otis Mining Co., Joplin.
Owosso Mining Co., Joplin.
Phoenix Mining Co., Joplin.
Prosperity Milling Co., Prosperity.
Quick Seven Mining Co., Alba dist.
Saint Francois Lead Co., Leadwood.
St. Joseph Lead Co., St. Francois.
St. Louis Smelting & Refining Co., St. Francois county.
St. Regis Mining Co., Duenweg.
School House Mining Co., Cartersville.
Short Creek Zinc & Lead Co., Joplin.
Spiral Lead & Zinc Co., Chitwood.
Sullivan Zinc Mining Co., Joplin.
Twin Cities Mining Co., Webb City.
Underwriters Land Co., Joplin.
United Zinc Co., Joplin.
United Zinc Smelting Corporation, Joplin.
Utah-Missouri Mines Co., Neck City.
Wade Mining Co., Tipton Ford.
Wallower Mill, Joplin.
Washington Land & Mining Co., Bliss.
Wilson Mines Co., Webb City.
Wingfield Mining Co., Webb City.
Winnie & Lawson Zinc Co., Joplin.

MONTANA

Alice Gold & Silver Mining Co., Butte.
Alliance Copper Co., Butte.
Alpena Copper Mining Co., Saltese.
American Zinc Co., Butte.
Anaconda Copper Mining Co., Butte.
Angelica Mining & Development Co., Wickes.
Argenta Dillon Mining Co., Argenta.
Arkansas Copper Co., Helena.
Arlington Mining Co., Thompson.
Atlantic Mines Co., Walkerville.
Balkan Butte Copper Mining Co., Elk Park.
Baltimore Copper Mining Co., Boulder.
Bamar Copper Co., near Butte.
Bannack Consolidated Mining Co., Bannack.
Bannack Gold Mining Co., Bannack.
Banner & Bangle Mining Co., Troy.
Barnes King Development Co., Kendall.
Bear Gulch Mining Co., Twin Bridges.
Beaverhead Montana Copper Mining Co., Argenta.
Ben Hur Mining Co., Ltd., Saltese.
Bernice Red Rock Mining Co., Bernice.
Betty Alden Mining Co., Basin.
B. & H. Mines & Milling Co., Twin Bridges.

Big Butte Mining Co., Butte.
 Big Elk Mining Co., Saltese.
 Big Seven Mining Co., Neihart.
 Black Traveler Copper Mining Co., Saltese.
 Blue Bird-Corbin Gold, Silver & Copper Mining Co., Wickes.
 Blue Vein Copper Mining Co., Butte.
 Bluebird Company (The), Butte.
 Bonanza-Butte Mining Co., Butte.
 Boston & Alta Copper Co., Corbin.
 Boston-Butte Copper & Zinc Co., Butte.
 Boston-Colby Copper Mining Co., Saltese.
 Boston & Corbin Mining Co., Corbin.
 Boston & Montana Development Co., French Gulch & Elkhorn.
 Broadwater County Mining Co., Townsend.
 Bullion Mine, Basin.
 Butte-Alex Scott Copper Co., Butte.
 Butte & Anaconda Consolidated M. & M. Co., Flint Creek Gulch.
 Butte-Argenta Copper Co., Dillon.
 Butte & Bacorn Mining Co., Butte.
 Butte & Ballaklava Copper Co., Butte.
 Butte & Boulder Mine, Boulder.
 Butte Bullwhacker Mining Co., Butte.
 Butte-Cable Copper & Gold Mining Co., Anaconda.
 Butte Central Mining & Milling Co., Butte.
 Butte-Concordia Mining Co., Butte.
 Butte Consolidated Copper Co., Corbin.
 Butte Copper Co., Butte.
 Butte Copper King Mining Co., Butte.
 Butte Copper & Zinc Co., Butte.
 Butte & Corbin Consolidated Copper Mining Co., Corbin.
 Butte-Curtis & Majors Copper Mining Co., Butte.
 Butte Detroit Copper & Zinc Mining Co., Butte.
 Butte-Duluth Mining Co., Butte.
 Butte & Elliston Gold & Copper Mining Co., Elliston.
 Butte Exemption Copper Co., Butte.
 Butte & Great Falls Mining Co., Butte.
 Butte Hill Copper Mining Co., Walkerville.
 Butte Lode Extension Mining Co., Butte.
 Butte & London Copper Development Co., Butte.
 Butte Main Range Copper Mining Co., Butte.
 Butte-Milwaukee Copper Co., Butte.
 Butte Mine Exploration Co., Butte.
 Butte-Minnesota Mining Co., Butte.
 Butte Monitor Tunnel Mining Co., Butte.
 Butte & New York Copper Co., Butte.
 Butte & Red Eagle Copper Co., Butte.
 Butte & Superior Mining Co., Butte.
 Butte & Vipond Gold Mining & Milling Co., Vipond Park.
 Butte & Zenith City Mining Co., Butte.
 Cable Consolidated Mining Co., Cable.
 Cactus Consolidated Mining Co., Radersburg.
 Cactus Copper Co., Radersburg.
 Calamont Copper Co., Norris.
 Calumet-Corbin Mining Co., Wickes.
 Calumet & Montana Mining Co., Elkhorn.
 Camas Copper Mining & Milling Co., Camas.
 Cape Nome Copper Mining Co., Clinton.
 Carbon Hill Mining & Milling Co., Helena.
 Cayuga Development Co., Divide.
 Clark Mining & Realty Co., Butte.

Coeur d'Alene Pacific Mines Co., Saltese.
Colusa-Leonard Extension Copper Co., Butte.
Colusa-Parrot Mining & Smelting Co., Butte.
Consolidated Central Butte Copper Co., Butte.
Contact Consolidated Copper Co., Helena.
Cooke Mining & Reduction Co., Cooke.
Copper Age & Edison Mining Co., Saltese.
Copper Chief Mining Co., Saltese.
Copper Hill Mining Co., Ltd., Quartz.
Copper King Mining Co., Cooke City.
Copper Mountain Mining & Development Co., Thompson.
Copper-Silver Montana Mining Co., Helena.
Coppersmith Mining & Milling Co., Lothrop.
Corbin Copper Co., Butte and Corbin.
Corbin-Copper King Mining Co., Corbin.
Corbin Metal Mining Co., Corbin.
Corbin-Valparaiso Copper Mining Co., Corbin.
Coyle Mine, Phillipsburg.
Crystal Copper Co., Basin.
Cuprite Copper Mining Co., Marysville.
Curlew Mine, Victor.

Daily Copper Mining & Smelting Co., Wickes.
Daisy Bell Gold & Copper Development Co., Renova.
Davis-Daly Copper Co., Butte.
Dennemora Gold & Copper Mining Co., Ltd., Taft.
Durant Mining & Smelting Co., Spring Gulch, via Martinsdale.

Eagle Mining Co., Walkerville.
East Butte Copper Mining Co., Butte.
East Butte Extension Copper Mining Co., Butte.
Eastern Belle Mine, Helena.
Eclipse-Argo Mining Co., Argo.
Economy Gold Mines Co., East Helena.
Elm Orlu Mining Co., Butte.

Farrell Copper Co., Butte.
Flathead Development Co., Coram.
Franklin Mining Co., Helena.

Garfield Mining Co., Belgrade.
Girard C. Co., Warm Springs.
Gold Crown Mining Co., Ltd., St. Regis.
Golden Curry Mine, Elkhorn.
Goose Lake Copper Co., Cooke.
Great Northern Copper Co., Tava.
Greendale Exploration Co., Butte.

Hecla Consolidated Mine, Glendale.
Helena Mining Bureau, Inc., Helena.
Hemlock Silver-Lead & Mining Co., Saltese.
Hidden Treasure Group, Clinton.
Highland Copper Co., Ltd., Silver Star dist.
Hugo Gold & Copper Mining Co., Saltese.

Ida Montana Mining Co., Butte.
Independence Gold & Copper Mining Co., Deer Lodge.
Indian Queen Mining & Smelting Co., Apex.
Intermountain Copper Mining Co., Iron Mountain.
International Mining Co., Bozeman.
Iowa Montana Development Co., Jefferson Island.
Iron Mask Mining Co., Carter.
Ironside Mine, Whitehall.

Jefferson Copper Mines Co., Corbin.

Keating Gold Mining Co., Radersburg.
King & Queen Mining Co., Keystone.
King Solomon Mining Co., Clancey.

Ladysmith Copper Mining Co., Elliston.
Last Chance Copper Mining Co., Saltese.
Lerby Gold & Copper Mining Co., Saltese.
Leviathan Gold Mining Co., Pony.
Little Goldie Mine, Twin Bridges.
Lost Ranch & Tunnelsite Mine, Brenner.
Lupfer Mining Co., Whitefish.

Madden Scratch Gravel Mines Co., Helena.
Marysville Gold Mining Co., Marysville.
Mines Development Co., Twin Bridges.
Monarch Mine, Elliston.
Montana-Clinton Copper Co., Elliston.
Montana Consolidated Copper Co., Boulder.
Montana Copper Silver Co., Helena.
Montana-Illinois Copper Mining Co., Jefferson Island.
Montana Morning Mining Co., Troy.
Montana Oreway Mining Co., Briston.
Montana Radersburg Mining Co., Townsend.
Montana Scotch Bonnet Copper & Gold Mining Co., Cooke.
Montana States Mining Corporation, Alhambra.
Montana United Minting Co., Deer Lodge.
Mount Thompson Gold Mining & Milling Co., Stevensville.

New Copper Silver Co., Helena.
New York & Montana Copper Mining Co., Corbin.
North Butte Extension Development Co., Butte.
North Butte Mining Co., Butte.
Northern Valley Mining Co., Amazon dist.

Ohio Keating Gold Mining Co., Radersburg.
Original Bannack Mining Co., Bannack.

Phillipsburg Mining Co., Phillipsburg.
Pittsmount Copper Co., Butte.
Prickly Pear Mining Co., Jefferson.

Rainbow Lode Development Co., Butte.
Reliance Mining & Milling Co., Butte.
Revia Creek Mining & Power Co., Dixon.
Richmond Mining, Milling & Reduction Co., Saltese.
Robert Emmet Copper Co., Amazon.
Rock Rose Mining & Milling Co., Helena.
Rose Consolidated Mining Co., Libby.
Royal Basin Mining Co., Maxville.
Royal Copper Mining Co., Ltd., Belknap.

Sacajewea Gold & Copper Mining Co., Helena.
Saginaw Copper Co., Jackson.
St. Joe Gold-Copper Mining & Milling Co., Saltese.
St. Paul Montana Mining Co., Maiden.
St. Regis Copper Mining & Milling Co., St. Regis.
Saltese Mining & Milling Co., Saltese.
Scratch Gravel Gold Mining Co., Helena.
Selway-Bond Copper Group, Armstead.
Silver Cable Mining Co., Missoula.
Silver Fissure Mining Co., Polaris.

Silver Tip Mining Co., Coeur d' Alene dist.
 Smokehouse Mining Co., Butte.
 South Butte Mining Co., Butte.
 Summit Gold Mining Co., Radersburg.
 Swastika Mining Co., Phillipsburg.
 Snowstorm Mines Consolidated, Troy.

 Tarbox Mining Co., Saltese.
 Three Forks Copper Mining Co., Copper City.
 Ticon Mining Co., Butte.
 Timber Butte Milling Co., Butte.
 Triangle Mining & Development Co., Clinton.
 Tuolumne Copper Mining Co., Butte.
 Twin City Mining & Milling Co., Elliston.

 United Smelting & Refining Co., East Helena.

 Valley Forge Mining Co., Helena.

 War Eagle Gold & Copper Mining Co., Alhambra.
 Wasa Group, Hall.
 Washington Mine, Wickes.
 Washoe Copper Co., Butte.
 Washoe Reduction Works, Anaconda.
 Western Reserve Mining Co., Basin.
 White Chief Copper Co., Jefferson Island.
 Whitehall Mining & Milling & Development Co., Whitehall.
 Whitlatch Mine, Helena.
 Wickes-Corbin Copper Mining Co., Wickes.
 Willow Creek Mining Co., near Pony, Madison county.
 Wilson Mining & Smelting Co., Saltese.
 Wisconsin Montana Mining Co., Superior.

 Yellow Boy Mine, Helena.

NEVADA

Adelaide Star Mines, Ltd., Golconda.
 Alaska Improvement Co., Lone Mountain.
 Alkali Mines Co., Eureka.
 Alpha Mine, Jarbridge.
 Alta Silver Mining Co., Comstock.
 Amalgamated Pioche Mines & Smelters Corporation, Pioche.
 Anderson Group, Luning.
 Andes Silver Mining Co., Virginia City.
 Antelope Group, Yerington.
 Antelope Spring Mining Co., Jungo.
 Arcane Mining Co., Pioche.
 Argentine Mining Co., Candelaria Camp (Mineral county.)
 Associated Mines Development Co., Rochester.
 Atkins Kroll Co., Pioche and Osceola.
 Atlanta-Home Gold Mining Co., Atlanta.
 Atlanta Mines Co., Goldfield.
 Aurora Consolidated Mines Co., Aurora.
 Aurora Mines Co., Aurora.
 Austin Dakota Development Co., Austin.
 Austin Manhattan Consolidated Mining Co., Austin.
 Azalia Mining Co., Platina.

Azurite Mining Co., Goodsprings.
Azurite Mining Co., Hawthorne.

Belcher Mining Co., Virginia City.
Belmont Mining Co., Tonopah.
Big Pine Mining Co., Manhattan.
Bi-Metallic Mine, Candelaria.
Black Diamond Copper Mining Co., Yerington.
Black Eagle Mining Co., Rawhide.
Black Rock Mine, Yerington.
Blue Bull Mine, Goldfield.
Blue Jay Mine, Yerington.
Blue Light Copper Co., Mina.
Bluestone Mining & Smelting Co., Yerington.
Bluster Consolidated Mining Co., Jarbridge.
Bonanza Mining Co., Winnemucca.
Boss Gold Mining Co., Platina, via Goodsprings.
Boston-Ely Mining Co., Kimberly.
Boyer Copper Mines Co., Boyer.
Bristol Consolidated Mines & Smelting Co., Pioche.
Brooklyn Mining Co., Contact.
Buckeye-Belmont Mines Co., Tonopah.
Buckeye-Eagle Mining Co., Tonopah.
Buckeye Tonopah Mining Co., Tonopah.
Buckhorn Mines Co., Buckhorn.
Burlington-Nevada Copper Co., Yerington.
Butte & Ely Copper Co., Kimberly.
Butte & Yerington Copper Co., Yerington.

Calavada Copper Co., Luning.
Cambria Copper Co., Aurum.
Carrara Mining, Milling & Leasing Syndicate, Carrara.
Cash Boy Consolidated Mining Co., Tonopah.
Centennial Development Co., Ely.
Chainman Consolidated Copper Co., Kimberly.
Churchill Milling Co., Wonder.
C. O. D. Consolidated Mining Co., Goldfield.
Colorado Nevada Mining & Milling Co., Nelson.
Columbia Consolidated Mines Co., Sweetwater.
Comstock Tunnel Co., Virginia City.
Consolidated California-Nevada Mining Co., Pioche.
Consolidated Coppermines Co., Kimberly.
Consolidated Nevada-Utah Corporation, Pioche.
Consolidated Virginia Mining Co., Virginia City.
Contact Copper Co., Contact.
Copper Basin Mining & Milling Co., Battle Mountain.
Copper Belt Mining & Development Co., Yerington.
Copper Shield Mining Co., Contact.
Coppermines Co., Ely.
Crown Point Gold & Silver Mining Co., Virginia City.
Cuprite Copper Co., Cuprite.

Day Bristol Consolidated Mines Co., Pioche.
Deep Mines Co., Goldfield.
Delaware Mining Co., Seven Troughs dist.
Demijohn Consolidated Mining Co., Pioche.
Denny Dulin Gold & Silver Mining Co., Morning Star dist.
Diamondfield Black Butte Reorganized Mng. Co., Goldfield.
Diamondfield Daisy Gold Mining Co., Goldfield.
Diamondfield Mining & Milling Co., Goldfield.
Dunlap Copper Mine, Mina.
Duplex Mining Co., Searchlight.

Eastern Prince Gold & Silver Mining Co., Pioche.
Eastern Star Mining Co., Golden Circle dist. (Elko county.)
E. & F. Mining Co., Pioche.
Elko Prince Leasing Co., Midas.
Elko Prince Mining Co., Gold Circle dist.
Ely Amalgamated Copper Co., McGill.
Ely Bell Mining Co., Ely.
Ely Calumet Copper Co., Ely.
Ely Consolidated Copper Co., Ruth, via Ely.
Ely Copper Co., Ely.
Ely Giroux Copper Co., Kimberly.
Ely-Mizpah Copper Co., Ely.
Ely Revenue Copper Co., Ely.
Ely Valley Mining & Milling Co., Ely.
Ely Verdi Copper Co., Ruth, via Ely.
Ely Witch Copper Co., Ely.
Empire-Nevada Copper Mining & Smelting Co., Yerington.
Excelsior Mountain Copper Co., Hawthorne.

Federal Ely Copper Co., Ely.
56 (Fifty Six) Copper Mine, Mill City.
Finance Mining Co., St. Thomas.
Findlay Copper Chief Mining Co., Las Vegas.
Florence Goldfield Mining Co., Goldfield.

Giroux Consolidated Mines Co., Kimberly.
Glasgow & Western Exploration Co., Ltd., Golconda.
Gold Mountain Mining & Milling Co., Hornsilver.
Gold Prince Mining & Leasing Co., Goldfield.
Golden Pen Mine, Rand.
Goldfield Blue Bell Mining Co., Berlin.
Goldfield Consolidated Mines Co., Goldfield.
Goldfield Merger Mines Co., Goldfield.
Goldfield Shale Mining Co., Goldfield.
Good Springs Anchor Co., Jean.
Gowganda Copper Co., Goldfield.
Grandina Mining Co., Goldfield.
Granite Hill Copper Mine, Reno.
Great Western Consolidated Mining Co., Tonopah.
Green Monster Mine, Platina.
Gypsy Queen Mining Co., Tonopah.

Halifax Tonopah Mining Co., Tonopah.
Hamilton Power, Mining & Transportation Co., Hamilton.
Hasbrouck Mine, Tonopah.
Haystack Mines, Inc., Jungo.
Hilltop Milling & Reduction Co., Hilltop.
Holden Mining & Milling Co., Tuscarora.
Home Run Copper Co., Pioche.
Honest Endeavor Mining Co., Yerington.
Hotcreek Syndicate Trust, Hotcreek, via Tonopah.
Humboldt Trinity Gold Mining & Milling Co., Lovelocks.

Ideal Copper Co., Luning.
Imlay Mining Co., Imlay.
Indian Springs Mining Co., Lida.
Iron Dike Mine, Mina.
Iroquois Copper Co., Luning.

Jacket-Crown Point-Belcher Mines Co., Virginia City.
Jersey Valley Mines Co., Battle Mountain.
Jim Butler Tonopah Mining Co., Tonopah.

Jolly Jane Leasing Co., Pioneer.
 Jumbo Extension Mining Co., Goldfield.
 Jumbo Junior Mining Co., Goldfield.
 June Bug Development Co., Las Vegas.
 Justice Gold Mining Co., Goldfield.

Kansas City-Nevada Cons. Mines Co., Bruner.
 Kansas Nevada Mining Co., Goodsprings.
 Kattenhorn Bros. Mine, Battle Mountain.
 Kaufman & Randall Mine, Yerington.
 Kennedy Consolidated Gold Mining & Milling Co., Buckskin.
 Kewenas Extension Mining Co., Goldfield.
 Kimberly Consolidated Mines Co., Hilltop.
 Kimberly Shipper Mining Co., Hilltop.
 Kingsley Development Co., Currie.
 Klamath Mining & Milling Co., Virginia City.
 Klondyke-Portland Mines Co., Goldfield.

Last Hope Mine, Rand.
 Lead King Mining & Milling Co., Duck Creek dist.
 Lincoln Hill Mining & Milling Co., Rochester.
 Lone Star Consolidated Mining Co., Goldfield.
 Louisiana Consolidated Mining Co., Mina.
 Lucky Boy Consolidated Mining Co., Hawthorne.
 Lucky Deposit Mining Co., Aurum.
 Ludwig Mine, Yerington.
 Luning-Idaho Mining Co., Luning.
 Lynn Big Six Mining Co., Goldville, via Carlin.

MacNamara Mining & Milling Co., Tonopah.
 Manhattan Big Four Mining Co., Manhattan.
 Manhattan Copper Mining & Milling Co., Pioche and Ely.
 Mason Valley Extension Mining Co., Mason.
 Mason Valley Mines Co., Mason.
 McConnell Mines Co., Mason.
 McDonald Ely Copper Co., Ely.
 Mendha-Nevada Mining Co., Pioche.
 Mercury Mining Co., Ione.
 Mexican Gold & Silver Mining Co., Virginia City.
 Mineral Hill Consolidated Mines Co., Mineral Hill.
 Mines Development Co. of Nevada, Lovelocks.
 Minnesota-Nevada Copper Mines Co., Wabuska.
 Minnesota Nevada Investment Co., Fairview.
 Mizpah Consolidated Copper & Gold Mining Co., Mizpah.
 Mizpah Extension Mining Co., Tonopah.
 Monarch Pittsburg Mining Co., Tonopah.
 Monitor Belmont Mining Co., Belmont.
 Montana-Tonopah Mining Co., Tonopah.
 Montana Yerington Co., Yerington.

National Mines Co., National.
 Nenzel Crown Point Mining Co., Rochester.
 Nest Egg Gold & Copper Mining Co., Kimberly.
 Nevada Bonanza Copper Co., Morningstar City.
 Nevada British Mining Co., Ltd., Cherry Creek.
 Nevada-Bullion Mines Co., Bullion.
 Nevada-Bunker Hill Mining Co., Bullion.
 Nevada Butte Mining Co., Dolly Varden dist. (Elko county.)
 Nevada Calumet Copper Co., Battle Mountain.
 Nevada-Calumet Copper Mining Co., Wabuska.
 Nevada Central Copper Co., Cedar, via Palisade.

Nevada Champion Copper Co., Luning.
 Nevada Consolidated Copper Co., Ruth, via Ely.
 Nevada Consolidated Mines & Selling Co., Hawthorne.
 Nevada Co-Operative Mining Co., Goldfield.
 Nevada Copper Co., Mina.
 Nevada Copper Hills Mining Co., Luning.
 Nevada Copper Mining, Milling & Power Co., Contact.
 Nevada Douglas Consolidated Copper Co., Ludwig.
 Nevada Gold Mines Co., Austin.
 Nevada Hills Mining Co., Fairview.
 Nevada Lincoln Mining Co., Lincoln.
 Nevada New Mines Co., Rawhide.
 Nevada Ore Copper Co., Acme, via Mina.
 Nevada Pacific Mines Co., Mina.
 Nevada Packard Mines Co., Rochester.
 Nevada Progressive Gold Mining Co., Wellington.
 Nevada Queen Copper Co., Yerington.
 Nevada Regent Mines Co., Regent dist.
 Nevada Smelting & Mines Corporation, Tybo.
 Nevada Standard Copper Co., Mina.
 Nevada Superior Mines Co., Jungo.
 Nevada Tungsten Mines Co.
 Nevada Wonder Mining Co., Wonder.
 Nevada Zinc Co., Tobar.
 Neversweat Mine, Luning.
 New Empire Goldfield Mines Co., Goldfield.
 New Goldfield Sierra Mining Co., Goldfield.
 New Goldfield Simmerone Mining Co., Goldfield.
 New Jersey Mines Co., Goldfield.
 New Yerington Copper Co., Yerington.
 Ninety-Nine Copper Co., Goodsprings.
 Nixon Nevada Mining Co., Reno.
 Nobe Tungsten Mine, Sodaville.
 Northern Light Copper Co., Yerington.
 Oakland Copper Bell Mine, Yerington.
 Ohio Lead Mining & Smelting Co., Wells.
 Old Imperial Mining & Milling Co., Cherry Creek.
 Ophir Silver Mining Co., Virginia City.
 Orizaba Mining Development Co., Orizaba.
 Oro Amigo Platino Mining Co., Goodsprings.
 Packard Extension Mines Co., Lovelocks.
 Packard North Extension Mining Co., Lovelocks.
 Palisade Copper Co., Bullion, via Elko.
 Peer Gold Mining Co., Dayton.
 Pilot Knob Group, Osceola.
 Pilot Range Mine, Luning.
 Pioche-Bristol Mining Co., Pioche.
 Pioche Metals Co., Pioche.
 Pioneer Consolidated Mines Co., Pioneer.
 Pioneer Extension Mines Co., Pioneer.
 Pittsburgh-Dolores Mining Co., Rockland, via Yerington.
 Pittsburgh-Ely Copper Co., Ely.
 Prince Consolidated Mining & Smelting Co., Pioche.
 Princess Copper Co., Ely.
 Providence Extension Gold Mining Co., Seven Troughs.
 Queen Regent Merger Mines Co., Rand.
 Quo Vadis Gold Mining Co., Las Vegas.
 Ralston Mining Co., Tonopah.
 Red Lion Consolidated Mines, Goldfield.

led Metals Co., Reno.
 ledlich Tungsten Co., Mina.
 leno-Yerington Copper Co., Yerington.
 eorganized Blue Bull Mining Co., Goldfield.
 eorganized Booth Mining Co., Goldfield.
 eorganized Cracker Jack Mining Co., Goldfield.
 eorganized Kewenas Gold Mining Co., Goldfield.
 escue-Eula Mining Co., Tonopah.
 ichmond-Eureka Mining Co., Eureka.
 ochester Buck & Charley Mines Co., Rochester dist.
 ochester Elda Fino Mining Co., Rochester dist.
 ochester Merger Mines Co., Rochester dist.
 ochester Mines Co., Rochester.
 ochester Raven Mines Co., Lower Rochester.
 ochester Treasure Mining Co., Rochester.
 ochester United Mines Co., Rochester.
 ound Mountain Mining Co., Round Mountain.
 oyal Consolidated Copper Co., Luning.
 uby Silver Mining & Development Co., Lewis dist.
 ye Patch Mining & Leasing Co., Rye Patch.

 afford Copper Co., Safford dist.
 aint Anthony Mines Co., Toy, via Lovelocks.
 aint Anthony Mining Co., Goodsprings.
 almon River Mining Co., Contact.
 alt Lake Tungstonia Mines Co., Tungstonia, via McGill.
 andstorm-Kendall Consolidated Mines Co., Goldfield.
 eattle Contact Mining Co., Contact.
 even Troughs Buckhorn Mining Co., Vernon.
 even Troughs Coalition Mining Co., Seven Troughs.
 even Troughs Mining Co., Seven Troughs.
 heepherders' Dream Mine, Lovelocks.
 hipper Copper Mining Co., Luning.
 hoshone Polaris Mining Co., Bullfrog.
 ierra Nevada Mining Co., Virginia City.
 ilver Bell & Alpha Consolidated Mines Co., Rye Patch.
 ilver Comet Mining Co., Panaca.
 ilver Pick Consolidated Mines Co., Goldfield.
 ilver Tungsten Mining Co., Cherry Creek.
 ilverfields Mining Co., Ltd., Golconda.
 mith Valley Mines Co., Yerington.
 outhwestern Mines Co., Hornsilver.
 parta Mining Co., Mina.
 pearhead Gold Mining Co., Goldfield.
 eptoe Valley Smelting & Mining Co., McGill.
 ultana Mine, Goodsprings.
 sunset Mining & Development Co., Rhyolite.
 yncline Gold-Silver-Copper Mining Co., Lida.

 enabo Mining & Smelting Co., Tenabo.
 housand Member Gold Mining Association, Elko county.
 odd Mining Co., R. B., Luning.
 onopah Belmont Development Co., Tonopah.
 onopah Bonanza Mining Co., Tonopah.
 onopah Extension Mining Co., Tonopah.
 onopah Merger Mining Co., Tonopah.
 onopah Midway Mining Co., Tonopah.
 onopah Mining Co. of Nevada, Tonopah.
 onopah North Star Tunnel & Development Co., Tonopah.
 onopah Placers Co., Tonopah.
 onopah 76 Cons. Mining Co., Tonopah.

Tonopah Victor Mining Co., Tonopah.
Toy Tungsten Mine, Toy.

Umatilla-Tonopah Mining Co., Tonopah.
Union Amalgamated Mining Co., Manhattan.
Union Consolidated Mining Co., Virginia City.
Union Copper Co., Yerington.
Union Mines Co., Union.
United Mining Co., Carson City.
United States Tungsten Corporation, Tungsten, via Osceola.
Utah-Yerington Mining Co., Yerington.
Uvada Copper Co., Pioche.
Uvada Tungsten Co., Osceola.

Vernal Mining Co., Goldfield.
Victoria Copper Mines Co., Dolly Varden dist.
Vulcan Mining, Smelting & Refining Co., Cherry Creek.

Wabuska Copper Mines Co., Wabuska.
Wagner Azurite Co., Luning.
Watt Mine, Austin.
Wedge Copper Co., Luning.
West End Consolidated Mining Co., Tonopah.
West End Extension Mining Co., Tonopah.
West Tonopah Mining Co., Tonopah.
Western Nevada Copper Co., Ludwig.
Whale Mine, Goodsprings.
White Caps Mining Co., Manhattan.
Willard Mines Co., Lovelocks.
Winnemucca Mountain Mining Co., Winnemucca.
Wolfone Extension Mining Co., Manhattan.
Wolverine Copper Co., Winnemucca.

Yellow Pine Mining Co., Goodsprings.
Yellow Tiger Mining Co., Goldfield.
Yerington Bullion Mining Co., Yerington.
Yerington Consolidated Copper Co., Mason.
Yerington Malachite Copper Co., Yerington.
Yerington Mines & Exploration Co., Yerington.
Yerington Mountain Copper Co., Schurz.
Yuba Leasing & Development Co., Pioche.

NEW JERSEY

Balbach Smelting & Refining Co., Newark.
Irvington Smelting & Refining Co., Irvington.
National Lead Co.
New Jersey Metal Refining Works, Ltd., Elizabeth.
New Jersey Zinc Co., Franklin Furnace.
Orford Nickel-Copper Refinery, Bayonne.
Perth Amboy Smelter, Perth Amboy.
United States Metals Refining Co., Chrome.

NEW MEXICO

Abbey Mining Co., Socorro.
 Admiral Gold & Copper Mining Co., Tusas.
 American Exploration & Mining Co., Steeple Rock.
 Anaconda Skookum Copper Group, San Andres Mtns., Socorro county.
 Anderson-Apache Copper Co., Hachita.
 Animas Peak Gold Mining Co., Hillsboro.
 Atwood Copper Co., Lordsburg.
 Aztec Copper Co., Organ.
 Aztec Gold Mine, Baldy.
 Azure Mining Co., Tyrone.

Battleship Mining & Milling Co., Lordsburg.
 Bearup Group, Cooney.
 Bennett-Stephenson Mining & Milling Co., Organ.
 Big Three Mines, Organ.
 Black Copper Co., Elizabethtown.
 Black Range Tunnel & Mining Co., Chloride.
 Bonney Mining Co., Lordsburg.
 Burro Mountain Copper Co., Leopold.
 B. V. N. Mining Co., Pinos Altos.
 By-Chance Copper Co., Brice.

Calumet-New Mexico Mining Co., Magdalena.
 Champion Copper Co., Dixon.
 Chicago Copper Mining Co., Oscuro.
 Chino Copper Co., Santa Rita.
 Cleveland Group of Mines & Mill, Silver City.
 C. O. D. Leasing Co., Lordsburg.
 C. & O. Mining & Milling Co., Silver City.
 Copper Queen & Copper King Group, Steins.
 Cossack Mining Co., Bland.

Deadwood Mining & Milling Co., Mogollon.
 Dividend Mining & Milling Co., Estey.
 Donna Dora Mining Co., Organ.

Economic Mining & Milling Co., Carrizozo.
 Edison Mining & Milling Co., Red River.
 Eighty-Five Mining Co., Lordsburg.
 El Centro Mining & Milling Co., Lordsburg.
 El Cliff Mining Co., Hermosa.
 Emma Mine, Fierro.
 Ernestine Mining Co., Mogollon.
 Excelsior Mining & Development Co., Oro Grande.

Fort Fitt Copper Co., Clayton.
 Fraser Mountain Copper Co., Twining.

Garnet Mine, Oro Grande.
 Gold & Copper Deep Tunnel M. & M. Co., Elizabethtown.
 Golden Link Co., Jackson.
 Great Eastern Group, Santa Rita.

Hanover Copper Co., Hanover.
 Hardscrabble Mining Co., Pinos Altos.
 Hembrillo Copper Mining Co., Hembrillo Canyon, Socorro Co.
 Hermosa Copper Co., Hanover.
 Hop Canyon Mining & Smelting Co., Magdalena.

Iron King Mine, Oro Grande.

Jarilla Consolidated Copper Co., Brice.
Johnny Bull Mine, Steins Pass.

Kelly Mine, Kelly.
King & Queen Copper Co., Steins Pass.

LaLuz Copper Co., La Luz.
La Salle Copper Mining & Milling Co., Carrizozo.
Las Animas Peak Gold Mines Co., Hillsboro.
Lucky Group, Brice.

Manhattan Mine, Pinos Altos.
Mangas Development Co., Tyrone.
Memphis Mining Co., Organ.
Mineral Hill Mining Co., Organ.
Mogollon Mines Co., Mogollon.
Monitor Silver Lead & Zinc Mining & Milling Co., Hermosa.
Monte Rico Mining & Milling Co., Lordsburg.

National Copper Co., Tyrone.
National Gold & Silver Mining Co., Steins.
Nevada Hills Mining Co., Gage.
November Mining Co., Steins Pass.

Oaks Co., Alma.
Octo Mining Co., Lordsburg.
Organ Mountain Mining Co., Organ.
Otero Copper Co., Brice.
Ozark Smelting & Mining Co., Magdalena.

Pecos Copper Co., Hamilton dist., San Miguel county.
Pinos Altos Mining & Milling Co., Pinos Altos.

Republic Mines Co., Lucero.
Robert Lee Mine, Lordsburg.
Rocky Mountain Mines Co., Cerrillos.
Romero Mining Co., El Porvenir.

San Lazarus Mines Co., San Pedro.
Santa Fe Gold & Copper Mining Co., San Pedro.
Savanna Copper Co., Leopold.
Shamrock Mining & Milling Co., Steeple Rock.
Steeple Rock Development Co., Steeple Rock.
Sunset Copper Co., Hachita.
Susquehanna Mining Co., Lordsburg.
Sutton Consolidated Mining Co., Lordsburg.
Socorro Mining & Milling Co., Silver City.

Taos Mining Co., Twining.
Tri-Bullion Smelting & Development Co., Kelly.
Tularosa Copper Co., Bent.
Tulloch Gold & Copper Co., Silver City.
Tusas Peak Gold & Copper Mining Co., Tusas.
Tyrone Copper Co., Tyrone.

United States Copper Co., Hanover.

Victoria Mining & Smelting Co., Organ.

White Oaks Mines Consolidated, Inc., White Oaks.

NEW YORK

American Finance & Securities Co. (The), New York.
Douglas Lacey & Co., New York.
Grant Mine, Carmel.
Matheson Lead Co., Long Island City.
Nichols Copper Co., Laurel Hill.
Northern Ore Co., Edwards.
Tottenville Copper Co., Tottenville.
United Copper Securities Co., New York.
United Metals Selling Co., New York.
Western Development Co., New York.

NORTH CAROLINA

Ashboro Copper Mining Co., Ashboro.
Blue Wing Mining Co., Baker City.
Carolina Copper Co., Cullowhee.
Copper Knob Mine, Hopkins.
Cullowhee Mining & Reduction Co., Cullowhee.
Gold Hill Consolidated Co., Gold Hill.
Salisbury Copper Co., Gold Hill.
Twin-Edwards Copper Mine Co., Greensboro.
Union Copper Mine, Gold Hill.
Union Copper Mines Co., Gold Hill.
Virginia Zinc & Chemical Corporation, Ltd

OKLAHOMA

American Pipe Line Co., Kansas.
Eagle-Picher Lead Co., Cardin.
Lanyon Star Smelting Co., Bartlesville.
Lennan Zinc & Lead Co., Miami.
Underwriters Land Co., Ottawa Co.

OREGON

Almeda Cons. Mines Co., Merlin.
Alta Mine, Kerby.

Baker Mines Co., Cable Cove.
Ben Harrison Mine, Grant county.
Bill Nye Mine, Grant's Pass.
Blue Mountain Mining Co., Sumpter.
Braden Mine, Gold Hill.

Chetko Copper Co., Curry county.
Columbia Gold Mining Co., Sumpter.
Copper Mountain Mining Co., Takilma.
Cornucopia Mines Co., Cornucopia.

Electric Mining & Smelting Co., Idanha.
Equity Copper & Gold Mining Co., Prairie City.
Eureka Mining, Smelting & Power Co., Imnaha.

Freeland Consolidated Mining Co., Elkhorn.

Golden Gate Mining Co., Greenhorn.
Grizzly Mine, Cottage Grove.

Homestead-Iron Dyke Mines Co., Inc., Homestead.

Imperial Mining Co., Cable Cove.
Iron Dyke Copper Co., Homestead.

Jim Blaine Mine, Placer.

Lucky Bart Group, Gold Hill.

Old Glory Gold Mining Co., Grant's Pass.
Oregon-Idaho Investment Co., Baker City.

Queen of Bronze Mine, Takilma.
Queen of the West Mines Co., Cornucopia.

Sumpter Smelter, Sumpter.

Takilma Smelting Co., Takilma.

United Copper-Gold Mines Co., Selma.

~~**Vanguard Gold-Copper Co., Kerby.**~~
Vesuvius Mines Co., Bohemia.
Vincent Creek Gold & Copper Co., Austin.
Virtue Mines Development Co., Baker City.

Waldo Smelting & Refining Co., Takilma.
West Side Gold & Silver Mining Co., Greenhorn.

PENNSYLVANIA

American Vanadium Co., Bridgeville.
Arizona-Idaho Copper Extraction Co., Pittsburg.

Eagle Metallic Copper Co., Fairfield.

National Copper Mining & Development Co., Adams county.

Snow Creek Mining Co., Greenhorn.

Virgin Copper Co., Charmian.

PHILIPPINES

Lepanto Mining Co., Inc., Mancayan, Lepanto, Luzon.

SOUTH DAKOTA

Anaconda Gold Mining Co., Deadwood.

Black Hills Copper Co., Rochford.

Custer Peak Milling & Ore Co., Roubaix.
Cuyahoga Mining Co., Keystone.

Dakota Continental Copper Co., Sheridan.
Deadwood-Heidelberg Mining Co., Deadwood.

Echo Gold Mining Co., Deadwood.

Golden Reward Consolidated Gold Mining & Milling Co., Deadwood.

Hidden Treasure Co., Trojan.
Hill City Mining & Development Co., Hill City.
Homelode Mining & Milling Co., Silver City.
Homestake Mining Co., Lead.

Imperial Copper Co., Custer Peak dist.

Maloney-Blue Lead Copper Mining & Smelting Co., Sheridan.
Montezuma & The Whizzers Mine, Deadwood.

New Golden West Mines Co., Rochford.
New Puritan Mining Co., Galena.
New Reliance Gold Mining Co., Trojan.
North Homestake Mining Co., Maitland.

Puritan Mining Co., Deadwood.

Rattlesnake Jack Mining & Milling Co., Galena.

Tenderfoot Hill Consolidated Mining Co., Black Hills.
Trojan Mining Co., Trojan.

Wasp No. 2 Mining Co., Lead.

TENNESSEE

American Ballast Co. (American Zinc, Lead & Smelting Co.).
American Zinc Co. of Tennessee (American Zinc, Lead & Smelting Co.).

Chattanooga Copper Co., Ducktown dist.

Ducktown Sulphur, Copper & Iron Co., Ltd., Isabella.

Tennessee Copper Co., Copperhill.

Virginia Zinc & Chemical Corporation, Ltd.

TEXAS

Consolidated Kansas City Smelting & Refining Co., El Paso.

Hazel Mining & Milling Co., Van Horn.

Pecos Mining Co., El Paso county.

Presidio Mining & Milling Co., Shafter.

UTAH**Alta-Cottonwoods District**

Albion Mining Co.

Alta Consolidated Mining Co.

Alta Cottonwood Mining Co.

Alta Divide Gold Mining Co.

Alta Mining & Development Co.

Alta Prince Mining Co.

Alta Tiger Mining Co.

Alta Tunnel & Transportation Co.

American Consolidated Copper Co.

Antelope & Prince of Wales Mining Co.

Big Cottonwood Consolidated Mining Co.

Big Cottonwood Copper & Gold Mining Co.

Boston Development Co.

Cardiff Mining & Milling Co.

City Rocks Mining Co.

Columbus Consolidated Mining Co.

Columbus Extension Mining Co.

Cottonwood King Mining Co.

Emma Copper Co.

Flagstaff Copper Mining Co.

Free Coinage Mining & Milling Co.

Giles Mining & Milling Co.

Glenwood Mining Co.

Great Copper King Mining Co.

Great Western Gold & Copper Co.

Great Western Mines Co.

Howell Mining Co.

Kennebec Mining Co.

Last Chance Mining Co.

Logger Mining Co.

Michigan Utah Consolidated Mines Co.

Monetaire Mining Co.

Old Emma Mines Co.

Old Evergreen M. & T. Co.

Price Mining Co.

Prince of Wales Mining Co.

Reed's Peak Mining Co.
Rexall Silver & Copper Mining Co.

Secret Mining & Milling Co.
Sells Mining Co.
Silver Moon Mining Co.
South Cardiff Mining Co.
South Hecla Extension Mining Co.
South Hecla Mining Co.

Tar Baby Mining Co.
Thor Mining Co.

Wasatch Mines Co.
Wasatch Utah Mining Co.
West Toledo Mines Co.
Woodlawn Copper Mining Co.

American Fork District

Bay State Mining & Development Co.
Belorophon Mining Co.

Earl & Eagle Mining Co.

Julian Mining & Milling Co.

Major Evans Mining Co.
Miller Hill Mining Co.
Miller Mining & Smelting Co.
Mineral Flat Mining Co.
Mountain Dell Consolidated Mining Co.

Osborn Consolidated Mining & Milling Co.

Pacific Gold Mining & Milling Co.
Pittsburg Consolidated Mining Co.
Plentiful Mining & Milling Co.

Silver Flat Mining Co.
South Park Mining & Development Co.

Texan Mining Co.

Utah Centennial Mining Co.

Whirlwind Consolidated Mining Co.
Wig Mountain Mining & Milling Co.

Beaver County District

Beaver Butte Copper Co.
Beaver Copper Co.
Beaver Gold Mines Corporation.
Beaver Horseshoe Gold Mining Co.

Cactus Mine.
Cedar Talisman Consolidated Mines Co.
Commonwealth Mines Co.
Copper Ranch Mining Co.
Creole Mining Co.
Croff Mining Co.
Cupric Mines Co.

Excelsior Mining, Milling & Electric Co.

- Frisco Consolidated Mining Co.**
- Granite Copper Co.**
- Horn Silver Mining Co.**
- Ibapah Gold Mining Co.**
- Indian Queen Cons. Mining Co.**
- King David Mining Co.**
- King of The Hills Mine.**
- Leonora Mining & Milling Co.**
- Mammoth Copper Mining Co.**
- Majestic Mines Co.**
- Michigan Copper & Gold Mining Co.**
- Monzonite Silver & Copper Co.**
- Moscow Mining & Milling Co.**
- Nevada Copper Co.**
- O. K. Extension Mining & Reduction Co.**
- Orphan Boy Mining Co.**
- Paloma Extension Mining Co.**
- Paloma Gold & Silver Mining Co.**
- Progressive Mining Co.**
- Red Warrior Mining Co.**
- Rob Roy Mining Co.**
- St. Mary Mining Co.**
- South Utah Mines & Smelters.**
- Utah Baltimore Consolidated Co.**
- Utah Leasing Co.**
- Utah Mining, Milling & Transportation Co.**
- Utah-United Copper Co.**
- Vicksburg Gold & Copper Co.**
- Volunteer Mining Co.**
- Wasatch King Mining Co.**
- Bingham District**
- Alpine Galena Mining Co.**
- Bingham Amalgamated Copper Co.**
- Bingham Central Mining Co.**
- Bingham Central Standard Copper Co.**
- Bingham Empire Co.**
- Bingham Metal Mining Co.**
- Bingham-New Haven Copper & Gold Mining Co.**
- Congor Gold & Copper Mining Co.**
- Dalton & Lark Gold-Silver-Lead Mining & Milling Co.**
- Fortuna Mining Co.**
- General Exploration Co.**
- Highland Boy Gold & Copper Mining Co.**
- Keystone Extension Mining Co.**

Mineral Lands Co.
Montana-Bingham Consolidated Mining Co.

New England Gold & Copper Mining Co.
New Utah Bingham Mining Co.
North Bingham Consolidated Mining Co.

Ohio Copper Mining Co.

Pine Canyon & Bingham Tunnel Co.

Silver Shield Mining & Milling Co.
Starless Mine.

Tintic Co.
Tintic Mining & Development Co.
Tom Moore Group.

United States Mining Co.
United States Smelting Co.
Utah Apex Mining Co.
Utah Consolidated Mining Co.
Utah Copper Co.
Utah Lead & Copper Co.
Utah Metal & Tunnel Co.

Western Mining & Milling Co.

Yampa Smelting Co.
Yosemite Mines Co.

Park City District

American Exploration Co.
American Flag Mining Co.
Anchor Mining Co.

Big Four Exploration Co.

Conkling Mining Co.

Daly-Judge Mining Co.
Daly Mining Co.
Daly West Mining Co.

Iowa Copper Mining Co.

Judge Mining & Smelting Co.

Kearns Keith Mining Co.
Keystone Mining Co.

Little Bell Consolidated Mining Co.

Naildriver Mining Co.
New Quincy Mining Co.
New York Bonanza Mining Co.

Ontario Silver Mining Co.

Park City Mines Co.

Silver King Coalition Mines Co.
Silver King Consolidated Mining Co. of Utah.

Thompson-Quincy Consolidated Mining Co.
Three Kings Silver Mining Co.

Utah Ore Sampling Co.

Tintic District

American Mines Syndicate.

American Star Mining Co.

Apex Consolidated Mining Co.

Beck Tunnel Consolidated Mining Co.

Bingham Mines Co.

Black Jack Consolidated Mining Co.

Boston & Tintic Mining Co.

Bullion Beck & Champion Mining Co.

Carisa Gold & Copper Mining Co. of Maine.

Centennial Eureka Mining Co.

Chief Consolidated Mining Co.

Colorado Mining Co.

Consolidated Copper Mining Co.

Dragon Consolidated Mining Co.

Eagle & Blue Bell Mining Co.

Emerald Mining Co.

Eureka Hill Mining Co.

Fairbairn Exploration Co.

Gemini Mining Co.

Godiva Mining Co.

Gold Chain Mining Co.

Grand Central Mining Co.

Grutli Mining Co.

Iron Blossom Consolidated Mining Co.

Iron King Mining Co.

Joe Bowers Mining Co.

King William Mining Co.

Knight Investment Co.

Lehi-Tintic Mining Co.

Lion Hill Consolidated Mines Co.

Lower Mammoth Mining Co.

Mammoth Mining Co.

Mammoth No. 2 Mining & Milling Co.

May Day Mining & Milling Co.

Opohongo Mining Co.

Oxford Consolidated Mining Co.

Plutus Mining Co.

Queen Isabella Mines Co.

Raymond-Illinois Mining Co.

Ridge & Valley Mining Co.

Scranton Leasing Co.

Scranton Mining & Smelting Co.

Sioux Consolidated Mining Co.

South Iron Blossom Mining Co.

Southern Swansea Mining Co.
 Swansea Consolidated Mining Co.
 Swansea Extension Mining Co.

Tintic Central Mining & Milling Co.
 Tintic Combination Mining Co.
 Tintic Delmar Mining Co.
 Tintic Milling Co.
 Tintic Smelting Co.
 Tintic Standard Mining Co.
 Tintic Tunnel Co.
 Tintic Zinc Co.

Uncle Sam Consolidated Mining Co.
 United Tintic Mining Co.
 Utah Consolidated Mines Co. of Tintic.
 Utah Consolidated Mining & Milling Co.
 Utah Minerals Concentration Co.

Victor Consolidated Mining Co.
 Victoria Consolidated Mining Co.
 Victoria Gold Mining Co.

White Star Mining Co.

Yankee Consolidated Mining Co.

Zuma Mining & Milling Co.

Miscellaneous Districts

American Copper Mining & Milling Co., Lehi City.

Beaver Mines Co., Marysvale.
 Bee Bee Mining Co., Goldstrike.
 Bingham Copper Boy Mining Co., Lincoln.
 Blackbird Copper & Gold Mining Co., Ltd., Blackbird.
 Blue Ribbon Gold Mining Co., Minersville.
 Brewer Gold & Copper Mining Co., Ibapah.
 Bull Valley Gold Mines Co., Enterprise.
 Bull Valley Hassayampie Gold Mining Co., Goldstrike.

Cliff Mining Co., Ophir.
 Clipper Mining Co., Tacoma.
 Copper Butte Mining Co., Marysvale.

Detroit Copper Mining Co., Detroit, via Oasis.
 Dry Canyon Consolidated Mining Co., Ophir.
 Dugway Copper Mining & Smelting Co., Dugway.
 Duluth & Utah Development Co., Stockton.

Eagle Copper Mining Co., Santaquin.
 Eureka Ophir Mine, Dry Canyon, via Stockton.

Federal Mining & Milling Co., Stateline.
 First Chance Mining & Milling Co., Ibapah.

Garfield Smelting Co., Garfield.
 Garrison-Monster Mining Co., Ibapah.
 Gethin Leroy United Mines Co., Wendover.
 Ginza Copper Co., Kelton.
 Gold Bond Mining & Milling Co., Tooele.
 Goldstrike Bonanza Mining Co., Hamburg.
 Goldstrike Consolidated Mining Co., Goldstrike.
 Goldstrike Mining & Leasing Co., Goldstrike.

- Granite Mining & Milling Co., Santaquin.
 Great Divide Mines Co., Lincoln.
 Green Mountain Mining & Milling Co., La Sal.
- Hamburg Mine, Goldstrike.**
 Hanauer Smelting Works, Salt Lake City.
 Homestake T. & C. Co., Pine Canyon.
- Ibex Gold Mining Co., Joy.**
 International Smelting Co., Tooele.
- Kentucky-Douglas Mining Co., Tooele county.**
 King Copper Mining Co., Red Butte Canyon, Salt Lake City.
- La Vore Gold Mines Co., Goldstrike.**
 Lakeview Mining Co., Promontory Point.
 Lakeview Volunteer Mining Co., Promontory Point.
 Lemhi Gold Mining Co., Baker.
 Lowland Tunnel Water & Transportation Co., Star dist.
 Lucky Boy Mining & Milling Co., Clear Creek dist., Box Elder county.
- Morgan Argentine Mining Co., Peterson.**
 National Radium Mines Co., Green River.
 Neva Mining Co., Brighton.
 New Stockton Mining Co., Stockton.
- O. K. Silver Mining & Milling Co., Indian Springs.**
 Opex Consolidated Mines Co., Robinson.
 Ophir Hill Consolidated Mining Co., Ophir.
 Ophir King Gold Mining Co., Ophir.
 Ophir Utah Mining Co., Ophir.
- Pennuva Copper Co., Promontory Point.**
 Promontory Mining Co., Promontory.
- St. Patrick Mining & Milling Co., Hughes Canyon.**
 Salt Lake Copper Co., Lucin.
 Santa Maria Gold & Copper Mining & Red. Co., Utah Hot Springs.
 Santaquin Chief Mining Co., Santaquin.
 Santaquin King Mining Co., Santaquin.
 Selma Mines Co., Knightsville.
 Silver Peak Mining Co., Pinto.
 Soffe Silver Mining Co., Erickson, via Center.
 Southern Pacific Gold & Copper Mining & Milling Co., Ogden.
 Stockton Standard Mining Co., Stockton.
 Syndicate Mining Co., Santaquin.
- Union Chief Mining Co., Santaquin.**
 United Promontory Mining Co., Promontory.
 Utah & Eastern Copper Co., Dixie.
 Utah-Reliance Mining Co., Ibapah.
- Vipont Mining Co., Ashbrook.**
- Wasatch Bonanza Mining Co., Charleston.**
 Wedge Mining & Milling Co., Marysvale.
 West Jordan Smelter, West Jordan.
 West Mercur Mining Co., Mercur.
 Western Pacific Copper Co., Ibapah.
 Western Utah Copper Co., Ibapah.
 Western Zinc Co., Promontory Point.
 Wilson Consolidated M. Co., Clifton dist., Tooele county.
 Wolf Mountain Copper Co.

VERMONT

Orange County Copper Mine, Strafford.

Pike Hill Mines, Corinth dist.

Vermont Copper Co., South Strafford.

VIRGINIA

American Rutile Co., Roseland.

Arminius Chemical Co., Inc., Mineral.

Cabin Branch Mining Co., Dumfries.

Carnegie Copper Co., Jeffress.

Crimora Manganese Corporation, Crimora.

Gooney Manor Copper Co., Inc., Front Royal.

High Top Mining Corporation, Elkton.

Holloway Mine, Virgilina.

Kay Mine Smelting Co., So. Boston.

Norfolk Smelter, West Norfolk.

Norfolk Smelting Co., West Norfolk.

Seaboard Copper Co., Virgilina.

Southern Zinc & Mining Co., Inc., Fordtown.

Sulphur Mining & Railroad Co., Mineral.

United States Manganese Co., Elkton.

United Zinc Smelting Corporation, Clarksburg.

Virginia Carolina Chemical Co., Richmond.

Virginia Copper Mine, High Hill.

Virginia Mining Co., Monarat.

Virginia Smelting Co., Norfolk.

Virginia Zinc & Chemical Corporation, Ltd.

WASHINGTON

Admiral Mining Co., Valley.

Aladdin Mining Co., Northport.

Alder Group Mining & Smelting Co., Twisp.

Alliance Mining Co., Republic.

American Reduction Co., Republic.

American Tungsten Mining Co., Springdale.

Apex Mining Co., Chesaw.

Ark Group Mining & Milling Co., Ltd., Kettle Falls.

Aurelia Crown Co., Lucerne.

Aurora Copper Mining Co., Chewelah.

Bead Lake Gold-Copper Mining Co., Newport.

Beecher Gold Mining Co., Orient.

Belcher Mining Co., Republic.

Ben Hur Leasing Co., Republic.

Bonanza Mine, Bossburg.
 Boston-American Mining Co., Monte Cristo.
 Bunker Hill Mining & Smelting Co., Reiter.
 Butte-Chewelah Mining Co., Valley.
 Chelan Consolidated Copper Co., Index.
 Chewelah Copper King Mining Co., Chewelah.
 Chewelah Grey Copper Mining Co., Chewelah.
 Columbia Copper Co., Chewelah.
 Consolidated Copper Co., Springdale.
 Copper Butte Mining Co., Orient.
 Copper Cliff Copper Mining Co., Chewelah.
 Copper Queen Mining Co., Chewelah.
 Copper World Extension Mining Co., Loomis.
 Copper World Gold Mining & Smelting Co., Loomis.
 Crescent Mining Co., Ltd., Twisp.

Deerfly Mining Co., Lucerne.
 Dutch Miller Mining & Smelting Co., Skykomish.

Eagle Peak Copper Mining Co., Longmire.
 Eclipse Consolidated Mining & Investment Co., Silverton.
 Elizabeth Gold Hill Mining Co., Summit dist.

Favorite Gold & Copper Mining Co., Nighthawk.
 First Thought Mining Co., Orient.
 Foss River Consolidated Copper Co., Everett.

Glacier Peak Mining & Smelting Co., Snohomish county.
 Grant Consolidated Copper Mining Co., Chesaw.
 Gwinn Mining Co., Meteor.

Hall Creek Mining & Milling Co., Daisy.
 Hammond Mining Co., Bellingham.
 Head Lake Gold-Copper Mining Co., Metaline.
 Hecla Copper-Silver Mining & Milling Co., Chewelah.
 Highgrade Silver & Copper Co., Chewelah.
 Holden Gold & Copper Mining Co., Lucerne.

Illinois Copper & Silver Mining Co., Keller.
 Ivanhoe Mining Co., Oroville.

June Copper Co., Chewelah.

King Mining Co., Chewelah.
 King Solomon Mine, Lucerne.
 Knob Hill Mining Co., Republic.

Lakina Copper Co., Twisp.
 Laurier Mining Co., Laurier.
 Liberty Copper Mining Co., Blue Creek.
 Little Chopaca Mining Co., Loomis.
 Lone Star Copper Mining Co., Newport.
 Loon Lake Copper Co., Loon Lake.

Manila Mining & Milling Co., Keller.
 Metaline Oriole Mining Co., Metaline.
 Methow Gold & Copper Mining Co., Winthrop.
 Mineral Hill Tunnel & Copper Mining Co., Danville.
 Mount St. Helens Consolidated Mining Co., Spirit Lake.
 Multnomah Mining, Milling & Development Co., Nespelem.

National Lead-Silver Co., Curlew.
 New Crystal Mining Co., Miles.
 New Currency Mining Co., Chewelah.

New York Seattle Copper Mining Co., Index.
 Nonpareil Consolidated Copper Co., Index.
 Norman Mines Co., Northport.
 Northport Smelting & Refining Co., Northport.
 Northwest Mines Development Co., Keller.

Orient Gold Mines, Ltd., Orient.
 Oversight Mining & Milling Co., Republic.

Puget Sound Reduction Co., Everett.

Q. S. Copper Co., Salmon River dist.

Red Mountain Mining Co., Mt. Baker dist.
 Redwood Copper Mining Co., Chewelah.
 Republic Consolidated Mines Corporation, Eureka.
 Royal Basin Mining & Milling Co., Chewelah.
 Ruby Mining Co., Nighthawk.

Security Copper Co., Chewelah.
 Sharp Mining Co., Byron E., Springdale.
 Shipper Gold Mining Co., Chesaw.
 Silver Queen Mining Co., Kettle Falls.
 Silver Trail Mining Co., Evans
 Silver Creek Mining & Milling Co., Keller.
 Seattle-Boston Copper Co., Skykomish.

Tacoma Smelting Co., Tacoma.
 Tacoma Steel Co., Darrington.
 Tenas Mining Co., Keller.
 Tillicum Development Co., Loomis.
 Togo Mining & Smelting Co., Springdale.
 Trinidad Mining & Smelting Co., Tonasket.

Union Mines Co., Union.
 United Copper Mining Co., Chewelah.
 United States Copper-Gold Mine, Chewelah.

Vulcan Mining Co., Orient.

Walla Walla Copper Mining Co., Keller.
 Washington-Iowa Copper Mining Co., Mineral.
 Washougal Gold & Copper Mining Co., Washougal.
 West Hill Mining Co., Republic.

WISCONSIN

Baraba Mining Co., Mellen.

Cleveland Mining Co., Hazel Green.

Frontier Mining Co., Benton.

Holmes Mining & Milling Co., Mellen.

Indian Mound Mining Co., Benton.

Lucky Five Mining Co., Dodgeville.

Lucky Six Mining Co., Mifflin.

McMillan Zinc Co., Platteville.

Midland Leau & Zinc Co., Platteville.

Mineral Point Zinc Co., Mineral Point.
National Zinc Separating Co., Hazel Green.
Optimo Mining Co., Linden.
Rudolph Land Co., Gordon.
St. Croix Consolidated Copper Co., Superior.
Shamrock Mining Co., Mifflin.
Tiffany Mining Co., Platteville.
Vinegar Hill Zinc Co., Platteville.
West End Mining Co., Platteville.
West Hill Mining Co., Platteville.
Wisconsin Zinc Co., Galena.

WYOMING

Acme Consolidated Gold & Copper Mining Co., Laramie.
Aetna Mining Co., Riverside.
American Fireproofing & Mining Co., South Pass dist.
American Zinc Co. of Wisconsin, Wisconsin dist.
Anchoria Copper Mining Co., Copperton.
Annie Mining Co., Jelm.
Azurite Mining Co., Dillon.
Big Five Copper Co., Arlington.
Boston & Wyoming Copper Mining Co., Esterbrook.
Continental-Morris Copper Mining Co., Encampment.
Copper Belt Mines Co., Lusk.
Copper Bottom Mining & Milling Co., Hartville dist.
Elkhart Mine, Walcott.
Elkhorn Copper Mining Co., Overland.
Emerald Mining Co., Wheatland.
Ferris Haggarty Copper Mining Co., Rudefeha.
Fremont Development Co., Shoshoni.
Haggarty Copper Mining Co., Rudefeha.
Hecla Consolidated Mines Co., Hecla.
Henley Consolidated Copper Mines, Cheyenne.
Home Run Copper Mining Co., Rudefeha.
Imperial Copper & Gold Mining Co., Encampment.
Independence Mining Co., Dillon.
Itmay Copper Mining Co., Rambler.
Jack Pot Mining & Milling Co., Encampment.
Kimball Mining Co., Centennial.
Leighton-Wyoming Mining Co., Battle Lake dist.
Lost Cabin Co., Lysite.
Maggie Murphy Copper Co., Douglas.
North Laramie Peak Copper Mining Co., Douglas.

Oshkosh-Wyoming Mining Co., Dillon.
Otega Mining Co., Hecla.

Platinum Mining & Milling Co., Holmes.
Pluto Gold & Copper Mining Co., Dillon.
Portland Consolidated Copper Co., Encampment.

Rambler Copper & Platinum Co., New Albany.

Shawnee Copper Mining Co., French Creek dist.
Snake River Consolidated Mining Co., Encampment.

United Smelters, Railway & Copper Co., Rudefeha.
Utopia Mining & Milling Co., Centennial.

Walcott Copper Mining Co., Walcott.
West Virginia-Wyoming Copper Mining Co., Rambler.
Williams Luman Mining Co., Depass.
Winona Gold-Copper Mining & Milling Co., Painter.
Wyoming Copper & Gold Mining Co., Encampment.
Wyoming Copper Mining Co., South Pass.

CANADA

Alberta

Athabasca Mining Co., Edmonton.

British Columbia

A. B. C. Metals Co.
Alaska British Columbia Metals Co.
Argo Mining & Tunnel Co., Ltd., Greenwood.
Aufas Mines, Ltd., Hope.

Babine Bonanza Mining & Milling Co., Skeena dist.
Belmont-Canadian Mines, Ltd., Surf Inlet.
Big Interior Gold Mines, Ltd., Alberni dist., Vancouver.
Black Prince Mine, Slocan City.
Bowena Copper Co., Bowen Island.
Britannia Mining & Smelting Co., Ltd., Britannia Beach.
British American Mining Co., Ltd., Texada Island.
British Columbia Copper Co., Ltd., Greenwood.
British Columbia Phoenix Co., Ltd.
Butte & Rocher De Boule Copper Co., Hazelton.

Canada Copper Corporation, Ltd.
Carmi Mine, Carmi.
Cassiar Crown Copper Co., Telkwa.
Consolidated Mining & Smelting Co. of Canada, Trail.
Copper Mountain Mining & Development Co., Quatsino.

Eureka Copper Mines, Ltd., Nelson.

Fife Mines, Ltd., Rossland.
Fitzsimmons Group, Newport.
Florence Silver Mining Co., Ainsworth.

Galena Farm Mining Co., Silverton.
General Mining, Milling & Leasing Co.
Granby Cons. Mining, Smelting & Power Co., Ltd., Phoenix.
Great Ohio Copper Mine, New Hazelton.

Gribbell Island Copper Co., Gribbell Island.

Hedley Gold Mining Co., Hedley.
Hercules Mining Co., Moresby Island.
Hobson Silver-Lead Co., Ymir.
Howe Sound Co., Britannia Beach.
Hudson Bay Zinc Co., Salmo.

Ikeda Mines, Ltd., Ikeda Bay, Queen Charlotte Is.
Iron Mask Mine, Kamloops.

Jewel-Denero Mines, Ltd., Greenwood.

Kamloops Copper Co., Kamloops.
Kamloops Mines, Ltd., Kamloops.
King Edward Mines, Ltd., Similkameen div., Osoyoos dist.
Kootenay Bonanza Mines, Ltd.

Lasqueti Island Mining Co., Ltd., Lasqueti Island.
Le Roi No. 2, Ltd., Rossland.
Little Billy Operating Co., Vananda, Texada Island.
Lucky Jim Zinc Mines, Ltd., Zincton.

McKinley Mines, Ltd., Franklin.
Minneapolis & Texada Copperite Co., Ltd., Vanada, Texada Island.
Montana Continental Development Co., Rocher de Boule.
Mother Lode Sheep Creek Mng. Co., Sheep Creek, West Kootenay dist.
Mount Sicker & B. C. Development Co., Ltd., Mt. Sicker, Vancouver Is.

New Canadian Metal Co., Riandel.
New Dominion Copper Co., Ltd., Phoenix.
Noonday Mines Co., Sandon.
Norseman Exploration Co., Capsheaf, Vanada, Texada Is.

Olalla Copper Mining & Smelting Co., Olalla.
Oregon & B. C. Mining & Development Co., Ltd., Copper Mountain.

Phoenix Mining, Smelting & Development Co., Ltd., Phoenix.
Portland Canal Tunnels, Ltd., Stewart, Portland Canal.
Ptarmigan Mines, Ltd., Bedwell Sound, Vancouver Is.

Quatsino Copper Co., Quatsino, Vancouver Island.
Queen Mines, Inc., Sheep Creek, near Salmo.

Rambler-Cariboo Mines, Ltd., McGuigan Creek, nr. Three Forks.
Red Cliff Mining Co., Stewart, Skeena dist.
Rocher de Boule Copper Co., Hazelton.
Rossland Kootenay Mining Co., Rossland.

Silver Hoard Mining Co., Ainsworth.
Silver King Mines, Ltd., Nelson.
Silver Standard Mining Co., Hazelton.
Silvered-Copper Mining Co., Omineca-Atlin dist.
Silverton Mines, Ltd., Silverton.
Similkameen Consolidated Copper Co., Yale dist.
Similkameen Mining & Smelting Co., Ltd., Princeton.
Slocan Star Mines, Ltd. (N. P. L.), Sandon.
Spokane Rocher de Boule Mining Co., New Hazelton.
Surf Inlet Gold Mines, Surf Inlet.
Surprise Mine, Sandon.
Standard Silver Lead Mining Co., Silverton.
Star Mining & Milling Co., Sandon.

Tacoma Steel Co., Van Anda Island.

Tassoo Mining & Smelting Co., Moresby Island.
Tyee Copper Co., Ltd., Ladysmith, Vancouver Island.

Utica Mines Co., Slokan dist.

Van Anda Copper & Gold Mines Co., Ltd., Van Anda.
Van Roi Mining Co., Slokan dist.
Vancouver Island Mining & Development Co., Ltd., Vancouver Island.

War Eagle Mine, Rossland.
Western Mining & Development Co., Quatsino Sound, Vancouver Island.
Wolverine Mining & Development Co., Ainsworth.

Yale Development & Construction Co., Ollala.

Manitoba

Calumet-Corbin Mines Co., Gold Lake.

Dominion Gold Mining Co., Gold Lake.

Star Lake Gold Mines, Ltd., Ingolf.

New Brunswick

Eastern Canadian Copper Corp., Goose Creek Harbor, St. Johns county.

Intercolonial Copper Co., Dorchester, Westmorland county.

Nova Scotia

Bradford Mines, Ltd., Tangier.

Cape Breton Copper Co., Ltd., Coxheath.
Cape D'Or Copper Development Co., Cape d'Or.
Cheticamp Copper Co., Ltd., Cheticamp.

Dominion Mining Co., Tangier.

Goldenville Mining Co., Goldenville.
Great Bras D'Or Mining Co., Middle River.

Lake Copper Mining Co., Ltd., Polson's Brook.
Loon Brook Mining Co., Ltd., Montague.

Scheelite Mines, Ltd. (Tungsten), Scheelite.

Tommy Burns Gold Mines, Ltd., Brookfield.
Tommy Burns Gold Mining Co., Brookfield.

Wentworth Copper Co., Ltd., Wentworth.

Ontario

Acme Gold Mines, Ltd., Tisdale Twp., Porcupine.
Adanac Silver Mines, Ltd., Coleman Twp., Cobalt.
Aladdin Cobalt, Ltd., Cobalt.
Alexo Mines, Ltd., Dundonald Twp.
Algoma Custom Smelting & Refining Co., Ltd., Thessalon.
Algonican Development Co., Haileybury.
Allie Island Copper Mine, Allie Island.
Apex Porcupine Mines, Ltd., Tisdale Twp.

Bailey Cobalt Mines, Ltd., Coleman Twp., Nipissing dist.
Beaver Auxiliary Mines Co., Elk Lake.
Beaver Consolidated Mines, Ltd., Cobalt.
Boston-Parry Sound Copper Co., Parry Sound.
British-American Nickel Corp., Sudbury.

Bruce Mines, Ltd., Bruce Mines, Algoma.
 Buffalo Mines, Ltd., Cobalt.
 Burnside Gold Mines, Ltd., Kirkland Lake.

Calumet & Algoma Mining Co., Massey, Algoma.
 Calumet & Montana Cons. Mining Co., Coleman Twp., Cobalt.
 Canadian Copper Co., Copper Cliff.
 Canadian Exploration Co., Naughton.
 Canadian Mining Corporation, Ltd., Cobalt.
 Canadian Mining & Finance Co., Ltd., Porcupine.
 Canadian Smelting & Refining Co., Orillia.
 Caribou Cobalt Mines Co., Cobalt.
 Cart Lake Silver Mines, Ltd., Cart Lake.
 Cartwright Gold Fields, Ltd., Temiskaming.
 Casey-Cobalt Mining Co., Ltd., New Liskeard.
 Casey Cobalt Silver Mining Co., Ltd., New Liskeard.
 Chambers-Ferland Mining Co., Ltd., Cobalt.
 Cobalt Comet Mines, Ltd., Coleman Twp., Temiskaming dist.
 Cobalt Reduction Co., Ltd., Cobalt.
 Columbia Copper Mining Co., Parry Sound.
 Coniagas Mines, Ltd., Cobalt.
 Coniagas Reduction Co., Ltd., Thorold.
 Consolidated Copper Co. of Parry Sound, Parry Sound.
 Cordova Mines, Ltd., Belmont Twp., Peterboro county.
 Crown Reserve Mining Co., Ltd., Cobalt.

Deloro Mining & Reduction Co., Deloro.
 Dobie Mines, Ltd., Tisdale Twp.
 Dome Extension Mining Co., So. Porcupine.
 Dome Lake Mining & Milling Co., Ltd., Tisdale Twp.
 Dome Mines, Ltd., Tisdale Twp.
 Dominion Nickel-Copper Co., Ltd., Sudbury dist.
 Dominion Reduction Co., Ltd., Cobalt.
 Drummond Fraction, Cobalt.

Fidelity Copper Co., Sturgeon Falls.
 Foster Cobalt Mining Co., Glen Lake.

Garson Mine (Mond Nickel Co.)
 Genesee Mining Co., Cobalt.
 Glen Lake Cobalt Mines, Ltd., Glen Lake.
 Grey's Siding Development Co., Ltd., Grey's Siding.

Hermina Mining Co., Massey.
 Hollinger Consolidated Mines, Ltd., Timmons.
 Hollinger Gold Mines, Ltd., Tisdale Twp., Porcupine.
 Hudson Bay Mines, Ltd., Cobalt.
 Huronian Belt Co., Ltd., Northern Ontario.

International Nickel Co., Copper Cliff.

Kerr Lake Mining Co., Ltd., Cobalt.
 King Edward Mine, Rose Twp.
 Kirkland Lake Exploration, Ltd., Kirkland Lake dist.
 Kirkland Lake Proprietary, Ltd.
 Kitchigami Gold Development Co., Morissette Twp., Kirkland dist.

LaBelle Kirkland Mines, Ltd., Goodfish Lake, Kirkland Lake dist.
 LaMine D'Or Huronia, Ltd., McVittie & Gauthier Twp., Swastika dist.
 LaRosa Consolidated Mines Co., Nipissing dist., Cobalt.
 Lake Shore Mines, Ltd., Kirkland Lake dist.

Massey Station Mining Co., Ltd., Massey.
 McIntyre Extension Mines, Schumacher, Porcupine.
 McIntyre-Jupiter Mines, Ltd., Schumacher.
 McIntyre Porcupine Mines, Ltd., Schumacher.
 McKinley-Darragh-Savage Mines, Ltd., Cobalt.
 Mercer Silver Mines, Ltd., Cobalt.
 Metals Chemical Co., Welland.
 Meteor Silver Mining Co., Ltd., Cobalt.
 Miller Lake O'Brien Mine, Gowanda.
 Millerton Gold Mines, Ltd., Tisdale Twp.
 Mining Corporation of Canada, Ltd., Cobalt.
 Mond Nickel Co., Ltd., Victoria Mines, Algoma.

New Ray Mines, Ltd., Porcupine.
 Nipissing Mines Co., Cobalt.
 North Thompson (Associated) Gold Mines, Ltd., Tisdale Twp., Cobalt.
 Northern Customs Concentrator, Ltd., Cobalt.
 Northern Pyrites Co., North Pines.

O'Brien Mining Co., Cobalt.
 Ore Chimney Mining Co., Ltd., Northbrook, Frontenac Co.
 Ore Extension Mining Co., Ltd., Vineland.

Parry Sound Copper Mining Co., Ltd., Parry Sound.
 Penn Canadian Mines, Ltd., Cobalt dist.
 Peterson Lake Silver Cobalt Mng. Co., Ltd., Peterson Lake, Cobalt.
 Pittsburg & Lorrain Syndicate, South Lorrain.
 Porcupine Crown Gold Mining Co., Porcupine.
 Porcupine Excelsior Mining Co., Ltd., Shaw Twp., Nipissing dist.
 Porcupine Mines Syndicate, Tisdale Twp., Porcupine dist.
 Porcupine Pet Gold Mines, Ltd., Porcupine.
 Porcupine Premier Gold Mng. Co., Ltd., Whitney & Deloro Twps.,
 Porcupine.
 Porcupine Vipond Mines, Ltd., Porcupine dist.
 Preston East Dome Mines, Ltd., Tisdale Twp., Porcupine.

R. A. P. Syndicate, Boston Creek, Cobalt.
 Rapp Mining, Development & Prospecting Co., Boston Creek, Cobalt.
 Right of Way Mines, Ltd., Cobalt.

Schumacher Gold Mines, Ltd., Schumacher.
 Seneca Superior Silver Mines, Ltd., Cobalt.
 Shamrock Consolidated Mines, Ltd., Cobalt.
 Silver Leaf Mining Co., Ltd., Cobalt.
 Superior Copper Co., Ltd., Algoma.
 Sylvanite Gold Mines, Ltd., Kirkland Lake.

Teck-Hughes Gold Mines, Ltd., Swastika.
 Temiscaming & Hudson Bay Mining Co., Ltd., New Liskeard.
 Temiskaming Mining Co., Ltd., Cobalt and Porcupine.
 Tip Top Mine, Kashabowie.
 Tisdale Gold Mining Co., Ltd. (Dobie Mines, Ltd.)
 Tough Oaks Gold Mines, Ltd., Kirkland Lake.
 Townsite Extension, Cobalt.
 Trethewey Silver Cobalt Mine, Ltd., Cobalt.
 Two Lakes Copper Mining Co., Ltd., Sowerby, Algoma.

University Mines, Ltd., (LaRose Consolidated Mines Co.)

Vipond Mine, Porcupine.

West Dome Consolidated Mines, Tisdale Twp., Porcupine.
 Wettlaufer-Lorrain Silver Mines, Ltd., South Lorrain.

Quebec

Albert Copper Co., Capelton.
Ascot Mining Co., Ascot Twp.

East Canada Smelting Co., Ltd., Weedon.
Eustis Mining Co., Eustis.

Norton, A. O., Suffield.

Weedon Mining Co., Ltd., Weedon.

Saskatchewan

Beaver Lake Gold Mining Co., Prince Albert.

Yukon

Atlas Mining Co., White Horse.

Grafter Copper Mining Co., White Horse.

Yukon Copper Co., Ltd., White Horse.

NEWFOUNDLAND

Anglo-Newfoundland Development Co., Grand Falls.

Buchan's Mine, Millerton.

Great Northern Copper Co., Twillingate.

Pilley's Island Pyrites Co., Betts Cove.

Reid-Newfoundland Co., New Bay.

Terra Nova Properties, Ltd., Grand Falls.

Tilt Cove Copper Co., Ltd., Tilt Cove.

Western Copper Co., Ltd., York Harbour, Bay of Islands.

York Harbour Mine, York Harbour, Bay of Islands.

MEXICO**Chihuahua**

Almoloya Mining Co., Baca.
Alvarado Mining & Milling Co., Parral.
American Exploration & Mining Co., Terrazas.
Arados Copper Co., Chihuahua.
Aurora y Anexas, S. A., Cia. Min. La, Coyame.

Batopilas Mining Co., Batopilas.
Buena Tierra Mining Co., Ltd., Chihuahua.

Chihuahua-Esperanza Gold Mining Co., Chihuahua.
Chihuahua Mining Co., Chihuahua.
Consuelo Mining, Milling & Power Co., Madera.

Descubridor Mining & Development Co., Chihuahua.
Dolores Mines Co., Madera.

El Potosi Mining Co., Sta. Eulalia dist.
El Rayo Mines Co., Sta. Barbara.

Granadena Mining Co., Sta. Barbara, Hidalgo.

Ignacio Rodriguez Ramos, S. A.; Cia. Min., Chihuahua.
International Gold & Copper Mining Co., Guaynopa.

Las Vigas Mining Co., San Sostenes, Iturbide.
Lluvia Del Oro Mining Co., Chihuahua.

Montezuma Lead Co., Chihuahua.

Parcionera Consolidated Mining Co., Sta. Eulalia.

Rio Plata Mining Co., Guazapares.
Rio Tinto Copper Co., Terrazas.

San Francisco Mines of Mexico, Ltd., Parral.
San Toy Mining Co., Sta. Eulalia.
Sta. Maria Mexico Mining Association, Parral.
Sierra Mining Co., S. A., Ocampo.

Guanajuato

Caridad; Cia. Min. Silao.
Carmen-Guanajuato Gold Mining Co., Guanajuato.

Guanajuato Consolidated M. & M. Co., Guanajuato.
Guanajuato Development Co., Guanajuato.
Guanajuato Reduction & Mines Co., Guanajuato.

Mineral Development Co., Guanajuato.
Mineral Development Co., Guanajuato.

Peregrina Mining & Milling Co., Guanajuato.
Pinguico Mines Co., Guanajuato.
Proprietary Mines Co. of America, Guanajuato.
Providencia Mining & Milling Co., Guanajuato.

San Luis; Cia. Ben., San Luis de la Paz.

Sonora-Cananea

Abundancia Mining Co., S. A.

Boston Sonora Mines Co.

Calumet-Sonora Mining & Milling Co.
Cananea Consolidated Copper Co., S. A.
Cananea-Eastern Mining Co.
Carnegie Lead & Zinc Co.

Democrata Cananea Sonora Copper Co.
Dolores Mining & Development Co.
Duluth-Sonora Copper Co.

Eastern Cananea Development Co.
Elenita Development Co.
Empire Mining Co.

Fay Cananea Copper Co.

Greene Cananea Copper Co.
Greene Consolidated Copper Co.
Guerrero Mining Co.

Juanita Mining Co., S. A.

La Cobriza De Cobre.

Mexican Metals Co.

Picacho Mining Co. (Cia. Min. de Picacho).

San Pedro Copper Co., S. A.
Superior Bonanza Mining Co.

Victor Mining & Smelting Co.

Sonora

American-Mexican Sm. & Ref. Co., Fundicion.

Anita Copper Mines Co., S. A., Fundicion.

Arizona Mining & Trading Co., Nacozari.

Arnold Mining Co., Sta. Cruz.

Bonanza Mining Co., Imuris.
Bufa Mng., Mlg. & Sm. Co., La Bufa.

Cadena De Cobre Mining Co., Sahuaripa.
Caracahui Mountain Copper Co., Ltd., Llano.
Carman Consolidated Copper Co., Arizpe.
Chicago Exploration & Development Co., Mina, Mexico.
Cieneguita Cons. Mines, Sahuaripa.
Cobriza y Anexas; Cia. Min. La, Alamos.
Consolidated Sonora Mines Co., Fronteras.
Copete Consolidated Copper Co., El Copete.
Copete Mining Co., El Copete.
Creston Colorado Co., La Colorada.
Cubana Consolidated Copper Co., Arizpe.

Dolores Mines Co. (Mines Co. of America.)
Duluth-Moctezuma Mining Co., Moctezuma dist.

El Globo Mining & Milling Co., Nacozari.
El Triunfo Consolidated Mining Co., Bacoachi, Arizpe.
El Van Copper Co., S. A., Nacozari.
Esmeralda Copper Co., Llano, Magdalena.
Esquer y Ca; Alex., Baroyeca, Alamos.

Garretson Sahuaripa Co., Calera, Sahuaripa.

Harris Copper Co., Nacozari.
Hermosillo Copper Co., Hermosillo.

International Copper Ore Corporation, Noria.
International Mines Development Co., Sonora.

Josefina Mine, Santa Cruz.

La Cobriza Mining Co., Noria.
La Dura Mill & Mining Co., La Dura.
La Expositon Mining Co., Cumpas.
La Reina Union Mng. & Ref. Co., San Javier, Hermosillo.
La Union Cons. Copper Co., Fronteras.
Lucky Tiger-Combination Gold Mng. Co., Esqueda.

Maria Mining Co., Arizpe.
Manhattan Development Co., Sta. Cruz.
Manhattan Exploration Co., Hermosillo.
Mazatan Copper & Gold Mng. Co., La Colorada.
Metal de Cobre; Cia. Min., San Antonio de la Huerta, Ures.
Mexico Mng., Ref. & Expl'n Co., Hermosillo.

Mina Mexico Co., Tonichi.
 Minneapolis Copper Co., Cumpas.
 Moctezuma Copper Co., Nacozari.

Nacozari Consolidated Copper Co., Pilares de Nacozari.
 Northern Sierra Madre Mining Co., Soyopa.

Pacific Sm. & Mng. Co., Fundicion.
 Phelps, Dodge & Co.
 Piedras Verdes y Anexas, Cia. Min., Alamos.
 Plata-Fina Mng. & Dev. Co., Alamos.
 Promontorio Consolidated Mining Co., Lampazos, Moctezuma.

Quintera Mining Co., Ltd., Alamos dist.

Richfield Copper Co., Ures dist.

San Antonio Copper Co., San Antonio de la Huerta.
 San Xavier Copper Co., San Xavier, Hermosillo.
 Silver Seal Mining Co., Pilares de Teras.
 Sonora Central Mines Co., Alamos.
 Sonora Chief Mining Co., Suaqui de Batuc.
 Sonora Copper Mining Co., Arizpe dist.
 Sonora Copper Smelting Co., Noria.
 Sonora Development Co., Nacozari.
 Sonora Exploration Co., Estacion Yzabel.
 Sonora Mining & Development Co., San Antonio de la Huerta.
 Sonora-Pacific Mining Co., Noria.

Tecolote Copper Co., Tecolote.
 Tharsis-York Co., Nacozari.
 Tigre Mining Co., S. A., Esqueda.
 Transvaal Mining Co. of Utah, Cumpas.
 Trenton-Sonora Mining Co., La Calera.

United Mexican Mines, Cumpas.

Washington Mines Development Co., Arizpe dist.

Yaqui Canyon Copper Co., Suaqui de Batuc, Ures.
 Yaqui Copper Co., Suaqui de Batuc, Ures.
 Yaqui Mining Co., S. A., Fundicion.
 Yaqui Sm. & Ref. Co., S. A., San Antonio de la Huerta.

Zambona Development Co., Minas Nuevas, Alamos.

Miscellaneous Districts

Agula Amalgamated Mining Co., Cinco Minas.
 Ajuichitlan Mining & Milling Co., Toliman dist., Queretero.
 Almoloya y Anexas, Cia de., Ameca, Jalisco.
 Amajac Mines Co., Guadalajara, Jalisco.
 Amazon Gold Co., Chacala, Durango.
 American Smelters Securities Co.
 American Smelting & Refining Co.
 Antimony Corporation, Zimapan, Hidalgo.
 Ario Copper Co., Ario de Rosales, Michoacan.
 Armendaiz-Sucesores, Francisco, Cerralvo, Nuevo Leon.
 Asientos Mining Co., Asientos, Aguascalientes.
 Avino Mines, Ltd., Minas, Durango.
 Ayutla Smelter, Ayutla, Jalisco.

Baca Ortiz, Cia Restauradora De. Tenehuanes, Durango.
 Boleo, Compagnie Du. Santa Rosalia, Baja, Calif.
 Buena Vista Gold Mining Co. (Mines Co. of America).

- Carambola; Mina, Indé, Durango.
 Carmen Copper Co., Mineral del Carmen, El Oro, Durango.
 Castrejon; Hermanos, Huacaria, Ario, Michoacan.
 Chalchihuites Mining Co., S. A., Chalchihuites, Zacatecas.
 Choix Consolidated Mining Co., Ltd., Choix, Sinaloa.
 Coahuila Mining & Smelting Co., Ltd., Jimulco, Coahuila.
 Cobre; Compania Minera El Jungpeo, Michoacan.
 Continental Mining Co., Monclova, Coahuila.
 Cortez Associated Mines, Jacala, Hidalgo.
 Cusi Consolidated Mining Co., Cusihiuiriachic.
- El Eden; Cia Min. y Ben., El Eden, Zacatecas.
 El Favor Mining Co., El Monte, Jalisco.
 El Majistral Copper Co., Choix Fuerte, Sinaloa.
 El Orito Mining & Milling Co., Velardena, Durango.
 El Oro Mining & Railway Co., Ltd., El Oro.
 El Rayo Mines Co. (Mines Co. of America).
 Esmeralda Copper M. & S. Co., Santa Catarina del Norte, Baja Calif.
 Esmeralda; Negociacion Minera, Chalchihuites, Zacatecas.
 Esperanza, Ltd., El Oro.
 Esperanza Mining Co., El Oro.
 Esperanza Mining Co., Ensenada, Baja Calif.
 Esperanzas Mining Co., Estacion Symon, Durango.
 Evangelina Copper Mining Co., Sta. Catarina del Norte.
 Exploration Co., Ltd.
 Exploration Co. of England & Mexico, Ltd.
- Fortuna, S. A.; Cia. Min. La. Tepezalá, Aguascalientes.
- Guanacevi Tunnel Co., Guanacevi, Durango.
 Guggenheim Exploration Co.
 Gulf Copper Co., Angeles Bay, Gulf of Calif.
- Hidalgo Copper Mining & Smelting Co., Zimapan, Hidalgo.
- Inguaran; Cia D', Inguarán, Michoacan.
- Jimulco Mining Co., Otto, Coahuila.
- Keystone Mining Co., Tapalpa, Jalisco.
- La Fortuna Mining Co., Octolan, Oaxaca.
 La Regina Mining Co., San Martin, Jalisco.
 Leonora y Huerta; Minas, Villanueva, Zacatecas.
 Lucia Mining Co., Panuco de Coronado, Durango.
 Los Platanos Mining Co., Choix, Fuerte, Sinaloa.
- Magistral, S. A.; Neg. Min. Del, Zacatecas, Zacatecas.
 Magistral-Ameca Copper Co., Ameca, Jalisco.
 Mascota Copper Co., Ameca, Jalisco.
 Mazapil Copper Co., Ltd., Saltillo, Coahuila.
 Mexicana; Cia. Metalurgica, Sierra Mojada, Coahuila.
 Mexican Lead Co., Monterey.
 Michoacan Railway & Mining Co., Ltd., Anganguero, Michoacan.
 Mines Company of America.
 Molodoa Mining Co., Ltd., Hostotipaquillo, Jalisco.
 Monterey Smelting & Refining Co., Monterey, Nuevo Leon.
- National Metallurgical Co., Matehuala, San Luis Potosi.
 National Mines & Smelters Co., Magistral, Durango.
 National Smelting Co., Chalchihuites, Zacatecas.
- Pacific Copper Co., Ltd., Petatlan, Guerrero.

Pacific Copper & Pyrites Co., Petatlan, Guerrero.
 Penoles Mining Co., Mapimi, Durango.
 Pintado Consolidated Copper Co., Sta. Rosa, Guadalupe.
 Protectora y Anexas; Cia. Min. La, San Salvador, Zacatecas.
 Puebla Smelting & Ref. Co., Majistral dist.

Real Del Monte y Pachuca, Pachuca, Hidalgo.
 Rio Grande & Dolores Silver Mng. Co., Ltd., La Union, Guerrero.

Saltillo, S. A.; Cia. Min. Del, Mazapil, Zacatecas.
 San Bernabe y Anexas; Cia. Min. Zacatecas.
 San Felipe Mining Co., Hostotipaquillo, Jalisco.
 San Juan Reduction Co., San Antonia, Baja Calif.
 San Luis Mining Co., Panuco de Coronado, Durango.
 San Martin y Anexas, S. A., Cia. Min., San Martin de los Cansecos, Oaxaca.
 San Mateo, S. A., Cia. Min., Velardena, Durango.
 San Roberto Mng. Co., Zacatecas, Zacatecas.
 Sta. Gertrudis Co., Ltd., Pachuca dist., Hidalgo.
 Sta. Maria de la Paz y Anexas, S. A., C. M. B., Tejupilco.
 Sta. Maria de la Paz; Negoc. Min., Matehuala, San Luis Potosi.
 Sombreretillo Mining Co., S. A.

Tajo; Minas Del, Rosario, Sinaloa.
 Teziutlan Copper Co., Teziutlan, Puebla.
 Teziutlan Copper Mining & Smelting Co., Teziutlan, Puebla.
 Tiro General de Charcas Mine, Charcas, San Luis Potosi.
 Tiro General; Cia. Min. Del, San Luis Potosi.
 Torreon, S. A., Cia. Metalurgica De, Torreon, Coahuila.
 Tres Señores Mining Co., San Pedro, Zacatecas.

U. S. Smelting, Ref. & Mining Co.

Volcancillos Mines, Autlan, Jalisco.

West Coast Mng. & Sm. Co., Mocorito, Sinaloa.
 West Mexico Mines Co., San Antonio, Baja Calif.

ASIA

China

Wah-Chang Mining & Smelting Co.

Korea

Chosen Gold Mines, Ltd., Chung An, Chosen.

Oriental Consolidated Mining Co., Unsan.

Seoul Mining Co., Hol-Kol, Kwang-Hai.

CENTRAL AMERICA

Abangarez Gold Fields of Costa Rica, Abangarez, Costa Rica.

Butters Salvador Mines, Ltd., Santa Rosa, Salvador.
 Butters Divisadero Co., Divisadero, Salvador.

Eden Mining Co., Bluefields, Nicaragua.

New York & Honduras Rosario Mining Co., San Juancito, Honduras.

Tunkey Mining Co., Nicaragua.

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Andes Copper Co., Potrerillas.
Andes Copper Mining Co., Potrerillas.

Braden Copper Co., Rancagua.
Braden Copper Mines Co., Rancagua.

Chile Copper Co., Chuquicamata.
Chile Exploration Co., Chuquicamata.

Peru

Cerro de Pasco Copper Corporation, Cerro de Pasco.
Cerro de Pasco Mining Co., Cerro de Pasco.

Morococha Mining Co., Morococha.

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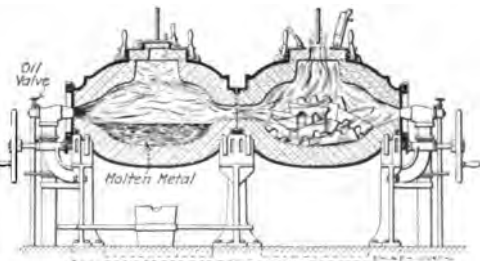
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CHAS. P. SANDS, Sec. and Treas. - New York, 233 Broadway

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